United States Nuclear Regulatory Commission
Office of Public Affairs
Washington, DC 20555
Phone 301-415-8200 Fax 301-415-2234
Internet:opa@nrc.gov

No. s-96-20 October 21, 1996

"NUCLEAR REGULATION IN THE UNITED STATES: CHALLENGES AND DIRECTION-SETTING ACTIONS"

BY

DR. SHIRLEY ANN JACKSON, CHAIRMAN
U.S. NUCLEAR REGULATORY COMMISSION

BEFORE THE

CONSEJO DE SEGURIDAD NUCLEAR
MADRID, SPAIN
SEPTEMBER 20, 1996

I. INTRODUCTION

Buenas Tardes. Estoy muy contenta de estar con ustedes.

Good morning. I very much appreciate the invitation to address this meeting of the Consejo de Seguridad Nuclear. I am delighted to have this opportunity to discuss with you the challenges to, and the future direction of, nuclear regulatory policy in the United States.

Our nuclear regulatory policy is evolving in response to external, governmental, technological, and other developments. While not all nations with nuclear programs face the same issues at the same time, there is enough overlap from one nation to another that it may be useful to describe the challenges facing the U.S. Nuclear Regulatory Commission (NRC) today, the ways in which we are seeking to address them, and the directions in which nuclear regulatory policy is evolving. The challenges that the NRC faces today may

PRO1
011

well be those which other nations will confront shortly -- if they are not doing so now.

In fact, I realize that you have your challenges here. However, in reviewing the 1996 data on worldwide nuclear power operations, I note that your Garona plant is among the top eight nuclear power plants in the world, as rated by capacity factor (99.01) -- followed closely by your Cofrentes plant (97.83). I congratulate you on those successes.

In addressing the question of a vision for the NRC, I am sometimes asked whether it is possible to have a vision for the agency, given that no new nuclear plants are being built in the U.S., and none is on the immediate horizon. The answer, of course, is yes, because licensing of nuclear power plants is only a part of the job of the NRC -- an important part, to be sure, because safety must be built into nuclear plants from the beginning -- but, nevertheless, it is just one part. The task of the nuclear regulator is to ensure not only that plants are designed and constructed safely, but also that they are operated safely throughout an operating life measured in decades; that they are properly maintained as they age; and that, when the time comes to retire them from service, they are decommissioned safely.

Therefore, from an operational and managerial point of view my focus as Chairman of the NRC has been to reaffirm our fundamental health, safety and environmental protection mission in the use of nuclear materials, to enhance our regulatory effectiveness, and to position the NRC for change. These three elements are woven throughout my remarks today.

In the United States today, numerous challenges face the nuclear power industry and its regulators. Domestically, these include: (1) economic constraints and the restructuring of the electric utility industry in response to competitive pressures, due to market and regulatory forces; (2) the evolving role of government in American life; and (3) the special challenges posed by a maturing nuclear power industry. There is, in addition, the possibility of potential new elements of the NRC mission. There also are a number of international issues confronting us. I would like to discuss each of these.

II. DOMESTIC CHALLENGES

ECONOMIC CONSTRAINTS

The U.S. electric utility industry faces substantial change that will inevitably affect its business practices. At present, the industry is restructuring in an effort to remain competitive, while lowering electric rates to consumers, in response to Federal and state regulatory initiatives. One concern is that economic pressures might cause electric utilities to cut costs at the expense of maintenance and safety upgrades. In fact, during the 1990's, safety performance, reliability, and availability for U.S. power reactors have been good, and generally continue to improve, albeit slowly. This is demonstrated by the key operational safety indicators monitored by the NRC. This improved management of operational safety has been accompanied by

decreases in average plant operation and maintenance costs, and increased plant availability. However, the nuclear power industry could find it challenging to maintain a proper focus on safety if good performance were to be taken for granted. We all know that creating and maintaining a true safety culture means resisting the temptation to become complacent in response to sustained success.

Therefore, as the business environment changes, the NRC must ensure that nuclear electric generators continue to maintain high safety standards, with sufficient resources devoted to nuclear operations, and with decommissioning funding secure. To help ensure this, I have asked the NRC staff to analyze this changing business environment carefully to determine whether our current regulatory requirements are satisfactory. The staff has proposed that the Commission initiate a rulemaking to provide adequate assurance of decommissioning funds for those power reactor licensees which are no longer economically regulated. We also are reviewing reportability requirements on the status of decommissioning funds, and strengthening our financial reviews of utility reorganizations.

ROLE OF GOVERNMENT

For some time, there has been public debate in the United States over the proper role of government in American life, with many Americans believing that the government has become too large, expensive, and intrusive. Public concerns about the size and cost of government, coupled with efforts to reduce the Federal budget deficit, have resulted in reduced funding for all government agencies, including the NRC. Like many other agencies, we are having to carry out our responsibility to assure adequate protection of public health and safety, and the environment, with diminished resources. This tighter fiscal environment requires us to prioritize our programs, and to make some difficult choices about where the increasingly scarce resources should be directed.

At the same time, the NRC may be asked to assume new duties. An advisory committee was formed in 1994 by the U.S. Department of Energy (DOE) to examine and to make recommendations on external regulation of DOE facilities, including its national laboratories and weapons plants. The Advisory Committee recommended that DOE be regulated by an external regulator. NRC is one of the organizations that is being considered for such external regulation. If full responsibility for such DOE activities is assigned to the NRC, it would add significantly to our current nuclear regulatory responsibilities requiring agency restructuring, and significant additional resources. Such a step also would require Congressional approval.

REGULATING A MATURING INDUSTRY

Reactor Aging

One of the most obvious manifestations of the maturation of the nuclear power industry is that plants have been in operation long enough for reactor aging

to become a major issue both for the NRC and the industry it regulates. Aging affects all plant structures, systems, and components to varying degrees, and it can affect operations and safety, if not appropriately managed. The NRC believes that a "risk-informed, performance-based" approach is an important step in ensuring that licensees continue to focus on safety-important plant equipment. The Maintenance Rule which became effective July 10, 1996, incorporates this approach. Licensees are required to have maintenance programs based on a risk-ranking of structures, systems, and components for their specific plants, and performance monitoring based on pre-established goals. Through inspection, the NRC is monitoring performance against each licensee's program.

Even with the implementation of the Maintenance Rule, we must examine the standards and operating procedures imposed on critical components to assure ourselves and the public that an adequate safety margin is being maintained. Two specific aging problems of great importance are reactor pressure vessel embrittlement and steam generator tube degradation. Some U.S. reactor pressure vessels may approach pressurized thermal shock (PTS) screening criteria before the end of their licensed terms. If so, licensees will have to perform plant specific analysis, mitigate the embrittlement, or shut down their reactors. To address steam generator tube degradation, the NRC is considering a generic regulatory approach for dealing with steam generator tube degradation, with a view to reducing plant-specific regulatory decisions, while ensuring defense- in-depth through a balance of preventive and mitigative measures. In the end, however, many plants may have to replace their steam generators because of an inability to accurately characterize and mitigate steam generator tube degradation mechanisms. Indeed, a number have made such replacements already. If not adequately addressed, both of these aging phenomena can cause plants to be shut down before the end of their 40-year license terms, as was the case with Yankee Atomic Electric Company's Yankee Rowe and Portland General Electric Company's Trojan facilities.

Waste Storage and Disposal

The continued operation of many nuclear plants over a period of decades has meant a steadily mounting quantity of radioactive waste and spent fuel needing storage and disposal. The need to address and resolve this problem remains critically important, in the U.S. and elsewhere.

The NRC believes, based on what we know today, that a deep geologic repository is a technically feasible solution to the problem of permanently disposing of spent fuel and other high-level radioactive waste in the United States. The responsibility for constructing and operating such a facility rests with the U.S. Department of Energy; licensing and regulating it is the responsibility of the NRC.

The delays in developing permanent storage and disposal facilities, coupled with diminished space in spent fuel pools, have caused many utilities to turn to dry cask storage for spent reactor fuel. NRC rules provide for site-specific licenses, and at reactor sites, generic approvals of dry cask designs, which allow a nuclear utility to purchase and use approved casks without the need for site-specific licensing action. Several such designs

have already been approved, and the NRC's approach, when challenged, has been sustained by the U.S. courts.

The attractiveness of dry cask storage as an interim solution to the spent fuel storage problem, coupled with uncertainties in the repository program, has led to interest in the development of a centralized interim storage facility for the United States. Legislation to that effect has been passed by the U.S. Senate, but faces an uncertain future. The NRC believes that any legislation should provide for an integrated high-level waste management program, with three components: interim on-site storage, centralized interim off-site storage, and deep geologic disposal of high-level radioactive waste, primarily spent fuel. We are examining the NRC's existing licensing capabilities and staff resources, should we be called upon to license an interim centralized storage facility. It is important that statutory clarity on the direction of the U.S. high-level waste program be established as soon as possible, so that the NRC and electric utilities (with nuclear facilities) can plan prudently.

While on the subject of radioactive waste, let me touch briefly on low-level radioactive waste disposal, which remains a major issue in the U.S. It is my understanding that Spain has made significant advances in this area with the operation of its state-of-the-art low-level waste (LLW) disposal facility at El Cabril.

In the Low-Level Radioactive Waste Policy Act of 1980 and its 1985 amendments, the responsibility for identifying sites and developing disposal facilities in the U.S. was given to the individual States. This authorized them to enter into compacts for the establishment and operation of regional disposal facilities for LLW. The NRC or, as appropriate, the 29 "Agreement States" (that is, states which have signed agreements with the NRC to regulate the use of radioactive material within their borders) are responsible for licensing these facilities. It currently appears that most, if not all, LLW disposal facilities will be licensed by Agreement States. Nevertheless, the NRC also must maintain some level of licensing capability, in case we are called upon to license a low-level radioactive waste disposal facility.

III. INTERNATIONAL CHALLENGES

NUCLEAR SAFETY AND SECURITY

Internationally, it is important that the nations of the world share their collective policy, technological, operational, and governmental experiences, to help keep the risks of nuclear accidents to acceptable levels in all countries. The NRC regards this part of our role as extremely important. Much of our focus in the past five years has been on the new nations formed in the aftermath of the breakup of the Soviet Union. Not only have these nations inherited Soviet-built reactors, they also may have limited experience with the concept of independent regulatory bodies, capable of shutting down nuclear power plants when safety concerns warrant that step. World wide, the NRC has provided assistance to a number of nations -- some with existing nuclear

programs, and others, particularly in Asia, which are studying their feasibility -- in establishing and strengthening regulatory bodies.

A major challenge in the international arena is safeguarding fissile materials. Every country with a nuclear program must have the means to prevent theft or misuse of dangerous materials through effective safeguards, including materials protection, control and accountability (MPC&A) programs, implemented through a strong and effective regulatory system. Various agencies of the U.S. government, including the NRC, are working closely with their counterpart organizations in Central and Eastern Europe to guard against such diversions, by assisting in the development of effective regulatory and safeguards programs.

NUCLEAR REGULATORY RESEARCH

A long-standing NRC international cooperative activity is regulatory research -- an area likely to assume even greater significance in the future. The NRC has over 60 research agreements, with organizations in more than 20 countries, including Spain. This cooperative approach not only makes good economic sense -- through the pooling of increasingly scarce resources -- but recognizes that no country or agency has a monopoly on good ideas. A diversity of perspectives and viewpoints on complex technical issues can only improve our understanding of how best to assure protection of public health and safety. We have to be certain that the focus and the results of such work continue to enhance nuclear safety and provide a means to leverage scarce research resources. We are working to re-focus and prioritize our various cooperative research agreements.

IV. RESPONDING TO THE CHALLENGES: THE U.S. PICTURE

I have described today some of the challenges I see facing nuclear regulators in the U.S. and internationally. I now would like to discuss some of the ways I envision that these challenges are and can be addressed -- in the U.S., by the NRC, and, internationally, by the world community.

STRATEGIC ASSESSMENT AND REBASELINING

To position the NRC to effectively meet the challenges we face and to intelligently guide our activities and decision-making in the future, last year, I initiated a strategic assessment and rebaselining at the NRC for domestic and international activities. The first phase of the initiative, the "strategic assessment," involved reviewing, categorizing and examining the sources of the mandates that make up our regulatory mission -- statutes, Executive Branch directives, and Commission decisions. This phase identified key strategic and direction-setting issues to be addressed by the Commission. This will lead to a new NRC strategic plan and performance plan. The subsequent rebaselining and any agency-wide changes needed will derive from these plans, and will reflect our programmatic needs and their required resource levels.

PROBABILISTIC RISK ANALYSIS (PRA)

In regulating a mature nuclear power industry in the U.S., "risk-informed, performance-based regulation" uses Probabilistic Risk Analysis (PRA) as a tool. This technique allows the NRC to focus on the most safety-significant aspects of reactor operations and other licensee activities, while maintaining the principles of defense-in-depth. Properly applied, it tends to relieve unnecessary regulatory burdens by focusing on those aspects of nuclear operations that have the greatest safety significance. At the same time, however, it also may reveal vulnerabilities which could result in new requirements. What is important is that a risk-informed, performance-based approach allows a sharpening of focus and a targeting of attention and resources in a way that should help the regulator, the industries we regulate, and the public.

To foster consistency in the use of PRA in NRC decision-making, the Commission in 1995 issued a PRA policy statement and related implementation plan. The NRC staff has been given the task of developing a basic structure for a risk-informed, performance-based regulatory framework, including standards development, a Standard Review Plan, and changes in the regulatory guidance documents-on an expedited basis.

REGULATORY ISSUES

Review of Regulations

The NRC has been engaged in a reexamination of its regulations for a few years, with emphasis added by a government-wide initiative of the Clinton Administration -- the National Performance Review. The objective of this effort for the NRC can be summed up in the phrase "regulatory effectiveness." To achieve this goal, the NRC is currently looking not only at whether a particular regulation or set of regulations is necessary, but also considering the ease of its implementation, its consistency with other applicable statutes and regulations, its fairness, its cost-effectiveness, and its place within the overall regulatory program. Efficiency and the use of risk insights within a performance-based framework, are also important components of regulatory effectiveness.

The NRC staff also has been asked to examine closely those regulations for which we have granted numerous exemptions. It seems reasonable that when exemptions from a particular regulation are routinely requested, at least, it must be asked whether the regulation needs amendment, or whether licensee performance needs improvement. We already have amended our regulation pertaining to containment leakage testing. We are considering amending other regulations as well.

Design Bases

In maintaining and improving their facilities, our nuclear power plant licensees make continual changes to their plant systems, structures and

components, procedures and other administrative controls. It is important that the as-built plant accurately reflects, and is reflected in, the plant design basis, and that plant changes do not erode or compromise safety margins of risk-significant systems. The Maintenance Rule aids in helping to ensure this, but it, also, is dependent upon an accurate design basis.

Therefore, the NRC is giving increased focus to design basis control, especially as embodied in the Final Safety Analysis Report (FSAR). The NRC uses the FSAR when evaluating license amendment requests and other issues at particular facilities. The accuracy of the FSAR has a direct impact on the accuracy of recurring reviews and safety analyses performed by the NRC staff. NRC resident inspectors continue to use the FSAR as a baseline when conducting their routine monthly inspections. Headquarters inspection teams are focusing on FSAR content during their inspections.

The NRC staff is returning to an increased use of inspections based on the safety system function format. This in-depth vertical slice review of actual design basis documentation, and comparison of "as-built" with "as-operated" safety systems provides a better picture of licensee effectiveness in maintaining licensing and design bases.

The verification that licensees know their licensing bases, have appropriate documentation of such, and properly perform the necessary assessments when licensing basis changes are made will continue to be a focus of NRC inspection activities.

Technical Specifications

Another area of attention involves technical specifications. Technical specifications are specific operational, testing, design and administrative constraints under which each nuclear power plant is required to operate. In this area, the NRC has implemented an improvement program designed to eliminate unnecessary license constraints and to improve understanding of the bases of the technical specifications, thereby substantially reducing the regulatory burden on licensees. Improved standard technical specifications are available for adoption by our licensees. As of this summer, approximately 80 percent of the operating units had converted or had indicated an intention to convert to the improved standard technical specifications.

AGING

Embrittlement of Reactor Pressure Vessels and Nondestructive Testing

Let me return to the embrittlement issue. From my perspective, adequate progress has not been made in measuring embrittlement changes in operating reactor vessels and relating those changes to microscopic models which give a stronger predictive capability, and which allow an assessment of post-annealing properties.

The surveillance programs used by nuclear power plant licensees for determining changes in toughness properties in the vessel materials of

operating reactors have a number of shortcomings, especially for older plants. These programs use a simple, but indirect, conservative method that does not utilize improvements in fracture toughness technology. The results tend to have significant variability, making more difficult the assessment of plant-specific reactor vessel integrity.

To address this problem, the use of advanced nondestructive examination techniques for measuring the embrittlement of irradiated reactor vessels should be pursued. Several possible approaches have been proposed for such measurements, including magnetic, ultrasonic, and hardness measurement techniques. Additional research is required. This is an area with considerable promise, and significant potential safety benefits.

NEW REACTORS

Although in the United States, new nuclear electric generating capacity does not appear likely at this time, the possibility remains that U.S. electric power generators will consider a standard nuclear power plant as a source for new generating capacity. The NRC has issued final design approvals for two standard reactor designs, and is in the process of certifying these designs by rulemaking. We expect that the certification of the two standard reactor designs -- the General Electric Advanced Boiling Water Reactor and the Combustion Engineering System 80+ will be completed in 1996. The NRC also is reviewing the Westinghouse AP-600 standard design application, a light water reactor design which employs passive safety features and greater use of modular construction. While the General Electric Company has announced that it is ending its simplified boiling-water reactor program, the Westinghouse Corporation has confirmed its continued participation in the U.S. Department of Energy's Advanced Light Water Reactor effort.

V. LOOKING TO THE FUTURE: THE INTERNATIONAL PERSPECTIVE

The United States is not alone in facing the problem of how to accomplish the health and safety objectives of government within the constraints of a limited budget. One obvious solution, for the numerous governments in this situation, is to pool their bodies of knowledge toward the common goal of enhanced nuclear safety in all countries. Already, a striking example of this is occurring in nuclear safety research, where many countries share their results. I believe that we should go further. Toward that end, I have recently proposed an international initiative which would help to meet the common challenges which we, as regulators, are encountering.

At the OECD/NEA Senior Regulators Meeting held just over a week ago, I led a session discussion called "International Cooperation Among Regulatory Bodies: Mechanisms to Meet Current and Future Needs." I long have thought that the world's nuclear regulators should consider establishing a better mechanism for coordinating their own efforts, through a structured forum for the exchange of information and views on topics of mutual interest. I know that significant exchanges already take place on an ad hoc basis, as well as in the context of meetings at the IAEA in Vienna or the NEA in Paris. However, these efforts do

not always reflect the needs of regulators or their priorities. I am not advocating a multilateral nuclear regulatory organization with a secretariat and headquarters, but a more formal organization of nuclear regulators on the international level might help to identify common themes and approaches and provide greater support for safety.

As we go forward, I believe that the international community should consider new programs of focused cooperative research in areas where we face common challenges such as aging and risk assessment methodologies. In certain areas of mutual interest, coordinated international research activity has already occurred, with excellent results. If existing international bodies can provide the necessary structure for such a program, this would be excellent; if not, the creation of other mechanisms should be considered.

One specific area in which international cooperation already is bearing fruit is in the thermal annealing of reactor pressure vessels, which involves significant engineering issues and financial risk to nuclear power companies. Although thermal annealing of a reactor pressure vessel has not yet been attempted at a commercial nuclear power plant in the U.S., the Russians have had success with their annealing procedures, and part of our cooperative safety program with Russia includes annealing technology. The NRC has created a regulatory framework to assess reactor pressure vessel integrity following annealing, and the Department of Energy is conducting two annealing demonstrations using two different heating techniques, including the Russian technique which utilizes electrical heat. One annealing demonstration, utilizing gas heating, was recently completed at the Marble Hill reactor in Indiana. The second annealing demonstration, using electrical heating, will occur this fall at the Midland facility in Michigan. We are observing carefully and evaluating these tests to strengthen our regulatory process in this area. The Palisades Nuclear Plant in Michigan is considering annealing its pressure vessel, and its decision will test our regulatory framework and its technical bases.

VI. CONCLUSION

I have attempted to describe some of the many challenges the nuclear power industry and nuclear regulators currently face, in the United States and around the world. Despite their number and complexity, I believe that there is reason for considerable satisfaction. The same maturing process that has brought issues such as reactor aging to the forefront of our concerns has also provided us with a base of operating experience, helping to ensure the safety of reactors in the U.S. and abroad. In the safeguards area, although the problems are substantial, there is increasing cooperation of the world community in coping with these problems, especially at the IAEA through the 93 plus 2 initiative, which the U.S. government strongly supports.

Nuclear energy and nuclear knowledge have long since ceased to be the preserve of just a few nations. Today the world's nuclear community has the benefit of the knowledge, the expertise, and the fresh insights of capable men and women around the world -- including those here this morning. As we approach a new century and a new millennium, we recognize increasingly our global

interdependence. We must continue to work together to ensure a unified commitment to nuclear safety throughout the world.

Thank you for your attention.

DOCUMENT NAME: G\SPAIN.TLK