



Sharing Regulatory Perspectives: The NRC in a Time of Change

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The United Kingdom and the United States have a long-standing history as partners and friends in the nuclear arena. US industry and regulators also share strong partnerships with most participants in this Symposium. Therefore I am delighted to be able to participate in and to continue this time-honoured dialogue, as I make my first visit to the UK as Chairman of the US Nuclear Regulatory Commission (NRC).

Because the generation and regulation of nuclear energy and reactor byproduct materials are topics not confined by national boundaries, changes to a particular aspect of how business is conducted in one country — such as the current trend towards competition and restructuring in the electricity industry — can have a direct impact on the world electricity market and, by implication, the nuclear power industry around the globe. Therefore we each must understand our own domestic issues, but at the same time we must work within the larger sphere of international energy demands and regulatory activities. This requires sharing knowledge to broaden international perspectives on nuclear issues, and to enhance a global nuclear safety culture.

I will begin by discussing several areas of emerging and/or active NRC focus, including: the storage and disposition of surplus weapons-grade plutonium; NRC nuclear regulatory jurisdiction over the US Enrichment Corporation (USEC) and its two associated gaseous diffusion plants; the potential for NRC oversight of US Department of Energy (DOE) nuclear facilities; and, of primary focus, US electricity utility industry deregulation. I will close with a brief discussion of

the recently formed International Nuclear Regulators Association, an organisation established to provide a forum in which senior nuclear regulatory officials can share perspectives and seek consensus on safety, policy and economic issues of concern to regulatory bodies worldwide.

Plutonium Storage and Disposition

In January 1997 the DOE issued its *Record of Decision for the Storage and Disposition of Weapons-Usable Fissile Materials*. In this document, DOE stated that it has decided to implement a programme for the safe and secure storage of weapons-usable fissile material (plutonium and high enriched uranium), and announced a strategy for the disposition of surplus weapons-usable plutonium. DOE plans to pursue a dual-track approach for plutonium disposition, which would include: immobilising surplus plutonium with high-level radioactive waste in a glass or ceramic material, for direct disposal in a geologic repository; and burning some of the surplus plutonium as mixed oxide (MOX) fuel in existing domestic commercial reactors before disposal in a geologic repository.

The NRC has a direct interest in this programme, because it impacts at least three major areas that the NRC regulates — commercial nuclear power reactors, fuel cycle facilities, and the (as yet unbuilt) high-level radioactive waste geologic repository. The NRC has been actively evaluating the proposed plutonium disposition alternatives since the DOE record of decision was issued. Shortly after issuing its record of decision, the DOE briefed the NRC on its plans for plutonium disposition. In February and March 1997 the NRC sponsored two technical

seminars, both open to the public, in which representatives of the nuclear industry, including several foreign representatives, made presentations on the fabrication of MOX fuel and its use in commercial reactors.

In July the DOE issued a programme acquisition strategy for selecting private sector organisations to assist in implementing the MOX fuel alternative for disposing of surplus weapons-grade plutonium. The MOX fuel fabrication services detailed in the proposed strategy include: designing, constructing or modifying, licensing and operating a fuel fabrication facility; supplying commercial nuclear fuel for reactors; and ultimately decontaminating and decommissioning the fabrication facility. The proposal would involve a one-time use of MOX fuel to dispose of existing weapons-grade plutonium, but would not include reprocessing. In addition, the MOX fuel fabrication facility would cease operation and be decommissioned after completing its mission of weapons-grade plutonium disposition.

Successful implementation of this approach also would require the full spectrum of irradiation services needed to burn MOX fuel at commercial NRC-licensed reactor facilities. This would include designing and engineering the necessary reactor and facility modifications; obtaining federal, state and local environmental permits; performing core design and fuel design services; irradiating the fuel; and storing the irradiated fuel until it can be ultimately disposed of in a geologic repository. The DOE acquisition strategy also states that the USA would pursue the use of Canadian Candu reactors, if international agreements are reached among the Russian Federation, Canada and the USA for implementing disposition of both US and Russian plutonium.

Certain technical, financial, and political questions, related to the MOX fuel initiative and to plutonium disposition in general, remain unanswered. Some supporters of the MOX fuel option have argued that plutonium immobilisation is not an adequate method of disposal, because the plutonium later could be re-extracted from the glass or ceramic immobilisation medium. In the USA, industry representatives have expressed reservations about the size and duration of the investment necessary for commercial nuclear power companies to invest in the MOX fuel programme — based on the financial vulnerability that could exist if unforeseen national or international events later prompted DOE to cancel the MOX programme. And certain US public interest groups have asked

that DOE set minimum standards of safety or performance for commercial utilities selected to participate in the MOX programme.

Last week at the Argonne National Laboratory near Chicago, DOE officials met with nuclear utility representatives and others to focus on these and other issues. In the upcoming weeks, DOE will brief the Commission on the overall DOE strategy for plutonium disposition, including its acquisition strategy for MOX fuel fabrication and irradiation services. The Commission recognises fully the importance of this programme — both to the USA and to nations around the world — as well as the need to carry out successfully the broader goals and objectives of weapons-usable fissile material storage and disposition. The Commission will continue to monitor the evolving DOE strategies for plutonium storage and disposition, to ensure that the NRC is prepared to perform its emerging regulatory role in a manner that ensures the protection of public health and safety, and that avoids unnecessary delays or costs.

US Enrichment Corporation

Another area of particular interest to this Symposium began with the US Energy Policy Act of 1992, which established the US Enrichment Corporation (USEC) to operate the DOE gaseous diffusion plants (GDPs) in Piketon, Ohio, and Paducah, Kentucky. The act required the NRC to establish standards that would govern these uranium enrichment facilities, and to establish a certification process to ensure that USEC complies with those established standards. The act also requires the NRC to submit annual reports to Congress, with input from DOE and the Environmental Protection Agency, on the status of health, safety and environmental conditions at the GDPs.

As required by the act, the NRC issued regulatory standards entitled *Certification of Gaseous Diffusion Plants* (10 CFR Part 76) in September 1994. USEC submitted a complete application for certification in September 1995. A proposed NRC certification decision was prepared and issued in September 1996, and the actual certificates were issued to USEC in November 1996. On 3 March 1997, the transition from DOE regulatory oversight was finalised, and the NRC officially assumed nuclear regulatory jurisdiction over USEC's operations at the two plants.

The next major milestone for USEC was set into motion by the passage of the USEC Privatization Act in April 1996. This act provides for USEC to

become a private corporation, and institutes a five-year certification cycle. President Clinton recently gave USEC approval to move forward with privatisation.

Given that USEC supplies about 40% of the worldwide production of enriched uranium for commercial power plants, privatisation of the enterprise offers a tempting acquisition to large US companies. The US government must decide soon whether to sell USEC as an entity or to make a public offering to prospective shareholders. However the transition is made, it will be the largest divestiture of a US federal production corporation in history and, unless unforeseen difficulties are encountered, it should occur in the first half of 1998.

The private sector entity that purchases the assets of USEC will be responsible for the operation of the two GDPs, and the development by USEC of any new uranium enrichment processes. The act prohibits the issuance of a certificate of compliance to that entity if the NRC determines that:

- The entity is owned, controlled or dominated by an alien (foreign) corporation, or a foreign government.
- Issuance of a certificate would be inimical to the common defence and security of the United States.
- Issuance of a certificate would be inimical to the maintenance of a reliable and economic domestic source of enrichment services.

On 19 December 1996, the NRC staff submitted for Commission approval a paper entitled *Direct and Final Rulemaking: USEC Privatization Act — Conforming Changes and Revision to the NRC Enforcement Policy* (NUREG-1600). With this paper, the staff proposed amendments to bring applicable NRC regulations into conformance with the statutory requirements of the act. The Commission approved this direct and final rulemaking.

The initial USEC certification was based upon a finding of compliance with NRC standards to protect public health and safety and the common defence and security. Any re-certification of the USEC, or certification of a USEC successor, will be based on NRC review and approval of any needed updates to the initial application. In addition, the Commission must make the three determinations listed above. The Commission also will review USEC's implementation of compliance plans, and accumulated regulatory experience. The staff has prepared for Commission review a standard review plan including these elements — as implementation

guidance for issuing a certificate of compliance to the privatised USEC or any subsequent re-certifications of the GDPs.

In summary, the NRC and USEC, as well as other responsible US federal agencies, are coordinating activities to ensure that the USEC Privatization Act requirements are met, and to facilitate a smooth transition from operation as a government corporation to operation as a private corporation.

External Regulation of DOE Facilities

By long-standing tradition, a primary mission of the DOE has been nuclear weapons production, as well as the development of commercial and naval nuclear reactors, and the conduct of energy-related research. With the end of the Cold War, certain elements of the DOE mission have shifted. The fundamental mission elements of the department have remained the same, but approximately half of the DOE nuclear budget is now devoted to three activities: materials management, decommissioning and cleanup, and waste management. Through decommissioning, DOE expects to decrease the number of its existing nuclear facilities from 600 to 200 over the next ten years.

The self-regulation, by DOE or its predecessors, of all aspects of safety at its nuclear facilities, with the primary exception of environmental protection, has existed since the enactment of the original Atomic Energy Act in 1946. In 1994 legislation was introduced in the US House of Representatives that would have subjected new DOE facilities to immediate external regulation, and would have created a stakeholder group to study external regulation of existing facilities. As an alternative to that approach, in January 1995 the Secretary of Energy created the Advisory Committee on External Regulation of DOE Nuclear Safety. This advisory committee was charged with providing advice and recommendations on whether (and how) new and existing DOE facilities and operations might be externally regulated to ensure nuclear safety.

In its December 1995 report, *Improving Regulation of Safety at DOE Nuclear Facilities*, the advisory committee recommended that essentially all aspects of safety at DOE nuclear facilities should be externally regulated. The Secretary of Energy accepted and endorsed the advisory committee report, and created the DOE Working Group on External Regulation to provide recommendations on implementation of the advisory committee report. The December 1996 recommendations of

the working group were that the NRC should be the external nuclear safety regulator, and that the transition to external regulation should proceed in phases.

In September 1996, as part of its Strategic Assessment and Rebaselining Initiative, the NRC published a direction-setting issue paper that addressed options for the NRC position on regulating DOE facilities. In March 1997, after considering public comments and the December 1996 DOE decision, the Commission endorsed having the NRC assume nuclear safety regulatory oversight of certain DOE nuclear facilities, contingent on the NRC being given adequate resources (financial and human) to take on this new responsibility, and a clear delineation of the authority the NRC will exercise over the facilities. In addition, the Commission directed the NRC staff to convene a high-level NRC Task Force to identify, in conjunction with DOE, the policy and regulatory issues needing analysis and resolution. In a June 1997 meeting, Secretary of Energy Federico Peña and I agreed on a pilot programme as a basis to explore pursuit of NRC regulation of DOE nuclear facilities.

At present, the NRC and DOE are preparing a memorandum of understanding (MOU) to establish the framework for a pilot programme that could, if successful, lead to a joint recommendation by DOE and NRC to the US Congress that NRC be given statutory authority to regulate nuclear safety at DOE nuclear facilities. The pilot programme is intended to “simulate” NRC regulation of a selected set of DOE nuclear facilities over a 2-year period, in order to help both agencies gain experience related to NRC regulation of DOE facilities.

This also will provide an opportunity to develop actual data on the costs and benefits of external regulation. “Simulated regulation”, as defined for the purposes of this pilot programme, means that the NRC will test regulatory concepts, performing the facility oversight functions that it believes would be appropriate to ensure safety, evaluating the facility and its standards, requirements, procedures, practices and activities against NRC standards. After six to ten pilots have been conducted, the NRC and DOE will determine whether to seek legislation to give the NRC statutory authority to regulate individual DOE facilities or classes of facilities.

Issues to be addressed include:

- the form of the regulatory process (licensing, certification, consultation or other processes);
- who is to be regulated (DOE or its contractors);

- the safety criteria;
- the role of stakeholders;
- safeguards and security;
- how best to transition into the external regulation framework, including the development of any necessary clarifying and/or enabling legislation.

As we proceed, our primary goal is to remain rigorous in ensuring public and environmental protection on a cost-justified basis, and to ensure that whatever steps we take toward phased-in DOE oversight do not compromise our ability to ensure adequate protection of public health and safety within the scope of our current mission.

Electricity Utility Restructuring in the USA

Let me turn to my main topic, which has been an area of focus for the electricity industry, government regulators and the public in both the UK and the USA, as well as in other countries. Despite significant differences in the electricity industries and regulatory structures, the deregulation (and, in the UK, the privatisation) of the electricity industry has raised certain areas of common concern.

As nuclear energy producers seek to be cost-competitive in an open market, a number of issues which I will discuss come rapidly into focus. They are intertwined with the following types of questions. What is the optimum structure for a cost-competitive utility company? How can the regulator best adapt its resources to ensure protection of public health and safety in this changing environment? To what extent should the public be involved? These and other questions quickly illustrate the value of sharing perspectives across national boundaries and learning from one another’s experience in this area.

The primary mission of the NRC is to ensure adequate protection of public health and safety, the common defence and security, and the environment in the use of nuclear materials in the United States. In particular, as the government agency responsible for regulating nuclear safety at power reactor facilities, the NRC has an important function during this transition to a competitive electricity generation market. Therefore, as the US electricity utility industry transitions to a competitive market, the NRC must understand any effects of the changing business environment — such as ownership changes, mergers, or cost-reduction strategies — on nuclear safety.

To be as fair as possible to all involved in the US electricity generation business it is important, as the NRC changes or contemplates changing its

regulatory requirements or outlook, that we lay out our plans as early and as clearly as possible. Wherever possible, we have sought to learn from and to apply the experiences of others, including the experiences in the UK, associated with privatisation and restructuring of electricity utilities.

As the trend toward restructuring continues, even national boundaries are becoming somewhat less distinct. We have seen American corporations such as General Public Utilities and Cinergy becoming part-owners of British utilities. We also are seeing corporations such as British Energy, in partnership with US companies such as Peco Energy, considering ownership of US utilities. Our responsibility is to evaluate this globalisation trend and to continue to ensure protection of public health and safety within these new and varied business arrangements. From our perspective, the NRC challenges in this area fall under three general headings:

- the availability of funds for decommissioning;
- electricity grid reliability;
- the impact of cost competitiveness on safe nuclear operations.

Decommissioning Funding Assurance

Under Section 161 of the Atomic Energy Act of 1954, as amended, the NRC has statutory authority to regulate the decommissioning of its licensed nuclear facilities. Existing decommissioning regulations require power reactor licensees to set aside funds periodically in external trust fund accounts (or to provide third-party guarantees for estimated decommissioning costs). As such, by the time a licensee permanently ceases operation, the total estimated amount of necessary decommissioning funding should be available.

In its regulations, the NRC shares responsibility for decommissioning funding regulation with rate regulators — that is, with state Public Utility Commissions (PUCs) and the Federal Energy Regulatory Commission (FERC). Traditionally, the NRC has relied on FERC and PUCs for such decisions as the sources of decommissioning funds (whether rate-payers or licensee stockholders), the timing of funds collection, and the investment in trust funds. This practice is consistent with earlier NRC determinations that traditional cost-of-service rate regulation has provided reasonable assurance of funds for operations and decommissioning.

In the emerging environment of electricity utility restructuring, the NRC has had to re-evaluate certain aspects of these provisions, including the

NRC definition of an electricity utility, the potential impact of new ownership arrangements, and the problem of above-market or “stranded” costs. In February 1996 the NRC issued a comprehensive action plan to provide a framework for evaluating this overall area. This action plan has resulted in a range of NRC actions, which I will discuss briefly.

To provide an operating framework, the Commission recently issued a final policy statement on financial assurance, which indicates that the NRC will:

- continue to conduct its financial qualifications, decommissioning funding and antitrust reviews;
- identify all direct and indirect owners of nuclear power plants;
- establish and maintain working relationships with US state and federal government rate regulators;
- re-evaluate its regulations for their adequacy in addressing the changes caused by restructuring and economic deregulation of the US electricity utility industry.

The NRC is also about to issue for public comment a proposed rule on decommissioning funding, based on the results of an April 1996 Advance Notice of Proposed Rulemaking and the continuing analysis of emerging industry developments. The proposed rule would modify NRC financial assurance regulations in four areas.

First, it would revise the NRC definition of electricity utility, to ensure that decommissioning funding requirements clearly cover all responsible licensee entities. The revision clarifies that the term applies to that portion of a company’s costs that are recovered through rate regulation, whether that portion constitutes all or only part of the company’s costs. For entities within the revised definition of electricity utility, rates must be established by a regulatory authority, either directly through traditional cost-of-service regulation or indirectly through another non-bypassable charge mechanism. Electricity utilities are allowed to use an external sinking fund that builds up over time; licensees that are not defined as electricity utilities must couple their external sinking fund with a surety method or insurance.

Second, it would allow credit on earnings from decommissioning trust funds. Third, to keep the NRC informed of decommissioning fund status, it would require periodic licensee reports on fund status and on any changes to licensee external trust agreements. This new requirement would go into effect nine months after the effective date of the rule, and would require reports every two

years thereafter.

Fourth, the NRC would take additional action as needed, either independently or in cooperation with state and federal rate regulators, to ensure adequate licensee accumulation of decommissioning funds, including modifying a licensee schedule for decommissioning fund accumulation. The proposed rule also indicates that the Commission will consider other financial assurance strategies, including accelerated funding, for inclusion in the final rule.

The NRC has taken several other related actions, including:

- issuing a draft standard review plan on antitrust reviews, and another on licensee financial qualifications and decommissioning plans;
- ensuring that NRC databases on licensee ownership and antitrust conditions are updated, as well as informing power reactor licensees of their continuing obligation to inform the NRC of any ownership changes or transfers of control;
- holding numerous meetings with industry representatives, state and federal rate regulators, the financial community, and other stakeholders.

The overall effect of these measures has been to improve NRC, licensee, and public awareness of issues of concern related to electricity utility restructuring.

Electricity Grid Reliability

An equally important area of NRC focus has been electricity grid reliability or security. In recent years, NRC probabilistic risk assessments (PRAs) have made it clear that a station blackout at a nuclear power station is a major contributor to core damage frequency. The term station blackout is used in the nuclear power industry to refer to an event in which a loss of off-site power is coupled with the inability of the on-site emergency diesel generators to provide vital power to plant safety equipment. While station blackouts have been extremely rare to date, the possibility of a station blackout continues to be an area of NRC focus, particularly in light of certain recent events.

In 1996, within a five week period, two electrical disturbances on the US Western Grid caused 190 power generating plants to trip off-line, including several nuclear units. In reviewing these electrical disturbances, the Western Systems Coordinating Council listed as contributing factors: high northwest transmission loads; equipment out of service; inadequate maintenance of right-of-way; operation in a condition in which a single failure would overload parallel lines, triggering cascading

outages; communication failures to neighbouring utilities, prior to the disturbances; and the lack of response to earlier events.

More recently, in June 1997, one of the US Midwestern regional grids experienced severe loading conditions that affected power flows into two other regions. Later analysis showed that the resulting grid disturbance came close to causing several tie line trips, which in turn would have resulted in over-frequency generation trips and under-frequency load shedding, and could have resulted in a smaller scale repeat of the blackouts that occurred in the previous Western Grid event.

These events and studies tell us that, while nuclear generating stations are robust in design and operational standards, they also are vulnerable to grid disturbances, and especially to losses of off-site power. Such events cause unnecessary challenges to plant safety systems. Grid reliability governance structures must take into account and mitigate this vulnerability.

In addition, efforts to enhance grid reliability must sometimes balance other concerns. As an example, the North American Electric Reliability Council (NERC), together with the regional councils, oversees grid reliability as a voluntary function. Recently, NERC has sought to establish measures to ensure that transmission operators can monitor their systems to ensure grid reliability. One such measure has been the interim transaction information system, which makes available to transmission operators all information related to a given transmission transaction — such as source, path, connections, middlemen and destination. Recently, two electrical power industry groups complained to the FERC about this measure — which is known as “tagging” — stating that NERC is usurping FERC authority over transmission scheduling. According to the complainants, tagging makes so much information public that competitors are able to undercut transactions. Just last week, NERC announced a change to its tagging requirements that will limit the dissemination of transmission information to control areas and transmission areas only.

These and other issues can make the assurance of grid reliability a complex endeavour. In the US, federal oversight currently is handled by the FERC and at the DOE. The 1996 and 1997 grid disturbances I have described showed that critical electricity network oversight issues — including standards of performance, operational criteria, and personnel training — must be properly addressed as deregulation proceeds. To address concerns in

this area, the DOE has created an advisory committee on US electrical system reliability. This committee is considering whether current efforts to maintain reliability are sufficient, and whether a need exists for increased federal authority over reliability in the future.

The NRC is participating in this activity as appropriate. What is important to the NRC is that grid reliability is addressed explicitly as electricity industry restructuring evolves. The Commission has asked the NRC staff to give greater focus to ensuring that health and safety issues within NRC jurisdiction are addressed — particularly in validating grid reliability assumptions. The staff was asked specifically to inform the Commission of actions by federal and state economic regulators in establishing membership requirements for NERC, particularly as they relate to the oversight issues I have delineated. The Commission is especially interested in the effectiveness of such requirements, and enforcement policies as they relate to grid reliability.

Cost-Competitiveness and Safe Operations

The NRC also continues to focus on the possible impact of cost-competitiveness pressures on safe nuclear operations. While the overall safety of the US nuclear power industry continues to improve, NRC safety assessments at several reactor facilities have identified deficiencies that may stem from the economic pressure on a licensee to be a low-cost energy producer, which in turn may limit the resources available for corrective actions and plant improvements.

The NRC is developing measures that would identify plants where economic stress may be adversely impacting safety, including the use of leading performance indicators, and reviewing and revising as appropriate all elements of our plant inspection and evaluation processes. We also are moving more strongly to risk-informed regulation through the appropriate use of PRA techniques, through the development of PRA guidance in the form of a Regulatory Guide and Standard Review Plan, as well as through pilot processes for risk-informed regulation, out of which application-specific regulatory guides will be developed. These efforts will assist the NRC and nuclear licensees in focusing their resources on the most safety-significant aspects of nuclear operations, while maintaining defence-in-depth — which in turn should both enhance safety and increase cost-competitiveness.

As we pursue these initiatives, we continue our

efforts to pursue our health and safety mission within the most efficient and effective regulatory framework possible — for both the NRC and the nuclear energy industry. We have been working with the nuclear energy industry to remove unnecessary regulatory requirements through conversion to improved standard technical specifications, changes to rules that are marginal to safety, and the implementation of NRC Regulatory Review Group recommendations.

International Nuclear Regulators Association

The topics I have covered so far this morning provide a few illustrations of safety improvements and concerns in one nation, the USA, which are very likely to be matters of interest for others. Many questions related to nuclear regulation — for example, the causes of nuclear accidents, the effects of exposure to low-level radiation, and new approaches to ensuring reactor safety — command attention throughout the world. To enhance international communication and cooperation, the heads of eight of the world's nuclear regulatory bodies — from Canada, France, Germany, Japan, Spain, Sweden, the UK and the USA — met in Washington DC in January 1997, and again in Paris in May, to negotiate and to constitute formally the International Nuclear Regulators Association (INRA).

The purpose of INRA is to influence and enhance international nuclear safety from a regulatory perspective. The organisation seeks to carry out this goal in several ways, including:

- establishing a forum in which senior regulators can exchange views;
- building a global nuclear safety culture;
- encouraging the most efficient use of resources;
- seeking international consensus on nuclear safety issues and facilitating international cooperation;
- cooperating with other international and national organisations involved in nuclear safety;
- identifying nuclear regulatory challenges.

In seeking to accomplish these goals, INRA also will focus on identifying and agreeing upon common elements of a nuclear regulatory programme, and working with other governments to influence improvements in nuclear safety.

INRA will act by consensus to fulfill its objectives, and will make recommendations to international and national agencies on nuclear safety issues. At the constituting meeting in Paris, the founding members of INRA elected me to serve a two year term as the association's first chairman. I am pleased and honoured by the challenges and opportunities

that come with this responsibility, and I will continue to make INRA issues an area of personal focus.

Conclusion

I hope that this presentation has given you a better understanding of several areas of NRC focus in this era of change, as well as some of the strategies we are pursuing in addressing these

issues. In addition, I hope that I have reaffirmed for you the value of the continuing dialogues that occur among nuclear safety regulators worldwide, as well as among all those involved in the nuclear enterprise, as we share perspectives in an attempt to achieve the robust and safe use of nuclear materials globally.