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TO THE SECOND ANS WORKSHOP
ON THE SAFETY OF SOVIET-DESIGNED NUCLEAR POWER PLANTS
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NUCLEAR SAFETY IN RUSSIA AND UKRAINE

INTRODUCTION

I am very pleased to be with you tonight, to discuss with you my own perspectives on the safety of Soviet-designed nuclear power plants. Tonight I'll concentrate on and what is needed to improve the very difficult energy situations in Russia and Ukraine.

The situation is simpler and more hopeful in the former COMECON countries -- if you wish, we can cover these in the question and answer session.

It is now eight years since Chernobyl, and we still lack confidence in the ability of Russia, Ukraine, Lithuania and Armenia to manage their nuclear power systems with the same attention to safety that we take for granted in Western Europe, North America, and Japan.

THE PROBLEM

The Chernobyl accident alerted the world to a gross disparity in the attention given to nuclear safety in the Soviet Union and Eastern Europe, compared to what is minimally acceptable in the West. The problem, we have learned, had three aspects: 1) design inadequacies in some key Soviet designed plants, particularly the graphite-moderated RBMK; 2) substandard operational safety procedures and attention to detail in managing the production of electricity at all nuclear power plants; and 3) an almost complete lack of independent governmental regulation of the state utilities, which were devoted to fulfilling the

production requirements of the latest economic plan, often at the expense of safe operation.

More than six years of cooperative work with both Russia and Ukraine has shown us that both the regulatory authorities and the nuclear power plant operating personnel are well-trained and committed to doing a good job, although the regulatory bodies in both countries are woefully underfunded for the work they are asked to do. And there is no question that the nuclear energy profession drew the best of the former Soviet Union's massive scientific and engineering talent pool.

The nuclear safety problems in these countries are structural; having less to do with engineering and personnel than with economics and sound management -- and the difficulty these nations are having in making the transition to market economies. Accordingly, I believe we need to effect an orderly transition in our nuclear safety efforts in Russia and Ukraine, *from short term measures* (such as technical fixes, operational improvements and regulatory practices), *to longer term measures* (e.g., assuring adequate resources, and making firm institutional and management arrangements).

The term that best describes what we need is *"sustainable safety,"* safety that will be sustained after Western financial assistance terminates. The task is to transform patterns of conduct in the nuclear power sector of these countries from the old Soviet model of greater production at any cost to a system where safety has the highest priority. And, to be realistic, the social, institutional, and economic transformation required may take decades, not years.

Sustainable nuclear safety is like a three-legged stool. If all three legs hold up, the stool will be stable. But if one leg buckles, the stool will collapse.

- The first leg is *technical and operational safety*, which is the usual focus of safety and regulatory programs.

- The second leg is *sound economics* over the long term. A nuclear program, including its regulatory aspects, must be well-funded. It must be profitable enough to permit continued investment in maintenance and training. And, it must make good business sense. An uneconomic program will eventually try to cut costs too far and thus compromise safety.

- The third leg is *organization and management*, under which I include good regulation, training, staffing, safety culture, responsible leadership, and realistic goals.

I would particularly like to emphasize two aspects of sustainable safety today. They are first, economic restructuring and proper management, and second, improved nuclear safety regulation. These are the two most troubling problems in the Russian and Ukrainian nuclear programs today.

ECONOMIC RESTRUCTURING AND PROPER MANAGEMENT IN THE FORMER SOCIALIST ENERGY ECONOMIES

Economic *stability and market pricing of energy are fundamental* to the development and maintenance of a safe and sustainable nuclear power program. Little progress has been made in Russia, and even less in Ukraine, toward the restructuring of their energy economies needed to pay for the safety improvements they so desperately need. It may no longer be effective to continue the "band-aids" of near term risk reduction, when the patient's very life is in jeopardy. They must learn the same lessons we in the West learned twenty years ago in developing our nuclear power programs.

Certain conditions must be met for nuclear power to be both economically sound and physically safe. There must first be a fundamental, realistic revamping of the energy pricing mechanism and a commitment to provide the maintenance and investment resources needed for technical excellence; only then will significant international investments find their way to the nuclear programs of Russia and Ukraine. Western investments are now beginning to gravitate to the Russian non-nuclear energy sector, which will make it far more competitive than the nuclear power sector. This will be highly disruptive for many in the scientific and engineering infrastructure of the former Soviet Union, as well trained nuclear specialists look for work in other fields.

In addition, *sustainable safety requires whole-hearted adoption of certain management principles fundamental to the adoption of a "safety culture."* Until Russia and Ukraine themselves institute modern economic reforms, we in the West risk pouring aid resources down a bottomless pit. Truly "sustainable" efforts to improve nuclear safety must emerge from within these societies themselves. This is not yet happening. Plant operators in Russia and Ukraine are not being paid on time, if at all. Utilities are not receiving payment for the electricity they produce. Regulators face overwhelming bureaucratic and legal barriers as they try to do their jobs properly.

Conditions such as these would cause strikes and brownouts anywhere else on the globe, and regulators would be shutting down the plants. And, in fact, "work-in" strikes did occur this past summer in Russia, and the Minister of Atomic Energy was forced to hold a mini-summit meeting with his power plant operators to try

to resolve the problem of payments for fuel and energy. But in Russia and Ukraine, whether because of the tradition of a command economy, because of the desperate need for energy, or simply because of the stubbornness of the atomic energy bureaucracies there, the nuclear power plants go on operating -- under circumstances which we in the West judge to be unsafe.

Plant operators are very well educated and trained, and they function with considerable individual responsibility and discipline. But because the centralized management philosophy of the former Soviet Union compartmentalized functions and inhibited horizontal communication, there has been a tendency for individuals to view responsibility in the very narrowest sense.

For nuclear safety to be sustainable, each worker's view of responsibility must expand. The safest and most efficient plants are those where people take responsibility not only for their individual contributions to safety and efficiency, but also for the safety and efficiency of the entire plant. Pride and sense of ownership of this sort do not develop by chance. They are the result of management actions to create a supportive, questioning environment. And this is very hard to do when you don't have the resources to pay your employees.

Tragically, the countries of the former Soviet Union, in spite of their proud technical traditions, have virtually become less-developed countries, without the economic or managerial resources to support safe and efficient nuclear power programs. This means that future assistance efforts must address general economic reforms and the total energy picture in these countries. As in the rest of their industrial sectors, these countries must find ways to pay adequate salaries, provide funds for necessary maintenance and improvements and, in general, support their nuclear infrastructures in a way that assures a high priority to safety over the long run.

This task will require a major and persistent effort on the part of their energy ministries and the commitment of substantial resources for upgrades, spare parts, maintenance and effective regulation. Such efforts can not be financed on a grant aid basis by western governments. They must originate within the societies themselves, and they must increasingly draw on commercial lending through international financial institutions and involvement by the private nuclear industry worldwide.

This is the holistic philosophy that underlies the G-7's approach to Ukraine, a radical departure from our previous piecemeal technical approaches both there and in Russia.

THE IMPORTANCE OF IMPROVED NUCLEAR SAFETY REGULATION TO SUSTAINABLE SAFETY

The second important element of sustainable safety is the establishment of independent, enforceable nuclear regulatory regimes. Although maintaining the three-legged stool of nuclear safety is primarily the responsibility of the energy, technology, finance ministries, and the utilities, the regulator also has a critical role to play in keeping the operators focused on safety.

Three elements of sound regulation are especially important in establishing and maintaining a proper nuclear safety culture.

- First, every nuclear nation must provide a firm *legal foundation* for a strong and independent regulatory authority to monitor and enforce high levels of safety.

  Where regulators have not traditionally had the independence, or political authority, to carry out their jobs effectively, and where there is no effective oversight body with the power to close down nuclear power plants for safety violations, there is a tendency to cut corners to produce needed power as cheaply as possible.

- Second, the regulatory authority must have the *resources,* in terms of personnel and technical capacity, to be effective. This means a well-trained and adequately paid staff to perform on-site inspections, review plants at all stages from design to decommissioning, and analyze errors to improve operations in the future.

- Third, both the industry and regulators must apply rigorous and *binding standards* which cover all safety-relevant aspects of the nuclear fuel cycle. I think the regulator should also have the authority to turn these rigorous standards into the mandatory regulations that all operators must follow.

These are the main elements of the International Nuclear Safety Convention that was opened for signature this past September in Vienna. The Convention requires each contracting party to take the needed legislative, regulatory, and administrative measures to implement its obligations under the Convention.

In addition, by national law or binding international commitment a state must put into place *legal liability and financial protection* arrangements that would provide adequate compensation for damage in the event of a nuclear accident, while setting appropriate limits on third party liability. Such protection holds both the nation and the nuclear power plant operators accountable for protecting the public health and safety, while assuring the public every right to redress any

injury it might suffer as a result of negligence or improper operation.

The NRC provides assistance and cooperation with counterpart organizations in Russia and Ukraine to help them develop safety cultures that can support nuclear energy development over the next few years. We believe this kind of cooperation can help improve nuclear safety regulation and ultimately encourage western investment, technology transfer, and non-discriminatory access to resources, technology and market, with appropriate protection for investments and intellectual property.

We therefore think such cooperation can be an important mechanism for raising the level of sustainable nuclear safety worldwide. But we have learned from our cooperative programs over the last several years that, unless the safety culture grows from within the society itself, and unless it is supported by economic stability, legal authority, and the commitment of resources for the long term, it will not reach down to the operational level. It will not contribute to sustainable safety. And this will endanger the future of nuclear power; not only in that society, but also world wide.

EPILOGUE

I recently returned from an extensive visit to the Far East where I met with leaders from a number of nations with broad aspirations to build up their nuclear electric power production capabilities. The region already boasts the world's most dynamic nuclear power program. In 1992, for example, along the Pacific Rim in Asia, there were 70 nuclear power plants connected to electricity grids, and 21 nuclear power plants under construction.

In Asia, as in the countries we are discussing tonight, safe use of nuclear energy depends on many conditions. As I repeatedly said to various leaders in China, *it is not enough* to build these plants. We need to head off poor practices in East Asia so as not to repeat the problems we see in the former Soviet Union.

The point is, *Nuclear Power is Not for Everyone*. Without adequate economic resources, and without an energy market where prices for nuclear power are competitive with other forms of electricity production, and without vigorous government regulation, civilian nuclear power becomes dangerous; a technology that, if mismanaged, can contribute to drastic instabilities such as those faced today in the former Soviet Union.

Nuclear units coming on line now can be expected to operate over at least the next forty years. Nuclear safety cannot be a temporary undertaking which depends on the support of outsiders. Each nation choosing to use nuclear energy to generate electricity must be prepared to make a long-term commitment to establish and maintain the key elements of a nuclear safety culture which will protect the public and the environment over the full fuel life cycle.