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Defining Nuclear Security in the 21st Century

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Reducing the Risk from Radioactive and Nuclear Materials

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A conference devoted to Reducing the Risks from Radioactive and Nuclear Materials presupposes that such risks exist. Few would disagree, but what are they?

While debate on the nature and severity of risks associated with nuclear energy will always remain, it is easy to define a set of risks that are almost universally acknowledged. These include:

- Nuclear warfare between states
- Continued proliferation of nuclear weapons and weapons-grade nuclear materials to states and non-state actors
- Terrorists or non-state actor acquisition or use nuclear weapons or nuclear materials
- Terrorists or non-state actors attack on a nuclear facility
- Loss or diversion of nuclear weapons or materials by a state to unauthorized uses

These are listed in no particular order of likelihood or potential consequence. They are also very broadly stated, each one could be broken down into a more detailed set of discrete risks or threats. The fact that there is a strong consensus on the existence of these risks is evidence that we remain in an era of **nuclear insecurity**. This becomes even clearer when we note that most major trends influencing the probability of these risks continue to run in a negative direction.

- Global quantities of weapons-usable nuclear materials are increasing
- The number of nuclear armed or nuclear weapon-capable states is expanding
- Terrorist and non-state actor interest in nuclear capabilities is rising
- Nuclear technologies are spreading to areas of the world that lack political and economic stability
- Global institutions created to address the risks of nuclear energy use are under stress. Their legitimacy and capabilities are increasingly challenged. (I refer here mainly to the NPT, IAEA and nuclear export controls)

Ironically, while the world is gripped with a sense of insecurity with respect to nuclear weapons and the potential misuse of nuclear materials, there is a growing consensus that an expanded use of nuclear energy for civilian purposes is vital to other key aspects of security. These include energy security for economic development and stability and environmental security through efforts to mitigate atmospheric pollution and global climate change.

What actions are likely to help us move from a condition of nuclear insecurity to one of nuclear security? How can we make maximum use of nuclear energy for civilian purposes without apprehension regarding its potential misuse for military or terrorist purposes? In summary, how do we move from an era in which the application of nuclear energy for military purposes is a national decision, to one in which international institutions enforce a common decision that this energy form is for civilian purposes and civilian purposes only?

This of course, is not a new question. The basic challenges of nuclear security for the international system, and its basic solution, were perceived even as the first nuclear weapons were created. The **Baruch Plan** proposed by the United States government and based on the Acheson-Lilienthal Report, to the United Nations in June 1946 reached the conclusion that nuclear security can only be achieved by international control of atomic energy to the extent necessary to ensure its use only for peaceful purposes. The Baruch Plan failed, but the most extensive existing international institution for controlling nuclear energy, the Treaty on the Nonproliferation of Nuclear Weapons (NPT), still embodies the goal of limiting nuclear energy to civilian purposes. Under the NPT 184, nations have pledged to never acquire nuclear arms, 5 are permitted to retain them while working toward their elimination and only 4 nations are not party to the treaty and they all possess nuclear weapons.

Before we think about ways to improve nuclear security we need to define it. A world with a high degree of "nuclear security" would be one very different from the one we live in today. It would be one where the chance of nuclear weapons use by states or terrorists is much lower. It would one with greatly reduced risks that additional states would use

nuclear technology for military purposes and those that continued to do so would be significantly reducing their reliance on such military applications in a verifiable manner. It would be a world that was confidently expanding the benefits of civil nuclear power.

More specifically, it would be a world in which all states possessing nuclear materials know to a high level of precision how much nuclear material they have, what form it is in, where it located, and whether it is adequately secured from theft or loss on a continuous, near-real-time basis. These national safeguards systems would be open to international evaluation to affirm effectiveness and offer assistance when needed. It would also be a world where all states had effective, enforceable laws criminalizing the unauthorized possession or trafficking of nuclear materials as well as possessing effective export and border controls to prevent illegal transfer of nuclear materials or the technologies for their production. Authorities and resources would be in place to quickly recover nuclear materials if they were stolen. Another feature of nuclear security would be enforceable domestic laws against assisting non-state actors to acquire or use nuclear weapons or materials as embodied in UNSC Resolution 1540. Finally, it would be a world where technologies, procedures and legal instruments for verifying the elimination of nuclear weapons are proven and accepted.

Much of this workshop deals with specific technical and organizational approaches to achieving these goals. While the focus is on the authorized and unauthorized movement of nuclear materials I want to take this opportunity to encourage this community to think about these challenges in their broadest context. One thing that stands out as crystal clear when addressing the workshop subjects:

- The Role of Borders in Nonproliferation
- Radioactive Materials Trafficking
- Transportation Security of Radioactive Materials and Associated Standards

Is that reducing risks in these areas is inherently and international undertaking. Security for all can only be as good as the weakest link in the chain. This rings true in discussing the nuclear enterprise as a whole.

A higher level of global nuclear security cannot be reached unless the technical community continues to coalesce at the international level and contribute to the formation of new international policies and institutions for managing nuclear risks as well as technologies and procedures.

Nuclear security is by nature one of the transnational problems that loom large in the 21st Century. It cannot be effectively achieved by the unilateral use of military force. Other related threats such as terrorism and political extremism, global climate change, regional ecological damage, resource scarcity, infectious disease outbreaks, illegal international trade, refugee crises and natural disasters also do not respect national borders and no nation can reduce its vulnerability to these threats without the cooperation of other states. It is true that these problems will affect states unevenly, but that does not refute the fact that they will pose increasing challenges to all and that solutions to them are by nature multilateral, regional and global. What does this have to do with nuclear security?

Simply this: it highlights how different the world is today than when the major concepts for achieving nuclear security were adopted nearly half a century ago. Neither the system of nuclear deterrence which currently provides the rationale for the possession of nuclear arms, nor the NPT-based nonproliferation regime that attempts to limit the possession of nuclear weapons to five states are well suited to meet the nuclear security challenges of the 21st century. Unfortunately both of these ideas have been enshrined in theory and practice, with vast and powerful interests and institutions behind them for over 50 years.

This brings me to the main point of my remarks tonight.

The most critical tool, skill or innovation needed to move the world toward greater nuclear security **is new thinking that allows us to reach a new level of understanding.** Einstein told us this more than 60 year ago when he said "The unleashed power of the atom has changed everything save our modes of thinking. Scientific workshops like this

are opportunities for focused thinking. During your two days of concentration on the role of borders, nuclear smuggling and transportation I want my remarks to provide a brief chance to think about the "big picture" and perhaps provoke some exchange of thoughts on these core issues of nuclear security.

I do not have a specific list of actions to advocate that could improve nuclear security at the global or state level. Rather I want to present five **take away or bumper sticker** points, one or two of which are deeply controversial in order to stimulate a discussion over this enjoyable dinner and among this gathering of very powerful minds. As I said before we cannot put off this debate any longer.

The first point has been made by others and we should consider the source. It is that **"nuclear deterrence is increasingly hazardous and decreasingly effective."**

The source of course is Schultz, Kissinger, Perry and Nunn. This statement is revolutionary and transformational even though the logic behind it has been around for decades. It is revolutionary because it refutes the claim that the deterrence of aggression provided by nuclear weapons is essential to the security of powerful nations and therefore remains critical to global stability. It is transformational because it claims our security would be better served by abandoning the system of nuclear deterrence and eliminating nuclear arsenals. On what judgments are these claims based?

Nuclear deterrence is increasingly hazardous because

- The existence of nuclear weapons and directly weapons-usable nuclear materials present opportunities for terrorists to acquire the means to conduct a nuclear attack.
- Nuclear deterrence motivates nuclear proliferation. Continued embrace of nuclear weapons as a central element of national defense capabilities by some states encourage others to rely upon or to seek nuclear weapons. (example, U.S.-China-India-Pakistan chain)
- Regions in which new nuclear-armed states are emerging are unstable.

- Recent nuclear proliferants lack the financial, technical and institutional resources to keep nuclear weapons and materials secure.
- Emerging nuclear-armed states share disputed borders, have limited experience with nuclear weapons safety and security and have vulnerable early warning and nuclear weapon control capabilities

Nuclear deterrence is increasingly ineffective because:

- The conditions that required mutual deterrence during the Cold War have changed. There are no major conflicts among leading states. No sates defines its security in terms of the elimination of failure of rival states with the exception of Iran's rhetoric towards Israel
- Terrorist organizations are not sufficiently deterred from attacks by the threat of nuclear retaliation, nor would such retaliation be wise or credible for cases in which a national government was not directly involved in an attack.
- Nuclear deterrence carries with it an unacceptable level of failure, with catastrophic consequences.

In the 21st century nuclear deterrence is subject to the same criticism leveled at arms control a decade ago "where it is necessary its impossible and where its possible it is unnecessary."

The second point is that **"Proliferation anywhere makes proliferation everywhere more likely."** This is true because of two main dynamics of international affairs. The first dynamic can be called "loose coupling." One nation may acquire nuclear arms because of a threat from a neighboring or regional rival, but that acquisition motivates proliferation by states other than the intended target of deterrence. Any state within the range of nuclear strikes will likely feel a need for its own nuclear deterrent. An example of loose coupling is that while India does not formulate its nuclear force requirements by evaluating U.S. nuclear posture, it certainly does assess Chinese nuclear forces and doctrine when making nuclear-force structure decisions. Correspondingly, China's nuclear forces **are** shaped by U.S. nuclear doctrine and capabilities. In this way, nuclear

decisions taken mainly within the context of a traditional nuclear dyad such as the United States and Russia or India and Pakistan cast influence on states outside of that dyad. Iran's growing nuclear capabilities will likely motivate proliferation not only in Israel but also in Egypt, Saudi Arabia, Turkey, Syria and other regional states. It should come as no surprise if one of the first actions a future independent Iraq will take is to revitalize its nuclear capabilities.

Proliferation anywhere can also undermine the consensus within multilateral coalitions to implement strategies to counter proliferating states. This is best illustrated by the growing acceptance of India's nuclear arsenal. Why should other states join nonproliferation initiatives and restrain their own nuclear ambitions when states such as India, Pakistan Israel and North Korea seem to be paying no price for proliferation. Indeed these states are the most unencumbered nuclear states; they retain arsenals without even the obligation of the P5 within the NPT to work towards their elimination. Certainly this dynamic lowers Iran's calculation of the cost of proliferation.

The third point is that the **"NPT is in danger of collapsing under the weight of its own internal contradictions,"** The NPT cannot sustain itself in its present form with 184 states forswearing nuclear weapons and 5 permitted to retain them. It suffers from multiple crises:

- **Crisis of compliance**: This is highlighted by at least five cases of weapons development activities in states that pledged never to undertake them; Libya, Iraq, Iran, North Korea and Syria.
- In addition the mechanisms for enforcement of compliance with the NPT have proven to be cumbersome and ineffective as demonstrated by Iraq, Iran and North Korea's refusal to comply with multiple United Nations Security Council (UNSC) resolutions. Political and economic sanctions enforced by the Security Council in response to this noncompliance have failed to impose penalties on the target nations sufficient to alter their proliferation behavior.

- **Crisis of implementation:** The crisis of implementation refers to the failure on the part of the nuclear weapons states to make greater progress on eliminating them as called for by Article VI of the NPT.
- Here again, the mechanisms to enforce compliance with Article VI suffer from disagreement among member states as to the specific obligations of Article IV itself and the lack of any established benchmarks for assessing implementation.
- Agreed Article VI compliance measures made at the NPT Review conferences in 1995 and 2000 were repudiated by the United States under the administration of George W. Bush.
- **Crisis of Legitimacy:** This stems from the condition of "nuclear apartheid," established by the division of member states into NWS and NNWS.
- **Crisis of Relevancy.** If the North Korean diplomatic process collapses as it did in the late 1990s and Iran acquires nuclear arms, there will be as many nuclear weapons states outside the NPT as there are in the treaty.
- **Crisis of Capability:** The quantity of nuclear material that the IAEA must safeguard to prevent from being diverted to nuclear weapons programs has grown more than six-fold between 1984 and 2004 while the agency's safeguards budget has barely doubled.
- The number of nuclear fuel fabrication and fuel making plants has grown over roughly the same period from a mere handful to 65, and the number of other plants containing special nuclear material that the IAEA must safeguard, has roughly tripled to more than 900 facilities.
- Vast and growing quantities of weapons-usable special nuclear materials exist in the nuclear weapons states that are not even under safeguards
- The IAEA's inspection mission has also expanded after revelations of Iraq's violations of its safeguards agreement to include assessing nuclear activities at the level of the whole state and verifying the "completeness" as well as the "accuracy" of states' declarations of their nuclear activities and inventories of nuclear materials. This requires the agency to make judgments on the absence of undeclared facilities and activities in states that have ratified the Additional Protocol.

- IAEA access to facilities is still limited, even under the Additional Protocol.
- The IAEA's safeguards goals of being able to detect the diversion of certain amounts of nuclear materials within certain time periods from enrichment, reprocessing and fuel fabrication plants are extremely difficult to meet. This has been demonstrated by quantities of nuclear material sufficient for the manufacture of several nuclear weapons being unaccounted for over long periods of time at reprocessing and fuel fabrication plants in Japan, France and the United Kingdom.
- Despite these expanded responsibilities the IAEA also faces human resource challenges with many inspectors expected to retire with 5-10 years.

Fourth point: **More effective measures to prevent the military uses of nuclear energy must precede any nuclear renaissance. Or, as I prefer to say "nuclear weapons give nuclear energy a bad name."**

In the opinion of many experts the world needs to expand its use of nuclear energy in order to improve environmental security and energy security. The advantages that civil nuclear power can provide for humanity's common wellbeing should be a catalyst to much greater restrictions on the military uses of nuclear energy. Without them a boost in global nuclear power use will almost certainly increase dangers in the three threats of nuclear black markets, clandestine state-level weapons programs, and terrorist acquisition of nuclear explosive knowledge, technology and materials. The NPT and the IAEA cannot prevent a sharp, sustained increase in the use of nuclear energy worldwide from spawning an increase in nuclear proliferation and terrorist threats. Any renaissance for civil nuclear energy will be hindered by these threats. This is because the countries that can be most instrumental in making a nuclear energy revival strong, effective and efficient in meeting global energy needs will be reluctant to do so if they see nuclear proliferation threatening regional stability and dimming prospects of realizing return on their investments in the global nuclear energy industry. Even in China and India who plan large fleets of civil power reactors, the efficient utilization of civilian nuclear energy will be hindered by proliferation concerns in southwest Asia and the Far East. This will slow the technology flows that are still necessary from Europe, the United States, and

Japan in order to support a rapid expansion of nuclear energy in India and China. In other words, if the global nonproliferation and nuclear security systems are not significantly strengthened the projected surge in civil nuclear energy use will place them under severe stress. The result could be a less than optimum revival of civil nuclear energy, limiting the contributions that it can make to meeting energy demand and easing global warming.

Fifth point: **Legal and institutional innovation is more critical to nuclear security than technical innovation.**

A world with improved nuclear security as defined earlier can only be achieved through the creation of stronger international institutions for preventing the military uses of nuclear energy. Fortunately it is possible to design civil nuclear fuel cycles that deliver energy without the presence of directly weapons-usable nuclear materials. It is just impossible to do so without creating the capability to manufacture weapons-usable nuclear materials. The technologies are inherently dual-use from a perspective of capability. So what is needed even more that technical innovation in the field of nuclear energy is legal and institutional innovation that effectively prevents military use of this technology.

The most obvious and direct approach to this objective would be an international convention banning the possession or manufacturing of nuclear weapons. No doubt there are brilliant people in this room who think this is nuts. But as made clear by my remarks on nuclear deterrence we must have this debate now and wage it until a new consensus is reached. I am pleased that we have now national leadership that understands this essential fact and I urge all of you who agree to devote some small part of your professional effort to support the nuclear security goals of this administration. They are likely to include major institution-building efforts such as a new U.S –Russian bilateral nuclear arms reduction treaty, U.S. ratification and perhaps entry-into-force of the CTBT and initiation of formal negotiations on a Fissile Material Cutoff Treaty. These efforts must be guided by the best possible technical knowledge. Major innovation in the NPT/IAEA system is needed as well and a decision needs to be made regarding what role

if any, these existing institutions will play in verifying the reduction or eventual elimination of nuclear weapons.

To Conclude

The path to greater nuclear security is one that has yet to be well traveled, partly because of the lingering power of paradigms and ideologies that evolved during the Cold War. It is essential that progress be made on international efforts to eliminate the uses of nuclear energy for weapons purposes and expand its uses for clean civil nuclear energy. In the 21st Century nuclear energy must be for power, not weapons.

Thank –you and I now look forward to a lively discussion of these issues.