



48th Strategy for
Peace Conference

The Stanley
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LockDown, CleanOut, FissBan

In October 2007 a group of policy advocates, government officials, and academics gathered for the Stanley Foundation's annual Strategy for Peace Conference to discuss options for securing, consolidating, and eliminating stockpiles of fissile materials.

Today more than 2,300 tons of separated highly enriched uranium and plutonium, stockpiled in civilian and military programs, pose a serious proliferation risk.¹ The quantities in the existing stockpiles and the number of stockpile locations could grow if plans for an expansion in civilian nuclear energy materialize. The participants in the Stanley Foundation conference explored a number of solutions, including measures that would limit the spread of enrichment and reprocessing, improve transparency with respect to fissile material stockpiles and protection, identify subsidies to nuclear energy, and advance progress on a fissile material cut-off treaty (FMCT).

Since 2005 more than 20 countries that do not now have nuclear power have expressed interest in installing nuclear reactors. With more reactors, it is likely that additional uranium enrichment and possibly plutonium reprocessing plants could also be built. Current efforts to restrict the expansion of such sensitive technologies are competing with efforts to promote plutonium as an energy resource.

The systems that guard against state diversion of, and nonstate actors' access to, sensitive nuclear materials are already under duress. New measures are needed now to ensure confidence that fissile material is adequately secured and safeguarded, especially in regard to weapon-usable high-enriched uranium (HEU) and plutonium (Pu).

Roundtable participants drafted a list of recommendations for the next US administration:

- New approaches to reduce the spread of uranium enrichment and plutonium reprocessing facilities need to address the entire range of states' incentives, including the desire for national prestige.
- More measures to improve transparency across the board are necessary. Such measures could build much-needed confidence in the nuclear trade.
- Subsidies to the nuclear industry need to be identified as part of an effort to encourage the application of economic criteria to nuclear energy development and to make it possible to compete nuclear energy projects against nonnuclear alternatives in a fair and open fashion.

This brief summarizes the primary findings of the conference as interpreted by the rapporteur, Lisa Obrentz. Participants neither reviewed nor approved this brief. Therefore, it should not be assumed that every participant subscribes to all of its recommendations, observations, and conclusions.

- A halt in the production of fissile material for nuclear weapons, either in the Conference on Disarmament (CD) in Geneva, or outside the CD via informal discussions among the five permanent UN Security Council members and the three de facto nuclear weapons states of Pakistan, India, and Israel will be a critical next step.
- States should consider a “safeguards user fee” for nuclear facilities that could be used to finance advances in safeguards and setting physical protection standards.
- The reduction in the use of highly enriched uranium and plutonium (HEU/Pu) in the civil sector needs to continue.

The “Nuclear Renaissance” Debate

Participants first discussed the possibility of a “nuclear renaissance” and its potential impact on efforts to lock down, clean out, and ban fissile material production. They agreed that desires to mitigate climate change and enhance energy security, as well as to take advantage of promotional initiatives by the United States and Russia (for example, through the Global Nuclear Energy Partnership), are creating a bigger appetite and enthusiasm for nuclear energy. The extent of future expansion, however, remains vigorously debated. It may be difficult to arrive at a global consensus on the proliferation risks of potentially significant expansion because of differences across states and regions in terms of their national and regional aspirations.

The Nature and Magnitude of the Threat

Fissile material, which has civilian and military purposes, poses a threat to the extent that it can be diverted from peaceful purposes, either by nonstate actors (including terrorists) or by states themselves. States may attempt to circumvent International Atomic Energy Agency (IAEA) safeguards to divert or produce nuclear material for non-peaceful purposes. They may also stockpile material before “breaking out” of the Nuclear Non-Proliferation Treaty (NPT).

Although traditional debates tend to stress state-level diversion, the assembled group focused just as intently on the 21st-century threat of failing and weak states. The dissolution of states that possess fissile material poses a special challenge by potentially making fissile material more vulnerable to theft or sale. Nonstate actors such as terrorists and criminals may attempt to defeat nuclear material security sys-

tems to acquire nuclear material. While producing nuclear material itself is generally still considered to be beyond the means of most terrorist organizations, some terrorists have made clear their intent to fabricate nuclear explosive devices, raising the specter of theft or purchase of weapons-usable material.

Assessments of the risk of proliferation of fissile material need to consider both the probability and the potential consequences of diversion. Absent a homogeneous threat perception and sufficient resources to provide protection, states will vary in the priority they place on reducing risks—for example, on the robustness of physical protection systems. It is therefore essential for the international community to craft measures and initiatives for the physical protection of existing stocks, such as United Nations Security Council Resolution 1540 and the amended Convention on the Physical Protection of Nuclear Material. It is also essential to maintain current physical protection criteria such as those contained in the IAEA’s *The Physical Protection of Nuclear Material and Nuclear Facilities* (INFCIRC/225), as well as to devise widely acceptable and enforceable norms for the cessation of weapons-usable fissile material production.

There is no existing adequate mechanism for the international community to track or verify the adherence of states to their obligations on physical protection of materials and facilities. States are likely to oppose such a mechanism, but a compromise between state sovereignty and international security is needed. The Stanley conference noted that opposition to intrusive monitoring and enforcement of physical protection standards stemmed not just from “rogue” states such as Iran but also many traditional US friends and allies throughout the developing world. Norms of sovereignty regarding internal security protocols and security training are entrenched and hard to overcome; the IAEA has had to negotiate such relationships bilaterally on a case-by-case basis, behind the scenes. While there have been individual successes in these efforts, much of the opposition stems from general sensitivities about sovereign control rather than malign intent, suggesting that the multilateral, consistent application of physical protection standards requires concentrated and sustained diplomatic efforts.

Future Threats

At the state level, the acquisition of “breakout” capabilities in Asia and the Middle East was a major concern. A North Korean failure to com-

pletely disarm its nuclear program could create a nuclear domino effect in Japan, South Korea, Taiwan, and China. In the Middle East, failure to resolve Iran's noncompliance with its NPT obligations could lead, at the very least, to nuclear weapons acquisition by Saudi Arabia and Egypt.

Several participants noted that even without such crises, the fissile material threat could grow quietly as a matter of course over time as if "material unaccounted for" in civilian nuclear programs grows.² A nuclear power expansion would only exacerbate this threat, particularly if the number of enrichment and reprocessing facilities increases. These "bulk-handling facilities" present a formidable challenge to the IAEA's ability to provide reliable, timely detection of the diversion of weapons-usable material; some suggested timely detection at such facilities is impossible.

The Role of the United States

The United States has played a key role in reducing the threat from fissile material, through the Cooperative Threat Reduction (CTR) program, the dismantlement of delivery systems, and a current \$1 billion a year effort spanning across several agencies and encompassing Russia and the former Soviet Union (FSU) states. The United States is seeking to expand CTR into regions beyond the FSU in an effort to transform threat reduction assistance into an established policy tool with wide application. As threat mitigation efforts are pursued in critical regions of the world, participants recommended encouraging more transparency from recipient states, clarifying and possibly expanding the scope of CTR's initiatives as they pertain to arms control or nonproliferation, and supporting legal mechanisms and treaties that underline such cooperation.

Participants noted that nonproliferation assistance programs have sometimes suffered from lack of coordination among agencies. Yet, imposing a "WMD Czar" [weapons of mass destruction] on the bureaucracy was deemed unlikely to be successful because of bureaucratic resistance to change and unwillingness to cede responsibilities or programs. Still, participants agreed that strong leadership is necessary to coordinate nonproliferation objectives and programs within the US government.

United Nations Security Council Resolution 1540

In 2004 the Security Council of the United Nations adopted a resolution—UNSCR 1540 in

UN nomenclature—binding upon all member states, requiring that all adopt and enforce appropriate, effective laws to prohibit nonstate actor WMD activity within their borders and to take and enforce effective measures to prevent the proliferation of WMD internally. The resolution established a committee to oversee progress on implementation of the resolution, mainly through the collection and analysis of reports submitted by states documenting their domestic actions and infrastructure in place to deal with the issue. As the committee's mandate initially expired after two years, in 2006, a follow-on resolution (UNSCR 1673) extended the lifespan of the committee for another two years, into 2008.

There was substantial agreement among participants on the value and viability of Resolution 1540 as a tool for the international community to help identify weaknesses in national systems. Still, as one participant noted, UNSCR 1540 attempts to "raise the bar," not "point the finger."

Several areas could be strengthened. First, the resolution lacks any mechanism to verify states' compliance. While such measures could strengthen the impact of UNSCR 1540, they were thought to be anathema to many states as an affront to their sovereignty. Second, the resolution lacks deadlines for compliance and specific guidelines for implementation. Participants did note that the committee had established a legislative database and that the identification of such good practices was foreseen as a further outreach effort. Third, some needed measures lie outside the purview of the 1540 Committee. For example, in the nuclear arena, establishing "appropriate effective" standards may fall more under the mandate of the IAEA.

Even though the resolution is energizing states' bureaucracies to work together, some participants were skeptical of the timeliness of 1540's implementation. Others urged the group to look beyond the slow implementation of 1540 simply to the long-term visionary work of the resolution.

Specifically, some participants suggested that simplifying a metric for progress, along with applying universal standards, could spur implementation. Although the 1540 Committee experts have developed a matrix of obligations, the large number of those obligations—about 380—render analysis difficult. Many countries in the UN system already feel overburdened by the number of post-9/11

commitments and norms on counterterrorism as well as nonproliferation, and further assistance will probably be needed to hasten implementation of the resolution's goals.

Toward this end, improving transparency could help identify current gaps to target assistance. The need for transparency became a major thread of discussion. In that regard, participants debated the feasibility of a global fissile material inventory.

Nuclear Fuel Cycle Issues

In the context of growing global enthusiasm for nuclear energy, participants discussed the pros and cons of current proposals for fuel assurances, including an international fuel bank. They expressed concern that plans that seek to limit the number of countries with a full fuel cycle capability might actually encourage the further spread of power reactors that, in turn, would make greater quantities of materials vulnerable to theft or diversion. For example, although an objective of the Global Nuclear Energy Partnership (GNEP) is to eliminate the need to invest in the complete fuel cycle, GNEP thus far seems to have sparked significant interest in some states (including Canada, South Africa, Ukraine, and Australia) that previously had not considered enriching uranium to reconsider their options. It is not clear whether the Gulf Cooperation Council's recent proposal to set up a regional enrichment center has been more influenced by the situation with Iran or global support for more nuclear energy. In any case, neither efforts to deny states access to such technologies, nor efforts to provide incentives to countries to forgo enrichment and reprocessing activities, appear to be working.

Some experts recommended an alternative approach to denial or incentives by attempting to devalue fissile material production. This could include clarifying associated environmental hazards of enrichment and reprocessing and stripping the prestige from nuclear technology by deemphasizing national reliance on enrichment and reprocessing.

As much as safeguards—even the most reliable, sophisticated, and invasive inspections and monitoring procedures—can do to verify that fissile materials are accounted for and being used for declared or intended civil purposes, they have their limits. In practice, enrichment and reprocessing capabilities could be quickly dedicated to producing fissile material for weapons, should political, security, and other considerations change. Today,

declared fuel-making capabilities are limited to 11 states for commercial enrichment and five states for commercial reprocessing. But an expansion of nuclear energy could change that substantially. For indigenous development of enrichment, the technical and financial challenges are considerable; for reprocessing, the challenges are less so. One participant noted that URENCO's current cost estimate for an enrichment plant is \$2 billion to build; by comparison, a new 1000 MW reactor could cost between \$1 and \$4 billion.

While the idea of a global international entity owning and controlling all sensitive nuclear technologies on behalf of the international community is beyond the pale, according to one participant, so are efforts to impose restrictions that would deny a right of access to technology. Sovereign states, many of whom are strongly disinclined, if not hostile to being subordinated to states that were former colonizers or seen as imperialist or hegemonic, are unlikely to accept restrictions on their rights. Nonetheless, allowing the prospect of multiple facilities capable of producing weapons-usable material to emerge in more countries should not be regarded as an appropriate and acceptable way forward. Hence there is a need for serious and sustained efforts to find consensual solutions to the "perils of the peaceful atom." Several complementary ideas are provided below.

Identifying Subsidies

Nuclear expansion depends heavily on government support, particularly in the form of tax incentives, loan guarantees, and streamlined licensing. There is currently insufficient data on the extent of subsidies to the nuclear industry, either within the United States or in other countries. There has also been no attempt to apply economic criteria to nuclear development. A useful step would be to identify subsidies going to nuclear industries both in the United States and abroad, to be used as a baseline for comparing nuclear energy to the costs of other energy sources. This would also require identifying subsidies to those other industries, so a "real cost" comparison could be performed. Knowledge of the extent of government subsidies to existing nuclear power programs could serve as an economic reality check for those states who have expressed an interest in or the intention to acquire such programs. As part of this effort, the regulatory, physical security, waste management, staff training, personnel security, and insurance requirements for operating such plants should be fully explained.

Introducing a Nuclear Safeguards User Fee

Participants debated the idea of a safeguards user fee that would be analogous to a potential international carbon tax. If nuclear energy is being promoted in the context of reducing global carbon emissions, the proliferation risks of nuclear energy need to be given equal emphasis. A separate fee could also be applied to improve and expand physical protection measures. Some nonnuclear weapon states could view such an approach as discriminatory, raising the bar ever higher for the peaceful application of nuclear energy. However, the largest amount of money raised could come from those that have the most reactors and fuel-making plants in operation (i.e., the United States, the European Union, Russia, and Japan).

Toward an Efficient and Reliable Safeguards System

Nuclear safeguards and export control systems are fundamental pillars in ensuring the peaceful uses of nuclear energy programs. However, in the context of a global expansion of nuclear power, participants were skeptical of the safeguards system's ability to keep pace.

In particular, participants recommended increased IAEA monitoring and improved national physical security measures at bulk-handling facilities that make or handle "direct-use" materials or weapons-usable materials. Although increased monitoring could not provide timely detection of diversions before they were completed, it could help to discover diversions that might otherwise go undetected. The group also recommended greater alignment between physical protection and safeguards activities of the IAEA, notwithstanding states' reluctance to cede sovereignty related to physical protection.

Fissile Material Cutoff Treaty

An FMCT is a critical nonproliferation and disarmament step, but efforts in the CD to engage in the negotiation of such a treaty have yielded little progress because of differences of opinion on issues of verifiability and scope. The group doubted the probability of substantial progress at the CD given the number of political difficulties and limitations facing the negotiation of such a treaty. One participant called for debate on what the exact prohibitions should be, stressing that differences on the verifiability of an FMCT are extending the years-long impasse. In particular, participants noted the

current US position that an FMCT is inherently unverifiable and is at odds with past US positions and with a 2006 IAEA study. Several wondered whether the next US administration will reverse this position to move negotiations forward. One participant reminded the group that the United States has strongly advocated the start of negotiations so that all issues can be identified and fully debated. Another participant suggested that a verified ban would do nothing to prevent countries from producing massive amounts of weapons-usable materials and claiming that they were "peaceful." The group affirmed that, ideally, the FMCT would reduce stocks of fissile material available for nuclear weapons.

Participants discussed the utility of engaging the eight critical states—the United States, United Kingdom, Russia, China, France, India, Pakistan, and Israel—outside the CD venue to reach either an interim agreement or a treaty to halt fissile material production for weapons purposes. This could begin with a declared moratorium on the production of fissile material for weapons purposes from the five nuclear weapons states (United States, United Kingdom, Russia, China, and France—and all but China have made such a public declaration). A declaration that China had halted such production could make it easier to bring India and then Pakistan into such an arrangement. All agreed that bringing the three non-NPT states into the mainstream is in the strategic interests of the United States, but also that the prospects for progress are dim. One participant doubted that an FMCT could be verified and raised concerns that such a treaty would make the civilian production of nuclear weapons-usable materials entirely legitimate. This participant believed that, at a minimum, the international system would need to ban the further recycling of plutonium for civilian or military purposes and as well the enrichment of uranium beyond low-enriched uranium levels in non-weapons states.

Conversion of Naval Fuel

The issue of converting naval fuel to low-enriched uranium (LEU) was also brought to the table. France is known to have converted some of its submarine reactors to using LEU. The ability of states to "non-apply" IAEA safeguards to uranium in naval fuel has been, as yet, untested, but holds the potential to allow such material to go unverified for decades at a time. Perhaps more importantly, officials from Brazil have raised the issue as a problem for signing the Additional Protocol (AP). Brazil is a

member of the Nuclear Suppliers Group, which has been discussing making the AP the new condition for nuclear supply—a goal articulated by President Bush in 2004.

Measures to Improve Transparency

Participants agreed unanimously that transparency should be improved across the board and they advocated for better dissemination of information on materials, including information on material that the IAEA considers “material unaccounted for.” At present, the nuclear industries of two states—the United Kingdom and Japan—publish information on material unaccounted for, but this is done on a voluntary basis.³ The IAEA Safeguards Implementation Report should be made widely available in full, and illicit trafficking databases (e.g., those of the IAEA, Interpol, Salzburg University) should be linked.

Developing states should also be encouraged to improve transparency as a way of increasing their attractiveness as international traders. The United States, France, Russia, China, and the United Kingdom could encourage greater transparency by being more forthcoming on the amounts of their materials, including the material that is in weapons.

New Political and Technological Directions

Participants suggested several political and technical improvements that would help reduce the risks that fissile materials pose. For example, they called for enhancing IAEA capabilities for using satellite imagery, near-real-time surveillance, and wide-area surveillance. They also called for the creation of default actions by the IAEA in the event that a country withdraws from the NPT, so that rules and norms for action could be established beforehand—rather than wait for a withdrawal to occur and then work in crisis mode to reach consensus on how the international community should react. Nuclear supplier states should also require safeguards in perpetuity as a condition of nuclear cooperation so that safeguards will remain in effect in the event that a recipient state withdraws from the NPT.⁴ The IAEA should also screen technical cooperation more closely.

One participant raised the question of how border patrols can complement nonproliferation efforts, particularly in detecting illicit nuclear trafficking. Nuclear forensics was also discussed, especially in terms of tagging: to what extent can inventories be tagged and when does doing so become too cumber-

some? Furthermore, what are the costs and risks of internationalizing all sensitive fuel cycle facilities?

Conclusion

Roundtable discussions over the course of 2½ days among a diverse set of expert participants revealed a welcome degree of consensus, not only by outlining the various threats, their sources, and their vectors but also by quite deeply mapping out improvements, needed emphases, and solutions. Divergences of opinion arose when participants attempted to determine specific metrics for success, and in gauging the likely effectiveness of particular actions. This congenial environment bodes well for the future of nonproliferation efforts, if decision makers hold their attention to the issues and pick up on recommendations presented to them. The roundtable participants hope that their discussion and this paper will be helpful and timely in that regard.

Endnotes

¹ See Matthew Bunn, *Securing the Bomb 2007*, Project on Managing the Atom, Harvard University, and Nuclear Threat Initiative, Cambridge, Mass., and Washington, DC, September 2007, p. 8.

² “Material unaccounted for” (MUF) is the difference between measured, physical material inventory and the book inventory. It is a natural consequence of accounting for nuclear material and mainly arises from measurement uncertainties. At bulk-handling facilities, according to the IAEA Safeguards glossary, a non-zero MUF is expected because of measurement uncertainty and the nature of processing. Human error, unmeasured flows, and theft or diversion can also result in MUF.

³ See, for example, Britain’s report for 2003/2004, at <http://www.berr.gov.uk/files/file19346.pdf>.

⁴ The United States already requires this under Section 123 of the 1954 Atomic Energy Act (as amended), but many other states do not.

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