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How Divergent Views on Nuclear Disarmament Threaten the NPT

By Alexander Kmentt

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Arms Control TODAY

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After the First-Phase Deal With Iran

After years of on-and-off negotiations, the Obama administration's negotiating team, along with its diplomatic partners, secured a breakthrough agreement with Iran that sets back that country's nuclear potential and increases international oversight of Iran's nuclear activities.

The six-month agreement opens the way for further talks on "a mutually-agreed long-term comprehensive solution that would ensure Iran's nuclear programme will be exclusively peaceful."

The first-phase deal announced by the P5+1 (China, France, Germany, Russia, the United Kingdom, and the United States) and Iran after their marathon Nov. 20-24 round of talks will stop uranium enrichment to 20 percent, neutralize Iran's stockpile of 20 percent material, cap the amount of fuel-grade uranium (3.5 percent enrichment), freeze the installation or operation of additional centrifuges, and halt progress on nuclear components for the unfinished Arak heavy-water reactor, which is a potential source of plutonium for weapons.

Just as importantly, the agreement provides for unprecedented transparency measures, including daily, rather than weekly, International Atomic Energy Agency (IAEA) inspections at the Natanz and Fordow enrichment facilities; IAEA access to centrifuge production sites; and increased information on and IAEA access to the Arak site.

Together, these constraints increase the time it would take Iran to produce enough highly enriched uranium for one bomb to about three months, compared to less than a month by next year without the constraints. The new transparency measures would effectively detect and deter any such effort by Iran. The agreement is a significant milestone for nonproliferation.

In exchange, the P5+1 will extend limited, reversible relief from certain existing sanctions. Meanwhile, the core of the existing international financial and oil sanctions regime against Iran will remain in place, providing the P5+1 with substantial leverage during negotiations on a long-term agreement.

The next and more difficult challenge will be to hammer out a comprehensive, final-phase agreement. The central question will be the extent to which Iran is willing to reduce the capacity of its enrichment program. The Nov. 24 agreement does not explicitly recognize the right to enrich uranium, but it does recognize the fact that Iran has a uranium-enrichment program, and the two sides agreed to negotiate a "mutually defined enrichment programme" with "agreed limits on the scope and level of enrichment, activities, capacity...and stocks of uranium" that should be "consistent with practical needs." Iran's nuclear fuel supply needs currently are close to zero, but could grow in the coming years.

Given Iran's limited needs, a reduction in Iran's overall enrichment capacity—from 10,000 operating and 19,000 installed centrifuges at two sites to 3,000 or fewer operating first-generation (or equivalent second-generation) machines at one site—would be more than sufficient for Iran's potential needs. The two sides might agree to effectively halt any significant enrichment at Fordow by converting it to a "research" facility.

Such limits on Iran's enrichment capacity and the size of its stockpile of low-enriched uranium would significantly increase the time necessary to produce enough highly enriched uranium for one bomb.

Nevertheless, some critics of the agreement between Iran and the P5+1, including Israeli Prime Minister Benjamin Netanyahu, are continuing to demand Iran's total capitulation: the permanent suspension of all uranium enrichment and the dismantlement of the Natanz, Fordow, and Arak facilities.

Such an outcome might have been conceivable a decade ago when Iran agreed to suspend enrichment work and had only a handful of centrifuges. But today, such

demands are unrealistic and are unnecessary to guard against a nuclear-armed Iran.

The P5+1 is expected to press Iran to abandon the unfinished Arak reactor, but Tehran will likely resist such an outcome. One compromise effectively neutralizing Arak as a threat would be to convert Arak to a more proliferation-resistant light-water reactor or to verifiably remove the spent fuel for disposition by a third country, possibly Russia, to prevent it from becoming a source of plutonium.

The final phase should lead to even more extensive IAEA inspection authority to guard against a secret weapons program under the terms of an additional protocol, which would give the IAEA access to undeclared sites and serve as a strong deterrent to any clandestine nuclear weapons work. To normalize its nuclear status, Iran must also resolve long-standing questions from the IAEA about suspected weapons-related experiments that may have been conducted in secret in the past.

To secure a final-phase agreement, the P5+1 will need to refrain from imposing additional sanctions and be prepared to phase out remaining oil and financial sanctions against Iran, which will require action by the European Union and the U.S. Congress.

Negotiating a comprehensive deal along these lines will be difficult. Implementing the steps that such an agreement would require will be even more challenging. But a practical, diplomatic solution that guards against a nuclear-armed Iran is within reach. Now is the time to seize it. **ACT**

**...a significant
milestone for
nonproliferation.**

InBRIEF

Notable Quotable

“The roadblock to more effective nuclear materials security and to a more secure nuclear fuel cycle is a concept of national sovereignty that is not consistent with today’s dangers.... A concern for the fate of citizens in our own countries entitles—even obliges—leaders to insist on global standards for nuclear materials security and a more secure nuclear fuel cycle.”

*—Former Senator Sam Nunn (D-Ga.),
American Nuclear Society winter meeting,
Washington, November 11, 2013*

Five Years Ago in ACT

A Different Kind of Complex: The Future of U.S. Nuclear Weapons and the Nuclear Weapons Enterprise

“The United States should move rapidly to a stockpile of 1,000 weapons of the current type. Vigorous and challenging work in the weapons labs and a smaller and more efficient support complex can maintain the safety and reliability of these weapons.”

—Richard L. Garwin, December 2008

BY THE NUMBERS

Civilian Stockpiles of Highly Enriched Uranium

2

Countries with more than 10,000 kilograms¹

6

Countries with 1,000-10,000 kilograms²

7

Countries with 100-1,000 kilograms³

4

Countries with 10-100 kilograms⁴

6

Countries with 1-10 kilograms⁵

5

Countries with about 1 kilogram⁶

1. Russia, United States

2. Canada, China, France, Japan, Kazakhstan, United Kingdom

3. Belarus, Belgium, Germany, Italy, Netherlands, Poland, South Africa

4. Israel, North Korea, Pakistan, Uzbekistan

5. Argentina, Australia, India, Iran, Norway, Switzerland

6. Ghana, Indonesia, Jamaica, Nigeria, Syria

Source: International Panel on Fissile Materials

News Briefs

Meeting Set to Discuss Autonomous Arms

Countries meeting in Geneva last month agreed to start discussions on a class of weapons that can use lethal force without human intervention.

At a Nov. 15 session of the annual meeting of parties to the Convention on Certain Conventional Weapons (CCW), countries decided to hold an “informal” meeting of experts next May 13-16 “to discuss the questions related to emerging technologies in the area of lethal autonomous weapons systems,” according to the official document summarizing the results of the session. The May discussions are to be “in the context of the objectives and purposes” of the CCW, which bans or restricts the use of certain types of conventional weapons.

The Nov. 15 decision represents the first international attempt to grapple with what observers and participants say are the complex and, in some cases, unique issues raised by these weapons systems, dubbed by their critics as “killer robots.”

Jean-Hugues Simon-Michel, the French ambassador to the Conference on Disarmament in Geneva who chaired the CCW meeting, said in a Nov. 25 e-mail to *Arms Control Today* that one of the reasons the topic is complex is that the technologies in question are still under development. The May meeting is intended to be “a first step toward building a common understanding of the questions raised” by the topic, he said, adding that “[i]t is too early to say” what the final result of the process will be.

The issue of lethal autonomous weapons systems has drawn increased attention in the past year or so. In November 2012, Human Rights Watch and the International Human Rights Clinic at Harvard Law School produced a report calling for a “preemptive prohibition on [the] development and use” of such systems. In an April report, Christof Heyns, special rapporteur for the UN Human Rights Council, recommended a number of steps including the establishment of “an international body...to monitor the situation [with regard to autonomous weapons] and articulate the options for the longer term.”

Simon-Michel is to chair the May meeting and prepare a report “objectively reflecting the discussions held” for next year’s annual meeting of the CCW. In the Nov. 25 e-mail, he said that with the report in hand, the CCW parties, “on the basis of the discussions and exchange of views, will be in a position to take an informed decision in November 2014 on how to further elaborate on this topic.”

Under the mandate, the chairman of the May meeting is to submit the report “under his own responsibility,” which means the meeting participants do not need to agree to approve it.

In a Nov. 15 statement, the Campaign to Stop Killer Robots, an international coalition of nongovernmental organizations, hailed the CCW parties’ decision earlier that day as “historic.” Mary Wareham of Human Rights Watch, the campaign’s global coordinator, said it was noteworthy that there had been so little opposition to the idea of the May meeting.

“Nobody’s calling for the status quo,” she said in a Nov. 20 interview.—**DANIEL HORNER**



U.S. State Department

Madelyn Creedon delivers remarks during a conference at the State Department on July 16.

Obama Announces Key NNSA Nominee

The Obama administration on Nov. 6 announced it would nominate Madelyn Creedon to be principal deputy administrator at the National Nuclear Security Administration (NNSA), a semi-autonomous part of the Energy Department. That position is the second-most senior in the NNSA, which oversees all U.S. nuclear weapons production and maintenance activities, as well as nonproliferation programs.

Creedon is assistant secretary of defense for global strategic affairs, a position she has held since 2011. From 2001 to 2011, Creedon was counsel for the Democratic staff on the Senate Armed Services Committee and was responsible for the Subcommittee on Strategic Forces and threat reduction and nuclear nonproliferation issues. From 2000 to 2001, she served as the deputy administrator for defense programs at the NNSA.

In August, President Barack Obama nominated retired Lt. Gen. Frank Klotz to lead the NNSA. Klotz is senior fellow for strategic studies and arms control at the Council on Foreign Relations and is a former commander of Air Force Global Strike Command. Earlier, Klotz served as the defense attaché at the U.S. Embassy in Moscow. Later, from 2001 to 2003, as the director for nuclear policy and arms control on the National Security Council staff, he represented the White House in the talks that led to the 2002 Strategic Offensive Reductions Treaty.

At Klotz’s Sept. 19 confirmation hearing before the Senate Armed Services Committee, Sen. James Inhofe (R-Okla.), the panel’s ranking member, said that “Congress has serious concerns about [NNSA] management, especially with respect to cost growth, schedule slippage, security, and planning.”

Klotz said at the hearing that “security and safety” would be his top priorities.

Klotz would replace Thomas D’Agostino, who retired in January. Creedon would replace Neile Miller, who left in June.—

TOM Z. COLLINA

CTBTO Announces Pledges to Limit Xenon

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) announced Nov. 13 that four medical isotope makers have pledged to reduce radionuclide emissions, a step that the organization said would help it in its mission of identifying nuclear test explosions.

The producers also have agreed to share information on emission levels, the CTBTO said in the announcement.

The increasing global production of medical isotopes has led to higher emissions of the radioactive noble gas xenon, the CTBTO said, and could affect one of the CTBTO's key verification technologies by masking a potential xenon release from an underground nuclear test. CTBTO Executive Secretary Lassina Zerbo said the cooperation with the medical isotope producers "helps us to provide confidence to our member states that, now and in the future, no radioactive release from a nuclear test will go unnoticed."

The four companies that signed the pledge are the Australian Nuclear Science and Technology Organisation, Coquí RadioPharmaceuticals Corp. in the United States, the Korea Atomic Energy Research Institute, and PT Batan Teknologi Company Indonesia. The CTBTO will assist producers in clarifying any concerns due to elevated xenon levels.

The Belgian-based Institute for Radio Elements signed the pledge in June.

The agreement was signed during a workshop at the CTBTO's Vienna headquarters on the radioactive signatures of medical and industrial isotope production. The permanent representatives to the UN office in Vienna of Belgium, Indonesia, South Korea, and the United States attended the ceremony, along with 70 representatives from established and prospective producers of medical isotopes from 24 countries and representatives from the International Atomic Energy Agency.

The Comprehensive Test Ban Treaty (CTBT) bans all nuclear explosions in the atmosphere, in outer space, underwater, and underground. The CTBTO's global verification regime, which is to have 337 facilities when it is fully operational, monitors the globe for nuclear explosions. Once the CTBT has entered into force, on-site inspections can also be used to search for evidence of a nuclear explosion.—*TOM Z. COLLINA*

Reports of Note

A WMD-Free Zone in the Middle East: Regional Perspectives

Paolo Foradori and Martin B. Malin, eds., Belfer Center for Science and International Affairs, Harvard University, November 2013

This collection of regional perspectives is intended to present "constructive approaches" that policymakers could take as they try to make progress in establishing a zone free of weapons of mass destruction (WMD) in the Middle East in the wake of the postponement from last December of a conference to begin discussions on this zone. Notable among the essays is one by Mahmoud Nasreddine, a former director of the Lebanese Atomic Energy Commission, who suggests using existing nuclear institutions in Europe and South America as models for creating a regional agency in the Middle East to inspect regional nuclear, biological, and chemical facilities. This agency could open "new opportunities" for cooperation on a wide range of areas related to nonconventional weapons, Nasreddine says. Emily B. Landau and Shimon Stein of the Institute for National Security Studies in Tel Aviv offer a provocative piece that discusses an approach for the zone that also would address Israel's security concerns. They suggest creating a Regional Security Dialogue Forum as a means of broadening the discussion to include issues beyond eliminating nonconventional weapons, such as the trust deficit among states, that could "cause instability if not addressed regionally." Creation of a WMD-free zone could emanate from this forum, they argue.—

KELSEY DAVENPORT

Don't Bank on the Bomb

International Campaign to Abolish Nuclear Weapons, October 2013

In this report, the International Campaign to Abolish Nuclear Weapons (ICAN) argues that the global arsenal of nuclear weapons can be reduced through divestment from private-sector entities involved in the production of those weapons. According to the report, financial institutions—defined in the report as banks, pension funds, asset managers, and insurance companies—can use financial disincentives to encourage private companies that produce nuclear weapons and their components to stop doing so. The report argues that divestment by financial institutions would stigmatize the production of nuclear weapons and their relevant components and would force companies that aid in the production of nuclear weapons to make strategic decisions about their involvement with nuclear weapons. The report includes a list of financial institutions that support companies involved in nuclear weapons production and a list of institutions that have a published policy of not funding the production of nuclear weapons. ICAN argues that the companies on the latter list should serve as a model for others to promote global reductions of nuclear weapons.—*ERIC WEY*

On the Calendar

Dec. 2-6	Meeting of states-parties to the Anti-Personnel Landmine Convention, Geneva
Dec. 2-6	Meeting of states-parties to the Chemical Weapons Convention, The Hague
Dec. 9-13	Meeting of states-parties to the Biological Weapons Convention, Geneva
Dec. 10	Presentation of the Nobel Peace Prize to the Organisation for the Prohibition of Chemical Weapons, Oslo
Jan. 20-Mar. 28	Conference on Disarmament: Part I, Geneva
Feb. 13-14	Conference on the Humanitarian Impact of Nuclear Weapons, Nayarit, Mexico



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How Divergent Views on Nuclear Disarmament Threaten the NPT

The nuclear Nonproliferation Treaty (NPT) is facing several serious challenges.

There are increasing doubts about its effectiveness in preventing the proliferation of nuclear weapons. The actions of North Korea are deeply worrying and significantly undermine the NPT edifice. The complex issue of the Iranian nuclear program and if and how it can be resolved will have serious repercussions for the treaty.

Universality is a key ingredient of the NPT's credibility, but looks more and more distant. Without India, Israel, and Pakistan, which never were parties, and North Korea, which declared its withdrawal from the treaty in 2003, the NPT's value as a security and confidence-building instrument is increasingly put into question in the regional contexts of the Middle East and Asia. Arguably its most serious challenge, however, is the extent to which it can still be considered as a framework in which to achieve

nuclear disarmament. Fundamentally different and even conflicting views are apparent among the NPT membership on key aspects, such as the priority of nuclear disarmament, the demands of Article VI,¹ the definition of credible progress, and the way forward. These differences threaten the integrity of the NPT.

When the 2010 NPT Review Conference adopted by consensus an action plan² that included 22 concrete nuclear disarmament actions,

it was heralded as a significant achievement because it would make the implementation of Article VI measurable against a set of clear benchmarks. The 2010 action plan, for the first time in the NPT context, declared a world free of nuclear weapons as the goal of nuclear disarmament. It contains recommitments to previous undertakings on nuclear disarmament and concrete steps on security assurances, nuclear testing, fissile material production, transparency, and other measures.

The action plan underscored that Article VI was a collective responsibility of all NPT states-parties—non-nuclear-weapon states as well as nuclear-weapon states. Action 1 commits all states-parties “to pursue policies that are fully compatible with the Treaty and the objective of achieving a world without nuclear weapons.” The plan calls on the nuclear-weapon states to report on their undertakings at next year's NPT Preparatory Committee meeting, the third and last such meeting before the 2015 review conference. The conference will take stock and consider the next steps for the full implementation of Article VI.³

With these benchmarks looming, the reporting of nuclear-weapon states on their actions and the extent to which

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non-nuclear-weapon states will consider those actions to be sufficient progress will be a key issue, if not the most important issue, in the run-up to the 2015 conference and at the conference. The argument probably will proceed along familiar lines: nuclear-weapon states will present the action plan as an endorsement of a gradual and incremental implementation of Article VI and will point to some steps they have taken as proof of their commitment to nuclear disarmament. In contrast, the non-nuclear-weapon states are likely to express disappointment about the lack of significant progress, which they will cite as proof of procrastination on the part of nuclear-weapon states.

During past review conferences, the NPT parties have largely brushed over these conflicting views through consensus language. This approach may not work any longer. The NPT may be reaching the point where the contradictions, particular those pertaining to nuclear disarmament, place too much stress on the credibility and cohesion of the treaty. It may be necessary to address these contradictions and differing perceptions openly in order to stop the slow but accelerating process of erosion of the NPT.

A Priority or Distant Objective?

The rhetoric in public statements and international forums would indicate a broadly shared view about the objective of nuclear disarmament and a world without nuclear weapons. In reality, there is a serious disconnect between nuclear-weapon states and non-nuclear-weapon states on the issue.

Nuclear-weapon states' declarations on disarmament focus on nuclear weapons reductions by bilateral agreements, such as between Russia and the United States, or through unilateral steps. Yet, these statements still posit the deterrence value of nuclear weapons and continue to rely on those weapons as ultimate guarantors of security. Modernization programs are in place, and long-term investments in nuclear weapons and their infrastructure are being made or are foreseen in all nuclear-weapon states.

Consequently, nuclear-weapon states consider nuclear disarmament and the achievement of a world without nuclear



UN Photo

Japanese Prime Minister Shinzo Abe addresses the UN General Assembly's high-level meeting on nuclear disarmament on September 26.

weapons to be a long-term aspirational objective at best. Thus, pending the achievement of perceived global preconditions for nuclear disarmament, these countries are prepared to take only limited and gradual disarmament steps without fundamentally reassessing the role of nuclear weapons or altering the nuclear strategic balance. At the same time, nuclear-weapon states focus on the prevention of further proliferation of nuclear weapons, which they see as the only real challenge to the integrity of the NPT. This is not only their clear

priority, but they argue it is a necessary precondition for more-substantial nuclear disarmament steps.

The perspectives of most non-nuclear-weapon states regarding the urgency of nuclear disarmament are quite different. Among these countries, nuclear weapons and nuclear deterrence are widely seen as a high-risk approach to national and international security. According to this view, humanity escaped unharmed during the Cold War period and thereafter as much by luck as by design. Moreover, the concepts of

nuclear deterrence and the necessity of nuclear strategic stability, which were merely transferred to the 21st century with little change, look increasingly anachronistic 20 years after the end of the Cold War. This lack of adaptation to new realities might be seen not only as a missed opportunity but also as a serious misjudgment and a key driver

weapons primarily from a national security perspective. Decisions about nuclear weapons are considered to fall under strictly national prerogatives.

Nuclear-weapon states make a clear distinction between the NPT nonproliferation obligations that are legally binding and operationalized in detail on the one hand and the NPT

Non-nuclear-weapon states look on the outcomes of past review conferences as a further development and operationalization of the NPT nuclear disarmament obligations of Article VI. They see a close conceptual connection between their agreement to be bound by the nonproliferation provisions and the implementation of

[C]redible progress on nuclear disarmament, in the eyes of [non-nuclear-weapon] states, would require discernible changes in the policies of nuclear-weapon states and a clear direction toward nuclear disarmament and a world without nuclear weapons.

and incentive for proliferation. Arguably, there is a direct relation between the continued reliance on nuclear weapons by nuclear-weapon states and the quest for these weapons by other states. This link can only be broken by a collective and sincere move away from nuclear weapons.

Most non-nuclear-weapon states that are not part of “nuclear sharing arrangements” or “nuclear umbrellas” consider nuclear weapons to be highly dangerous in themselves. They view retention of and reliance on nuclear weapons as outdated, while seeing disarmament as an essential element of preventing the proliferation of nuclear weapons. The mere existence of nuclear weapons results in a permanent risk of devastating consequences for the entire planet. Such an existential threat to all humankind should no longer be handled by a few states as a national security matter to the detriment of the security interests of the vast majority of states.

Obligations or Commitments?

Another fundamental divergence of views between nuclear-weapon states and non-nuclear-weapon states pertains to the status of NPT obligations and commitments to nuclear disarmament and the achievement and maintenance of a world without nuclear weapons. Nuclear-weapon states look on such

nuclear disarmament commitments on the other hand. Article VI remains the only legally binding multilateral nuclear disarmament obligation, but it is formulated so vaguely, for obvious historical reasons, that “the pursuit of negotiations in good faith” is largely left open to interpretation and is implemented very loosely. Moreover, the link between “nuclear disarmament” and “a treaty on general and complete disarmament” can be interpreted in a way that nuclear disarmament will be achievable only as part of a global security environment in the distant future, as a sort of end point of international relations.⁴

Nuclear-weapon states view the numerous nuclear disarmament commitments agreed by consensus at NPT review conferences as only political and therefore nonbinding. They make a clear distinction between compliance with nonproliferation obligations and implementation of nuclear disarmament commitments. They view the former as the fundamental measure of compliance with the NPT, but the latter is measured only against a set of nonbinding political commitments. One could well conclude that nuclear-weapon states agreed to the disarmament commitments only because, in their interpretation, these provisions do not qualify as legally binding commitments.

the agreed disarmament undertakings and outcomes.

This is particularly the case with respect to the indefinite extension of the NPT in 1995. The non-nuclear-weapon states agreed to the extension on the condition that the nuclear-weapon states take certain nuclear disarmament steps and measures. The NPT membership collectively elaborated these steps at the 2000 and 2010 review conferences. Today, non-nuclear-weapon states see those commitments as largely unfulfilled or not satisfactorily fulfilled. In their eyes, the body of agreed nuclear disarmament undertakings and outcomes in the NPT goes well beyond political declarations of intent. These states see the commitments as quasi-legally binding elements of a deal that has not been honored. In consequence, some non-nuclear-weapon states question the wisdom of the 1995 agreement for indefinite extension.

What Is Credible Progress?

Equally stark differences between nuclear-weapon states and many non-nuclear-weapon states are also evident with regard to the criteria for credible progress in implementing disarmament commitments and obligations. Nuclear-weapon states approach nuclear disarmament and the implementation of Article VI as a series of more or less

modest, gradual steps. These include reductions in the numbers of nuclear weapons, unilateral moratoriums on the production of fissile material or on nuclear testing, and technical steps such as a glossary of nuclear terms being developed by nuclear-weapon states.

On the multilateral front, the first step would be the Comprehensive Test Ban Treaty (CTBT), followed by a treaty prohibiting the production of fissile material. These steps, however, are conditioned on being compatible with maintaining nuclear strategic stability and continued reliance on nuclear weapons until a time when the conditions for nuclear disarmament exist. Nuclear-weapon states argue that there is no contradiction between the maintenance of nuclear strategic stability and their professed support for nuclear disarmament. Consequently, the continued reliance on nuclear weapons in military doctrines and the maintenance of, modernization of, and long-term investments in nuclear weapons and the nuclear weapons infrastructure are compatible with Article VI.

Non-nuclear-weapon states recognize that nuclear disarmament is technically complex and will need time and a series of interconnected steps. Nevertheless, credible progress on nuclear disarmament, in the eyes of these states, would require discernible changes

in the policies of nuclear-weapon states and a clear direction toward nuclear disarmament and a world without nuclear weapons.

These changes have been promised in successive NPT review conferences, but have not happened and do not appear to be being pursued with determination. The continued reliance by nuclear-weapon states on nuclear weapons until an unspecified point in the future is seen as contradictory to the spirit and letter of agreed nuclear disarmament commitments and obligations.

Progress on the other multilateral steps remains equally elusive. The CTBT has not entered into force, and the multilateral forum tasked with negotiating a treaty on fissile material—the Conference on Disarmament (CD) in Geneva—has been dysfunctional for a decade and a half. Nearly 20 years after the extension of the NPT, the first foreseen multilateral step has not been completed, and the second is nowhere in sight. As a consequence of this overall picture, there is widespread doubt that the nuclear-weapon states are acting on their nuclear disarmament rhetoric with a sense of urgency. Rather, many see a systematic approach that aims to maintain the nuclear status quo for as long as possible.

These different views and expectations regarding the implementation of

nuclear disarmament commitments and obligations clearly are very difficult to reconcile. The key question is the extent to which they are still reconcilable or whether the differences of views are such that reaching a broadly acceptable common understanding has become impossible. Interestingly, it could be precisely the consensus agreement on the 2010 NPT action plan that clarifies that the NPT nuclear disarmament debate suffers from fundamental inherent contradictions and that new approaches may be required.

The action plan provides a tool for the NPT community to measure progress on nuclear disarmament.⁵ In an interpretation widely shared among non-nuclear-weapon states, implementation of the action plan would require, in addition to further reductions in stockpiles, progress on the following key indicators:

- changes in nuclear doctrines to diminish the role of nuclear weapons;
- reduction of the operational readiness and lowering of the alert status of nuclear weapons;
- increases in the level of transparency;
- tangible progress toward entry into force of the CTBT; and
- overcoming the paralysis of the United Nations' so-called disarmament machinery, especially in the CD.

Barring some unexpected developments in the nuclear-weapon states, it appears highly unlikely that the 2014 reporting by nuclear-weapon states will point to significant developments on any of these indicators. More than anything else, however, the plans for the modernization and upgrading of nuclear arsenals and the supporting infrastructure that are foreseen in nuclear-weapon states and the accompanying budgetary allocations will likely demonstrate the determination of these countries to rely on nuclear weapons for the long term.

The 2015 NPT Review Conference



Thomas Countryman, assistant secretary of state for international security and nonproliferation, briefs the media at the UN Office at Geneva on April 22, the opening day of the 2013 Preparatory Committee meeting for the 2015 Nuclear Nonproliferation Treaty Review Conference.

thus could become the moment when the constructive ambiguities, as some see them, on nuclear disarmament from previous review conferences' final documents are replaced with clarity: that nuclear-weapon states are not prepared to accept the non-nuclear-weapon states' view of the urgency and necessity of nuclear disarmament and will continue to argue for a so-called step-by-step approach, irrespective of how unpromising or implausible this approach may be. The sluggish implementation of the nuclear disarmament commitments of the 1995, 2000, and, likely, the 2010 review conferences shows that this track record is a clear indicator of how far and fast nuclear-weapon states are willing to go in the framework of the NPT.

The Way Forward

The NPT debate has been based thus far on a broadly shared agreement among NPT parties that, in spite of all its flaws, the treaty is beneficial to the international community as a firm legal basis for nuclear nonproliferation, as the only multilateral nuclear disarmament framework, and as a means to facilitate access to peaceful uses of nuclear energy. This still holds true, and NPT parties continue to underscore this point in their public statements. This agreement cannot be taken for granted. Ultimately, the value of legal frameworks is not cast in stone. It needs to be demonstrated continuously and be grounded in a core understanding of credibility and fairness that is shared among the entire membership. Most international treaties represent difficult compromises and have contradictions built into them. For every legal norm, however, there is only a finite level of inconsistencies or credibility deficits that can be absorbed before the fundamental equilibrium is disturbed.

On this front, the NPT is in serious trouble. For the reasons pointed out above, its credibility as a framework for nuclear disarmament is in jeopardy. If nuclear-weapon states want to halt an erosion of the treaty, they need to take the views and expectations of non-nuclear-weapon states on nuclear disarmament much more seriously. The tactics of playing for time within the NPT and the other multilateral forums

will not work for much longer. This NPT review cycle is crucially important.

There is also a race against time. The multilateral nuclear disarmament and nonproliferation regime is at a crossroads. Some of the key parameters of the nuclear age, namely, that only a few states are in possession of nuclear weapons and have the required knowledge and technological capabilities, are fast losing their validity. The nuclear technological threshold is still high, but it is falling rapidly. More and more states and perhaps nonstate actors will be in a position to reach or cross the line of nuclear weapons capability. The decision to do so will increasingly be based on political rather than technological considerations.

The potential consequences of this trend are an increasing risk of nuclear weapons proliferation and use. A focus on nonproliferation alone, as important as it is, is ultimately doomed to fail. With the technological threshold getting lower and the interest in nuclear technology getting higher, the only long-term approach is to build credible political and legal barriers against nuclear weapons.

As long as nuclear-weapon states and their allies regard nuclear weapons as a legitimate security hedge for themselves, efforts to counter nuclear proliferation will always suffer from a fundamental

contradiction and credibility deficit. Both the possession of nuclear weapons and reliance on nuclear deterrence are drivers for proliferation.

Nuclear-weapon states may argue that proliferation is the only real challenge to the integrity of the NPT, whereas procrastination or slow progress on nuclear disarmament is not. This line of argument is self-serving and alarmingly shortsighted. In order to maintain global support for the NPT and the entire nuclear disarmament and nonproliferation regime and to halt the spread of nuclear weapons, nuclear-weapon states need to add much more credibility to their own nuclear disarmament efforts. Through their own example, nuclear-weapon states have the prime responsibility to prevent proliferation, but they urgently need to realize that, in the final analysis, they cannot have it both ways. The alternative would be an irreparable undermining of the NPT with the potential consequence of more and more actors seeking to develop nuclear weapons. The conclusion is clear: nuclear disarmament and nonproliferation efforts can only be achieved in parallel.

In view of the mounting concerns about the value of the NPT as an instrument of nuclear disarmament, it is encouraging that non-nuclear-weapon



Russian President Vladimir Putin (bottom left) and Prime Minister Dmitry Medvedev (bottom center) watch a Topol intercontinental ballistic missile roll through Red Square in Moscow during a Victory Day parade on May 9.

Alexey Druzhinin/AFP/Getty Images

states have focused on this issue with a renewed sense of urgency. Several initiatives have been launched as a consequence of non-nuclear-weapon states' commitment to facilitating a more focused implementation of Article VI in line with Action 1 of the 2010 action plan. One of these initiatives was UN General Assembly Resolution 67/56,⁶ which established an open-ended working group that met successfully during 2013 and produced a substantive report⁷ on proposals for the achievement and maintenance of a world without nuclear weapons. Another important manifestation by the international community of the shared wish to see progress was the convening on September 26 of a high-level meeting of the UN General Assembly on nuclear disarmament.⁸

The most remarkable development is the increased focus on the humanitarian consequences of nuclear weapons. This is an important shift in the discourse on nuclear weapons away from the traditional, narrow national security policy focus of possessor states. The 2010 NPT Review Conference expressed "deep concern at the catastrophic humanitarian consequences of any use of nuclear weapons."⁹ An important conference in Norway in March focused on this issue, and a follow-up conference will take place in Mexico next February. Recently in the UN General Assembly First Committee, 125 states delivered a joint statement underscoring their shared concern about the humanitarian consequences of nuclear weapons, building on several previous joint statements in different forums.¹⁰

As long as nuclear weapons exist, the risk of their use by design, miscalculation, accident, or madness remains real. Any use of nuclear weapons would cause unthinkable humanitarian emergencies and have catastrophic global consequences on the environment, climate, health, social order, human development, and economy. The more the world understands about the global humanitarian consequences of nuclear weapons, the stronger the case against them becomes. Viewed against such a background, nuclear weapons are not reconcilable with a 21st-century understanding of international law and,

in particular, international humanitarian law. In an age of globalization and in light of the uncontrollable destructive capability of nuclear weapons, such a broadening of the discourse was overdue. These aspects should be at the core of the international community's nuclear disarmament and nonproliferation efforts. Given the increased global attention, it is now clear that the humanitarian dimension will play a central role in the NPT discourse and beyond.

Nuclear-weapon states have boycotted or rejected the above initiatives with the utterly unconvincing argument that they would distract from the NPT and the implementation of the 2010 action plan. In truth, these initiatives do not distract from anything, but rather focus the attention of governments and the wider public on the importance of achieving a world without nuclear weapons. Civil society will likely play an increasing role in a broader nuclear weapons debate, a trend that already is evident today. Pressure for greater transparency and scrutiny of governmental action and priorities will increase, further coupled with a trend of more global interaction and cooperation. Against the background of a broader societal debate, it will become more and more difficult to sustain the arguments in favor of retention of nuclear weapons.

Instead of resisting and acting to undermine efforts by non-nuclear-weapon states and civil society, nuclear-weapon states should start to embrace a different discourse on nuclear weapons themselves and move seriously toward their elimination. This would be the most sustainable and credible way of contributing to the integrity of the NPT and retaining it as a key instrument of collective security.

ENDNOTES

1. Article VI states, "Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a Treaty on general and complete disarmament under strict and effective international control."

2. 2010 Review Conference of the Parties

to the Treaty on the Non-Proliferation of Nuclear Weapons, "Final Document," NPT/CONF.2010/50 (Vol. 1), 2010, pp. 19-31 (hereinafter 2010 NPT action plan).

3. *Ibid.*, p. 21 (Action 5).

4. The 1996 advisory opinion of the International Court of Justice (ICJ) provided a strengthened and expanded interpretation of the obligation for nuclear disarmament under international law. It underscored that "there exists an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament." According to the ICJ, this obligation is universal, thereby going beyond the issue of NPT universality. Nevertheless, there remains scope for interpretation in the advisory opinion regarding what constitutes "pursuing nuclear disarmament negotiations in good faith" in concrete terms. Although advisory opinions carry a great deal of authority, they are not binding on states. "Legality of the Threat or Use of Nuclear Weapons: Advisory Opinion," *I.C.J. Reports*, 1996, <http://www.icj-cij.org/docket/files/95/7495.pdf>.

5. See Ramesh Thakur and Gareth Evans, eds., "Nuclear Weapons: The State of Play," Centre for Nuclear Non-Proliferation and Disarmament, 2013, <http://cnnd.anu.edu.au/files/2013/state-of-play-report/Nuclear-Weapons-The-State-of-Play.pdf>; Gaukhar Mukhatzhanova, "Implementation of the Conclusions and Recommendations for Follow-On Actions Adopted by the 2010 NPT Review Conference," James Martin Center for Nonproliferation Studies, April 2012, http://cns.miis.edu/opapers/pdfs/120419_cns_npt_monitoring_report.pdf.

6. UN General Assembly, A/RES/67/56, January 4, 2013.

7. UN General Assembly, "Proposals to Take Forward Multilateral Nuclear Disarmament Negotiations for the Achievement and Maintenance of a World Without Nuclear Weapons," A/68/514, October 9, 2013.

8. UN General Assembly, A/RES/67/39, January 4, 2013.

9. 2010 NPT action plan, pp. 19-31.

10. Dell Higgie, "Joint Statement on the Humanitarian Consequences of Nuclear Weapons," October 21, 2013, http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/1com/1com13/statements/21Oct_Joint.pdf.

Securing the 2014 Summit: An Interview With Dutch Nuclear Security ‘Sherpa’ Piet de Klerk

As the Dutch “sherpa” for the nuclear security summit scheduled to take place March 24-25 in The Hague, Piet de Klerk is the host country’s lead coordinator and negotiator for the event. Before taking that position in mid-2012, he was the chairman of the Nuclear Suppliers Group. From 2011 to 2013, he was the Dutch ambassador to Jordan. In previous postings with the Dutch Foreign Ministry and the International Atomic Energy Agency (IAEA), he has held numerous positions dealing with nuclear arms control and nonproliferation.

De Klerk spoke with *Arms Control Today* at the Dutch embassy in Washington on Oct. 31. He described the goals for the upcoming summit, the announcement earlier this year of a 2016 summit, and the planned transfer of responsibility for certain nuclear security activities to the IAEA and other institutions once the summit process ends.

The Hague summit will be the third; the others were in Washington in 2010 and Seoul in 2012.

The interview was transcribed by Eric

Wey. It has been edited for clarity and length. The text of the full interview is available at www.armscontrol.org/interviews.

ACT: *Thank you very much for taking the time to sit down with Arms Control Today. We very much appreciate your time. First, could you tell us what the Dutch goals are for the 2014 summit?*

De Klerk: There are different levels at which you discuss these goals. First of

all, at the level of the event, the goal is a successful summit without incidents that everyone looks back at with pleasure and satisfaction. From a substantive perspective, we would be very happy if the important goal of preventing and combating nuclear terrorism has been brought once more to the forefront and that those concerned have not only the feeling but the conviction that they have contributed to this goal by substantively strengthening the international nuclear security architecture and by further consolidating and better protecting the materials in question, the weapons-usable material, highly enriched uranium and plutonium.

Of course, we have the results of the Washington and Seoul summits, and some of the same elements will come back in the conclusions of the leaders. But we have the hope and the expectation that, on a number of issues, we can do better than that.

Now, at the level of more-specific Dutch priorities, we’ve set up this summit in close cooperation with our nuclear industry and our think tank world. There will be three separate events, and we can talk about that later, but that synergy between these three we hope will also come back in the conclusions of the summit. One of the substantive parts where we think we can formulate stronger conclusions has to do with the more effective interaction of government

and industry with the regulator in the middle. That's one thing, and the other thing is [that] the stronger involvement of the world of science and technology is important—for example, the important role of forensics in combating nuclear smuggling. So I think these are a few more national priorities, if you want, within this broader goal of preventing and combating nuclear terrorism.

ACT: *In formulating these priorities, how has the announcement of a 2016 summit changed your thinking of what can be accomplished and what goals you might like to see carried forward in 2016?*

De Klerk: Interesting question. We knew in advance that President [Barack] Obama was going to announce in Berlin that he wanted a new 2016 summit in the United States, but in practical terms, it hardly has had any effect on our preparations. We have also agreed with our American colleagues, with whom we work together very intensively, that the motto will remain, "Full steam ahead to The Hague." So in that sense, nothing changes in the preparations for our summit.

At the same time, it's clear that some of the goals that we had in the early days—that we can get the amended Convention on the Physical Protection of Nuclear Material in force¹—[are] not progressing well, so that [entry into force of the convention] will be put, unavoidably, in the basket of the 2016 results. There are a number of other longer-terms goals that you can formulate in 2016 in stronger terms than you can in 2014, but I haven't thought in any detail about the goals for 2016, and I can't speak of course for the U.S. administration. I am convinced of the fact that they'll only start thinking seriously about goals after the summit in The Hague, which makes sense because then you can assess where we are and how we plan ahead for the next two years.

ACT: *So to bring it back, then, to Dutch priorities: After the last sherpa meeting in Ottawa in October, there was a press release put on the summit website saying the Netherlands believes that progress can be made in two areas: "closer cooperation between government and the industry*



Dutch Ministry of Foreign Affairs

Piet de Klerk, shown in this November 12 photo, is leading the Netherlands' preparations for the nuclear security summit it will host in The Hague next March.

on nuclear security" and "the sharing of information on the quality of nuclear security systems."² Can you tell us in a little more detail what you're looking for in terms of commitments or language in these two areas?

De Klerk: The relation between government and industry is difficult in the sense that the relationship differs from country to country. In some countries, the nuclear industry is predominantly state owned; in others, it's purely private industry. So it's difficult to put forward hard-and-fast rules, but by and large, we think that you gain quite a lot by looking again at that relationship and also at how an independent regulator works with both sides. How you should regulate is changing. For example, in the draft communiqué, we use a term that I hope survives further discussions, "performance-based inspections." The modern way of fulfilling your regulatory goal is not so much to come with your checklist of this and that, but you regulate with the goal of, "What should the outcome be?" In the end, how does a company need to perform? It's a combination of the checklist and performance in the end. This is all

formulated in a few sentences, but we want to capture changes in regulating and thereby better protecting nuclear material.

ACT: *There was an industry summit in Seoul, but there was some criticism, particularly from the nongovernmental community, that they were very separate events. So can you tell us if you're trying to integrate the industry summit more with the Dutch summit and how you would like to see these working in collaboration?*

De Klerk: I spoke, when you asked your previous question about more-effective interface between government and industry. That holds true here as well. Yes, there was this earlier industry summit in Seoul, but there was hardly any interface and interaction between the two processes. The lesson that we have drawn from that is that we decided to task Urenco, very shortly after we were picked as the chairman for the next summit, with organizing the nuclear industry summit and [doing so] in such a way that preliminary conclusions will be available in time for the sherpas to look at them. Because only then can you have at least the chance that some of the

recommendations, or lessons learned, or conclusions of the industry can be absorbed by the sherpas.

Of course, we have our own responsibility. If we think the industry's package of recommendations is

more confidential in many of its aspects than a nuclear safety regime. So it's not surprising, at least not to me, that the balance is more to the national responsibilities. At the same time, you've seen that nuclear security has

work and how it all logically hangs together.

Actually, there is one initiative where we worked closely with the United States. That initiative is to take a step further and say that states ought to implement

[O]ver time, you will see a greater harmony in how different countries regulate sources or nuclear material.

nonsense, then we don't do anything with it. But we expect there to be thoughtful conclusions, and then we need to have a debate within the group of sherpas whether we make these conclusions our own or we refer to the industry summit and welcome these conclusions or—I don't know what we are going to do, but the whole timing is set up in such a way that preliminary conclusions are available in time to look at them.

Different countries around the table have different views on whether leaders should explicitly refer to such other gatherings as those of captains of industry. So I don't know how that debate will end, and in the end, the chairman can't force that issue. The only responsibility that we felt was to set up the process in such a way that there would be the possibility of dovetailing. So far, at our last meeting in Ottawa, we had representatives of the different industry working groups during part of the session around the table and they shared where they were in the process. I think that, before mid-December, they will come up with a joint statement.

ACT: *Shifting a little more toward the development of standards, it seems there needs to be a balance in the summit process between developing more-rigorous standards and avoiding encroachment onto countries' sovereignty. How do you strike that balance?*

De Klerk: "Standards" is more a term from the nuclear safety world, but it's true that, as you say, it is very much up to individual countries to decide on their nuclear security regime. Security is even more sensitive and

made a spurt in recent years in terms of international cooperation, with many guidance documents in the IAEA coming to fruition. I don't think it's necessarily linked to the summit process, but the summit process has had quite an impact. If you start with the revised convention on physical protection, the fifth revision of the physical protection guidelines in [IAEA] INFCIRC/225, the IAEA Code of Conduct on the Safety and Security of Radioactive Sources, other guidance on sources in the [IAEA] Nuclear Security Series—quite a lot has been built up over the last years.

Of course, formally, even when states agree on or bless these recommendations as IAEA recommendations, then an individual state is not bound to implement them. That remains the state's responsibility, but there you have a bridge between international organizations and national responsibilities because these recommendations, adopted by consensus, are being implemented by most states. I had to check the Code of Conduct on the Safety and Security of Radioactive Sources recently and came to the conclusion, formulated in the conclusions of the draft communiqué [for the upcoming summit], that considerably more states have now implemented that sort of guidance.

So over time, you will see a greater harmony in how different countries regulate sources or nuclear material. I think that's an important role in international organizations: to streamline the field and make sure that inputs from different countries come together at a central point and go through the interactive peer process of checking what works and what doesn't

these IAEA recommendations. That is a separate project that we hope will come to fruition by the time of the summit as well. Greater commitment to implementing what the IAEA recommended and also to make yourself vulnerable to criticism by allowing IPPAS [International Physical Protection and Advisory Service] or other missions: a team from the IAEA comes to your country and looks at the way you have set up your physical protection and nuclear security organization. And then that state is free to accept the recommendations of the team.

The Netherlands has had several of these IPPAS missions in the last six, seven years, and sometimes we've said, "No, that recommendation doesn't fit in our system." You don't need to accept all the recommendations. But by and large, we have taken most recommendations to heart and have made certain changes in our setup. I think that's another very useful function of international organizations, that you have that sort of peer assessment. There are different ways international organizations can have an impact, but in the end, we all agree it remains a national responsibility.

ACT: *If I could ask about the U.S.-Dutch initiative: The idea would be to encourage countries to adopt as part of their national legislation the recommendation or standards of the IAEA or other organizations? Is that the idea?*

De Klerk: Yes. Right, in the national regulations.

ACT: *How do you go about providing that encouragement?*

De Klerk: We try to build a group of countries that will commit to that goal or to that ambition.

ACT: *The 2012 summit in Seoul introduced the concepts of joint statements, or “gift baskets.” Can you tell us a little bit about how these will be treated in the 2014 summit? Will there be new gift baskets? Will leaders of these gift baskets report on them at all?*

De Klerk: The whole terminology of gift baskets came up—I’m told, but I wasn’t there—shortly before the Seoul summit to inject more enthusiasm in the summit. The advantage of the summit in The Hague is that the concepts are now there and more mature. What we have tried to do at the first sherpa meetings is to make room for these different gift-basket holders—there is always one central country that is the chief organizer of that basket—to give them time to speak to these sessions to say what they’re planning, whether they’re planning new activities, and how they’re going about it. Some of the gift baskets

do not have much life in them and were more set up for the summit itself, and after the summit finished, the energy was gone. Others are very much alive and will make further presentations, probably with bigger groups, in The Hague. There will be time and room for presenting them.

So to answer the other part of the question, yes, I suspect that some of the old ones are still continuing, and I’m also sure that there will be at least a handful of new initiatives. You can call this initiative that I just mentioned, where we work together with the U.S. and also with South Korea and a number of other countries, you can call it a gift basket—it is an initiative of a group of countries—but other than that, I hesitate to mention other gift baskets because many are still works in progress. I expect a number of new initiatives when we come closer to the summit and political leaders are asking the question, “What do we have to offer in The Hague?”

So that will be another impetus for new gift baskets, and I hope there will be a lively presentation of different ideas

and hopefully with bigger groups than in Seoul. Then the concept of the gift basket was so novel that a number of countries said, “No, I don’t want to have anything to do with it, we don’t have enough time to study the idea, and I’m not setting my signature for something I don’t feel comfortable with.”

ACT: *There’s been quite a bit of discussion about the legacy of the summit process, based on the understanding that it was never meant to be a permanent institution. At a political level, where do you see nuclear security going after the summit process ends? Do you think the IAEA is the body that can best carry on this initiative?*

De Klerk: So first of all, the IAEA—for full disclosure, I should say that I worked for five years for the IAEA—has spent time and energy on nuclear security and physical protection since the 1970s. The first guidelines came out in 1972, the Convention on the Physical Protection of Nuclear Material was negotiated in the late 1970s, et cetera, et cetera. So it has a long history,



Paul J. Richards/AFP/Getty Images

National leaders attend a session of the nuclear security summit in Washington on April 13, 2010.

but at the same time, as I said before, it is undeniably true that the summit process has enabled them to shift into higher gear. Now more people there are working on nuclear security. I see that as a lasting effect, but of course in the long

term, that effect can wane. Who knows if we'll have nuclear accidents and safety becomes more important. We don't want to prescribe how the director-general of the IAEA and member states and the board and the General Conference need to set their priorities. Yes, the attention to nuclear security could go down over time, but I'm sure that ways can be found then for another political impetus. I see the effect of summits slowly going down because you can give a political impetus only so often, and at some point, the effect becomes less.

ACT: *Do you see the July conference on nuclear security at the IAEA playing a role in influencing your thoughts on where the Dutch summit can go and where the IAEA can continue to advance this agenda at a higher political level?*

De Klerk: Yes, I think the July conference was a good example of the higher profile of this nuclear security area, not only the fact that it was held, but also the fact there was this ministerial day at the beginning³ and the huge number of people showing up and having an interest. I think there were more than 1,300 people, which made it one of the biggest conferences the IAEA has ever organized. So yes, it's a demonstration of the higher priority, and some of the conclusions are also of some use for the nuclear security summits.

But not all parts of the nuclear security summit process fit in the IAEA. It may be we need new institutions or new entities after the summit process ends, but that thinking hasn't progressed far enough. Yes, there is a role for Interpol; yes, there's a role for

the UN; yes, there is a role for the Global Initiative to Combat Nuclear Terrorism, and the Global Partnership [Against the Spread of Weapons and Materials of Mass Destruction], and what have you. I'm not clear where the missing

dimension is. The IAEA clearly only deals with civil material, so to the extent that we can pay any attention, as we should, to military material, there are limits to the IAEA. The IAEA cannot, by definition, deal with all the questions that the nuclear security summit process deals with.

ACT: *You just mentioned the need to pay attention to military material. Do you see that as something the summit process needs to begin to take into consideration?*

De Klerk: I would be very happy if some attention would be paid by the summit to military materials, if only for the fact that, within nuclear-weapon states, there are large quantities of nuclear material not only in nuclear weapons, but three-quarters of it not in weapons, but in bulk, in reactors, in different forms. Considerations of physical protection and nuclear security apply to that material as well. Some sort of statement that it is at least as well protected as civilian fuel would be very useful and important in my mind. But how much we can say, if anything at all, would depend primarily on how much the countries concerned are willing to say.

Some of the principles [of the nuclear security summits]—for example, that it is better to convert your reactors that run on highly enriched uranium to lower enrichment—that's primarily for civilian research reactors, but there's no reason it can't or shouldn't apply to military reactors. Again, I know it's sensitive. But such principled considerations apply to all, except that we always add "when technically and economically feasible,"

and the implications of that caveat can, of course, be very different when you talk about military activities.

ACT: *So are you talking about submarine reactors? Is that, for example, what you're*

thinking about here?

De Klerk: I think it's better that I don't add more specificity.

ACT: *You mentioned that there may be a need for some new institutions to carry on this work. I actually want to ask about the existing institutions. Do you think that the institutions that are in place now are ready to take on this role—the IAEA, but also others? Are they ready at this point? Will they be ready in 2016 to take on the responsibilities they need to, to continue the work of the summits?*

De Klerk: I have great respect for the IAEA as it is, but again, I'm a former employee. I think it's very good that now they have more money, they have more people, they do more work on nuclear security. I see that as one of the results of the fact that, every two years, presidents and prime ministers come together to talk about nuclear security. Is everything precisely as we would like it in the IAEA? No. But they've made quite a lot of progress and can handle quite a lot, and of course in the end, you have to accept that, in international organizations, you have to compromise with 159 countries with different perspectives trying to formulate conclusions. So there is always a fair amount of watering down, but it is beyond doubt that they have made quite a lot of progress.

ACT: *Can you give an example of one area where you would like to see more progress by the IAEA before it takes on this role?*

De Klerk: Speaking personally, this notion of peer reviews, when that will be

It may be we need new institutions or new entities after the summit process ends, but that thinking hasn't progressed far enough.

broadly accepted, I think that will be a big step forward.

It will also be a big step forward if some of the concepts that are now common knowledge in nuclear safety could be applied to nuclear security as well. Nuclear safety developed very much after Chernobyl, and now inspections through the IAEA or through [the World Association of Nuclear Operators] are much more normal, whether you call it inspections or something else, than in nuclear security. That's still more in its infancy. I'm not suggesting that security needs to follow safety every step of the way, but there is a lot to be learned, in my own view, from the safety area.

One should also consider that the IAEA cannot do more than its member states allow it to do. So it would be very good if the United States and others would become party to this amended Convention on the Physical Protection of Nuclear Material because that would give a set of extra tools: review conferences, periodic reports would be more useful if

they are about the amended convention. But the 2005 amendment to the convention first needs to enter into force.⁴

ACT: *Well, thank you very much for taking the time—*

De Klerk: My pleasure.

ACT: *I don't know what your next interesting nuclear nonproliferation assignment will be, but hopefully we'll be able to interview you in that capacity, too.*⁵

ENDNOTES

1. The current, original version of the convention entered into force in 1987. In 2005 a diplomatic conference drafted an amendment that would extend protection requirements beyond the original agreement, which covers nuclear material while in international transport, by expanding the coverage to apply to nuclear facilities and to materials in peaceful domestic use and storage.

It also would impose new legal penalties for misuse of radioactive material and sabotage of nuclear facilities. The 2005 amendment will enter into force once it has been ratified by two-thirds of the states-parties of the convention.

2. NSS 2014, "Sherpa Meeting in Ottawa—One Step Closer to The Hague," October 22, 2013, <https://www.nss2014.com/en/news/sherpa-meeting-in-ottawa-one-step-closer-to-the-hague>.

3. The first day of the July 1-5 conference was focused on the participation of government ministers. According to the International Atomic Energy Agency (IAEA), 34 ministers attended the conference, which drew representatives from 125 states.

4. As of November 13, 2013, 28 additional countries need to ratify the convention.

5. *Arms Control Today* previously interviewed de Klerk when he was chairman of the Nuclear Suppliers Group. "The NSG in a Time of Change: An Interview With NSG Chairman Piet de Klerk," *Arms Control Today*, October 2011.



Yukiya Amano (left), director-general of the International Atomic Energy Agency, and Hungarian Foreign Minister János Martonyi participate in a press conference at IAEA headquarters in Vienna on July 1, the opening day of a week-long conference on nuclear security. Martonyi was president of the conference.

Iran, P5+1 Sign Nuclear Agreement

Iran and six world powers last month achieved an apparent breakthrough in negotiations over Tehran's controversial nuclear program when the parties reached a first-phase agreement on a six-month deal that will halt Iran's most sensitive nuclear activities and increase international monitoring of its nuclear program in exchange for some relief from sanctions that have hurt Iran's economy.

The deal was signed in Geneva in the early hours on Nov. 24 after four days of talks.

"For the first time in nearly a decade, we have halted the progress of the Iranian nuclear program, and key parts of the program will be rolled back," President Barack Obama declared shortly after the agreement was announced. Obama said the agreement "cut[s] off Iran's most likely paths to a bomb" and "creates time and space" to negotiate a comprehensive agreement.

Iranian President Hassan Rouhani also welcomed the deal. He said Nov. 24 that Iran's nuclear program, including its "right to enrichment," was recognized and the deal could serve as a basis for further negotiations.

Iran and the six world powers (China, France, Germany, Russia, the United Kingdom, and the United States), known as the P5+1, reached the agreement after three rounds of talks with Tehran's new negotiating team. (See *ACT*, November 2013.)

Rouhani appointed the new team after he took office in August. Iran maintains that its nuclear activities are entirely peaceful, but the international community is concerned that Tehran is keeping open the option to pursue nuclear weapons. The international community began negotiating with Iran over its nuclear program in 2003.

Iranian Foreign Minister Mohammad Javad Zarif led the Iranian team. EU foreign policy chief Catherine Ashton led the negotiating team for the P5+1. U.S. Secretary of State John Kerry joined the negotiations Nov. 23, as did the foreign ministers from the other P5+1 countries.

The First-Phase Agreement

The first-phase agreement is a four-page document that lays out specific actions for Iran and the P5+1 to take over the course



From left, Iranian Foreign Minister Mohammad Javad Zarif, Chinese Foreign Minister Wang Yi, U.S. Secretary of State John Kerry, Russian Foreign Minister Sergey Lavrov and French Foreign Minister Laurent Fabius participate in a press conference in Geneva in the early hours of November 24 announcing an agreement between Iran and six world powers on Tehran's nuclear program.

of six months and sets the goal of reaching a “comprehensive agreement” during that time (see box, page 24). The first-phase agreement can be extended beyond six months if the parties agree to do that.

The six-month time period will begin once the verification and enforcement mechanisms have been established, including creation of a joint committee to monitor implementation of the agreement. Implementation will begin after the committee is set up.

In a Nov. 24 press conference, Kerry said the course that Iran is required to take “locks the most critical components of a nuclear program into place and impedes progress in those critical components in a way that actually rolls back the stockpile of enriched uranium and widens the length of time possible” for Iran to move quickly toward a bomb.

According to the text of the agreement, Iran is required to eliminate its stockpile of uranium enriched to 20 percent and maintain its stockpile of 3.5 percent-enriched uranium at its current size. Over the next six months, Iran is to convert the 3.5 percent-enriched uranium that it produces to a form less suitable for further enrichment. Iran says it produces uranium enriched to 20 percent to fuel its research reactor and to 3.5 percent for power reactors that it plans to build in the future.

Iran’s stockpile of 20 percent-enriched uranium is a primary concern for the P5+1 because it can be more easily enriched to weapons grade. Iran currently has about 200 kilograms of uranium enriched to this level in its stockpile, according to a Nov. 14 report from the International Atomic Energy Agency (IAEA). Independent experts estimate that 250 kilograms of 20 percent-enriched material, when further enriched to weapons grade, is enough for one weapon.

The agreement also freezes installation or production of further centrifuges, which are used to enrich uranium, and construction of a heavy-water reactor at Iran’s Arak site. The reactor, when operational, would produce plutonium suitable for use in a nuclear weapon. But Iran is not known to have the facilities to separate plutonium from spent fuel.

Monitoring and verification would be increased under the agreement. International inspectors would have daily access to Iran’s enrichment facilities at Natanz and Fordow and be permitted to visit other nuclear sites, such as Iran’s centrifuge production facilities. The IAEA had limited access to the Natanz and Fordow facilities prior to this agreement, but was not permitted to visit the centrifuge production plants and other sites that are part of Iran’s nuclear program.

In return, Iran would be able to gain access to about \$4.2 billion in frozen assets from its oil sales. Among other benefits for Tehran, the United States would suspend certain sanctions on Iran’s auto sector, petrochemical exports, and trade in gold and other precious metals. The “core architecture” of the sanctions regime, namely sanctions on the oil and banking sectors, “remains firmly in place” as negotiations continue, Kerry said.

Right to Enrichment

In a Nov. 26 interview, an official familiar with the negotiations said the language dealing with recognition of Iran’s uranium-enrichment capabilities was one of the more difficult parts of the negotiations, as both sides hold “entrenched positions” on



T.J. Kirkpatrick-Pool/Getty Images

President Barack Obama delivers a statement on November 23 at the White House on Iran’s nuclear program. The agreement “cut[s] off Iran’s most likely paths to a bomb,” Obama said.

enrichment rights.

Iran maintains that it has the right to uranium enrichment under Article IV of the nuclear Nonproliferation Treaty (NPT), which guarantees states-parties access to nuclear technology as long as they adhere to their treaty obligations. Article IV does not specifically mention uranium enrichment. U.S. policy does not interpret access to enrichment technology as a right under Article IV.

The first-phase agreement allows Iran to continue enriching uranium to a level suitable for use in a power reactor. In outlining the general framework for the comprehensive deal, the agreement does not explicitly recognize Iran’s right to enrichment, but says that the “comprehensive solution would enable Iran to fully enjoy its right to nuclear energy for peaceful purposes under the relevant articles of the NPT in conformity with its obligations therein.” Iran would be allowed to maintain “a mutually defined enrichment programme with practical limits and transparency measures to ensure the peaceful nature of the programme,” the agreement says.

Washington and Tehran made statements interpreting the language used in the first-phase agreement as supportive of their respective policy positions.

Zarif told the press following the signing of the agreement that the deal “recognizes Iran’s right to enrichment.” Kerry, however, in a Nov. 24 interview with ABC reiterated that there is “no inherent right to enrich” and that the first-phase deal says Iran can enrich based on “mutual agreement.”

Further Sanctions

Under the first-phase agreement, no new sanctions on Iran would be imposed during the six-month term of the pact.

In his remarks following the signing of the agreement, Obama said that “now is not the time to move forward on new sanctions,” adding that it would “derail this promising first step.” If Iran does not meet its commitments under the agreement, however, the United States “will turn off the relief and ratchet up the pressure,” Obama said.

In an interview with NBC on Nov. 24, Zarif said that the “deal would be over” if there are any new sanctions passed during the next six months.

In Washington, senators are split on whether Congress should move ahead with more sanctions legislation.

In a Nov. 24 statement, Sen. Dianne Feinstein (D-Calif.), chairman of the Senate Intelligence Committee, called the preliminary agreement a “giant step forward” and said it “should not be undermined” by an immediate move toward further sanctions. If Tehran upholds the terms of the agreement, “we will know that Iran is serious about reaching a final agreement,” she said.

Sen. Saxby Chambliss (R-Ga.) said that additional sanctions pressure should be placed on Iran. In a Nov. 25 interview with ABC, Chambliss said that there is a “strong movement” in the Senate to move ahead to tighten sanctions. But Chambliss, vice chairman of the intelligence panel, said that, in light of the agreement, Congress might have to delay the effective date for the sanctions until after the six-month first-phase agreement ends.

The House of Representatives passed a bill in July that would expand restrictions on Iran, including a de facto oil embargo. Although the Senate has not moved forward on a bill similar to that one, several proposed amendments to the Senate version of the 2014 National Defense Authorization Act would impose further sanctions on Tehran. Those amendments could be considered when the Senate resumes debate on the defense bill in December.

A Senate staffer told *Arms Control Today* in a Nov. 25 e-mail that there is a great deal of skepticism in Congress about Iran’s intention to follow through on the deal. He said it is likely that the Senate will consider passing sanctions as stand-alone legislation or as an amendment to the defense bill, which would likely include language “delaying imposition of the restrictions for six months.” The legislation also could include language to allow the sanctions to be imposed immediately “if Iran doesn’t follow through on the deal,” he said.

Even if the legislation included language delaying imposition of further sanctions, moving forward on a sanctions bill would

be “extremely damaging” to unity within the P5+1 and “send the wrong signals” to Tehran, the official familiar with the negotiations said in the Nov. 26 interview.

Regional Perspectives

In the Middle East, attitudes toward the deal were also mixed.

Israeli Prime Minister Benjamin Netanyahu, perhaps the most vocal critic, described the deal as a “historic mistake” in a Nov. 24 statement. The Israeli Foreign Ministry issued a press release criticizing elements of the deal, saying that the first-phase agreement represented “unprecedented international recognition of Iran’s enrichment program” and “international acceptance” of the heavy-water reactor at the Arak site.

But in a separate Nov. 24 statement, Israeli President Shimon Peres said the agreement should be judged based on “the outcome, not on words alone.”

In a Nov. 25 e-mail to *Arms Control Today*, a former Israeli official said that Israel would continue pressuring the United States over the next six months to negotiate a “better comprehensive deal” with Iran that requires it to “dismantle its nuclear facilities.” Unilateral military action by Israel is “unlikely to occur if the agreement is properly implemented,” he said.

The deal could serve Israeli interests in the short term because the increased monitoring and access could give a “clearer picture of the state of the program,” the former official said. He added that gaining a more complete understanding of how Iran obtains and produces the materials it needs for building centrifuges could aid the international community in “properly enforcing international sanctions designed to control the sale and purchase of materials that could be used for nuclear weapons.”

Saudi Arabia, historically at odds with Iran, issued a statement Nov. 24 saying that if there are “good intentions,” this agreement could be a first step toward a comprehensive deal.

Final Deal

The framework lays out the goal of reaching a “mutually-agreed



Zarif addresses the Iranian parliament on November 27 as lawmakers review the agreement.

Atta Kenare/AFP/Getty Images

Key Features of the Iran Nuclear Deal

After four days of negotiations, Iran and six world powers reached agreement Nov. 24 on Tehran's nuclear program, which has caused discord between Iran and the international community for more than a decade. The agreement specifies initial steps the two sides are to take over a six-month period and outlines the terms of a comprehensive, long-term deal. The main points of the accord are described below.

Elements of the First Phase

The actions specified under the Nov. 24 first-phase agreement are to take place over a period of six months. The agreement can be extended if Iran and the P5+1 agree to renew it "by mutual consent."

The accord establishes a joint commission to monitor implementation of the deal and to work with the International Atomic Energy Agency (IAEA) on the monitoring and verification measures that the agency will undertake.

Iranian Actions

- Convert half of its stockpile of uranium enriched to 20 percent to oxide form and down-blend the remainder to an enrichment level of no more than 5 percent;
- Suspend production of 20 percent-enriched uranium;
- Refrain from further advances at the Natanz Fuel Enrichment Plant, the enrichment plant at Fordow, and the Arak heavy-water reactor;
- Convert uranium of enrichment levels of 5 percent or less produced during the six-month period to oxide form when the construction of a conversion facility is completed;
- Construct no new enrichment facilities;
- Continue research and development practices, including on enrichment, only under IAEA safeguards;
- Refrain from the reprocessing of spent fuel or the construction of any facility capable of reprocessing; and
- Enhance monitoring by measures including providing information to the IAEA on plans for nuclear power reactor sites and the Arak reactor, negotiating a safeguards approach for the Arak reactor, allowing daily IAEA access to the Natanz and Fordow enrichment plants, and allowing managed access to centrifuge workshops and uranium mines and mills.

long-term comprehensive solution that would ensure Iran's nuclear programme will be exclusively peaceful" and the broad outlines of a final deal.

The final agreement would include "practical limits and transparency measures" for Iran's enrichment program. It would lift sanctions "related to Iran's nuclear program" imposed by individual countries, the European Union, and the UN Security Council and would provide for international cooperation on civilian nuclear projects, including nuclear fuel and light-water power and research reactors.

An official involved with the negotiations said in a Nov. 24

P5+1 Actions

- Impose no new nuclear-related sanctions through action of the UN Security Council, the European Union, or the United States;
- Pause efforts to further reduce Iran's oil sales;
- Partially repatriate frozen Iranian assets from oil sales;
- Suspend U.S. and EU sanctions on Iranian petrochemical exports and trade in gold and precious metals;
- Suspend U.S. sanctions on Iran's auto industry;
- Supply and install spare parts for Iranian civil airplanes, including repairs and safety inspections;
- Establish a financial channel for humanitarian goods using Iran's oil revenues that are frozen abroad, which can also be used for tuition payments for Iranian students abroad and payment of Iran's UN dues; and
- Increase the EU thresholds for nonsanctioned trade with Iran.

Elements of a Comprehensive Deal

The first-phase agreement lays out the goal of reaching a comprehensive solution. It details elements of a comprehensive deal, following the principle that "nothing is agreed to until everything is agreed to."

The elements include

- agreeing on the duration of the accord;
- reflecting the rights and obligations of all parties under the nuclear Nonproliferation Treaty and of Iran under its IAEA safeguards agreement;
- lifting all UN Security Council sanctions on nuclear-related measures;
- adopting mutually agreed parameters on Iran's enrichment program;
- resolving concerns about the Arak reactor;
- implementing agreed-on transparency measures, including Iran's ratification and implementation of an additional protocol to its safeguards agreement with the IAEA; and
- cooperating on civil nuclear projects, including nuclear fuel and light-water power and research reactors.

interview that Iran was "satisfied by the language" in the first-phase agreement and by verbal assurances from the P5+1 that if Iran follows through on implementation of the deal, it will be permitted to continue "limited enrichment with intrusive monitoring" under the comprehensive agreement.

But the official also said that the P5+1 is likely to insist on "partial dismantlement" of Iran's uranium-enrichment facilities. That could include "shutting one of the enrichment facilities, and/or dismantling some of the installed centrifuges," but "a final decision about enrichment limits has not yet been made," the official said.—*KELSEY DAVENPORT*

Iran, IAEA Sign Framework Agreement

Iran and the International Atomic Energy Agency (IAEA) last month signed a framework agreement outlining future cooperation on the agency's investigations into Tehran's past activities that are suspected of having been part of an effort to develop nuclear weapons. The agreement included six initial actions for Iran to take by mid-February 2014 that will provide the IAEA with access to two nuclear sites and information on Iran's planned nuclear power plants and research reactors.

IAEA Director-General Yukiya Amano and Ali Akbar Salehi, head of the Atomic Energy Organization of Iran, signed the agreement in Tehran on Nov. 11.

In a statement following the signing, Amano said that "subsequent steps" under the framework would address issues that the six actions do not cover.

In a separate statement, Salehi said the agreement represented Iran's "will to resolve the dispute" over its nuclear program because Tehran is not formally required to grant the IAEA access to some of its nuclear sites. Iran says its nuclear

program is entirely for peaceful purposes.

The IAEA first laid out its suspicions about Iranian nuclear efforts allegedly relating to weapons development in a November 2011 report to its board. (See *ACT*, December 2011.) Between January 2012 and June 2013, the two sides met 10 times in an attempt to reach agreement on the scope and sequence of the investigations, but were unable to make progress on a document drafted by the IAEA, which outlined the agency's approach to the inquiry. (See *ACT*, July/August 2012.)

Less than three months after Hassan Rouhani's inauguration as president of Iran on Aug. 3, Tehran made a new proposal to the IAEA on how to proceed with the agency's investigations. The proposal was presented to Tero Varjoranta, the IAEA deputy director-general and head of the Department of Safeguards, during an Oct. 28-29 meeting in Vienna. In an Oct. 29 statement, Varjoranta described the proposal as a "constructive contribution" with a "view to future resolution of all outstanding

issues."

The framework agreement that was signed Nov. 11 was based on the progress made at the October meeting. It stipulated that the parties would "strengthen their cooperation and dialogue" to "resolve all present and past issues."

Iran agreed to provide the IAEA with "timely information" on its nuclear facilities and the implementation of "transparency measures." The IAEA agreed to "take into account Iran's security concerns" through managed access to Iranian information and sites and the protection of confidential information.

The parties agreed to meet again on Dec. 11 to continue discussing the actions that remain to be taken to address the agency's outstanding concerns.

Iran's Six Actions

As part of its six actions, Iran is to provide the IAEA with access to the Gchine uranium mine and the Heavy Water Production Plant at Arak and information



Ali Akbar Salehi (left), the head of the Atomic Energy Organization of Iran, and Yukiya Amano, director-general of the International Atomic Energy Agency (IAEA), sign a framework agreement in Tehran on November 11 on resolving IAEA questions about Iran's nuclear program.

about the facilities.

The Gchine mine, located in southern Iran, began operations in 2004. The IAEA was able to conduct inspections of the mine between 2003 and 2006 when Iran was voluntarily implementing an additional protocol to its safeguards agreement with the agency. Such protocols give the IAEA expanded access to information and sites related to a country's nuclear activities. The IAEA has not had access to Gchine since Iran stopped implementing that protocol in 2006.

The mine produces uranium ore that serves as the raw material for enrichment. Uranium enriched to different levels can be used to fuel nuclear reactors and for nuclear weapons.

The IAEA requested access to the Gchine mine in its original proposal, in February 2012, for its investigation. The IAEA stated that access was necessary in order to address its questions "related to undeclared nuclear material and activities" in Iran.

The heavy-water plant at the Arak complex began operating in 2010. It produces heavy water that will be used to operate the reactor that Iran is constructing at the same site.

The plant is not under IAEA safeguards, although Iran did allow the agency to inspect the facility in August 2011. Iran has not allowed the IAEA back, despite the agency's request to return to the site and take samples of the heavy water.

On Nov. 12, Iran allowed the IAEA to perform an initial analysis on the heavy water produced at the facility, according to a Nov. 14 IAEA report. In a Nov. 12 letter to the agency, Iran also agreed to provide further access to and information on the plant in the "near future."

The Nov. 11 agreement requires Iran to submit information on the sites for 16 nuclear power plants that Tehran says it intends to build and design information for four new nuclear research reactors for medical isotope production.

November IAEA Report

The IAEA released its most recent quarterly report on Iran's nuclear program last month.

The Nov. 14 report said that Iran had dramatically slowed the expansion of its uranium-enrichment program, installing



AFP/Getty Images

Increased IAEA access to Iran's heavy-water plant at Arak, shown in this August 2006 photo, is a key part of the November 11 agreement between Iran and the IAEA.

just four first-generation centrifuges since the last quarterly report was issued Aug. 28.

In comparison, the Aug. 28 report found that, from May to August, Iran installed 1,861 first-generation centrifuges and 319 advanced centrifuges.

In total, Iran has installed more than 18,000 IR-1 centrifuges at two facilities, Natanz and Fordow, of which about 10,000 are operational, and 1,008 advanced centrifuges, known as the IR-2M, in its enrichment facility at Natanz. According to the Nov. 14 IAEA report, none of the IR-2M centrifuges are enriching uranium.

Iran uses its IR-1 centrifuges to enrich uranium to 3.5 percent and 20 percent. Uranium enriched to 3.5 percent is used to fuel nuclear power plants, while uranium enriched to 20 percent is often used to fuel reactors that produce medical isotopes.

The IAEA reported that Iran has not installed any "major components" at the Arak heavy-water reactor during the time frame covered by the Nov. 14 report. Although the IAEA is inspecting the Arak reactor during construction, Iran has not provided the agency with up-to-date information on changes to the reactor's design since 2006.

Once operational, the reactor could produce enough plutonium for one to two nuclear weapons every year, although the plutonium would need to be separated from the spent reactor fuel to be used for weapons. At one time, Iran

had plans to build a facility that could be used for separating plutonium, but Tehran notified the IAEA in 2004 that it did not plan to construct that facility. Iran maintains that the reactor will be used to produce medical isotopes, but independent experts say that it is poorly suited to that task.

Earlier this year, Iran told the IAEA the reactor would begin operations in early 2014. But in an Aug. 25 letter, Tehran said startup in the first quarter of 2014 was no longer feasible. The letter did not set a new start date.

In the Nov. 14 report, the IAEA said Iran's stockpile of uranium enriched to 20 percent is growing. The report measured the stockpile at 196 kilograms, up from the 186 kilograms cited in the Aug. 28 report.

A principal goal of the six-country group that is negotiating with Iran over Tehran's nuclear program is halting Iranian production of 20 percent-enriched uranium and limiting the size of its stockpile of that material (see page 20). Those talks are separate from the ones involving the IAEA.

Uranium already enriched to 20 percent is more easily enriched to weapons grade than reactor-grade uranium, which is enriched to less than 5 percent. Experts estimate that approximately 250 kilograms of uranium enriched to the 20 percent level, when further enriched to weapons grade, is enough for one bomb.—KELSEY DAVENPORT

U.S. to Destroy Key Syrian Chemical Arms

The United States will destroy Syria's most dangerous chemical weapons, using a mobile technology on board a ship, officials from the international team that is overseeing Syrian chemical disarmament said late last month.

In a Nov. 30 press release, the Organisation for the Prohibition of Chemical Weapons (OPCW) said the operations would be conducted "on a U.S. vessel at sea using hydrolysis," a process that breaks down the chemical agent with hot water and a caustic compound such as sodium hydroxide. Hydrolysis is a type of neutralization, which, along with incineration, is one of the two main methods of destroying chemical weapons.

In a separate Nov. 30 statement, Sigrid Kaag, special coordinator for the joint chemical disarmament mission in Syria by the OPCW and the United Nations, said the operation would take place outside Syrian territorial waters.

At a Dec. 2 briefing, State Department spokeswoman Jen Psaki confirmed the U.S. role but provided few details.

There is widespread agreement that removing chemical agents from Syria for destruction elsewhere is the most practical approach, particularly in light of the tight timetable established by the OPCW and the UN. A main reason to take the chemicals out of Syria is the security concerns created by the ongoing civil war in the country.

Destruction of the weapons on a ship became a leading option as no country volunteered to accept the weapons for destruction on its territory. After the possibility of destruction at sea became public, Psaki said at a Nov. 22 press briefing that the United States "and many other countries have responsibilities under the CWC [Chemical Weapons Convention] and the London Convention" and would consider destroying chemical weapons at sea only "if it can be done in a safe and environmentally sound manner."

She was referring to the 1972 London Convention, also known as the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter. In response to a question about the UN Convention on the Law of the Sea, she replied, "I'm certain all of the treaties that are applicable are being consulted through this process."

Even as the signs increasingly pointed to shipboard destruction, U.S. officials had held open the possibility that another country might agree to accept the weapons on its territory. But that possibility appears to have dissipated. In a Dec. 3 e-mail to *Arms Control Today*, an official from the OPCW-UN mission said, "There will be no other country. The destruction of the most critical weapons will happen on a US ship."

Under the CWC, the term "chemical weapons" includes "[t]oxic chemicals and their precursors."

Schedule Pressure

Under a plan approved by the OPCW Executive Council and UN Security Council in late September, the Syrian chemical weapons are to be eliminated by mid-2014. (See *ACT*, October 2013.) The plan set Nov. 15 as the date by which the Executive Council was to establish "detailed requirements, including



A protestor in the Albanian capital of Tirana takes part in a November 14 demonstration against a proposal for Albania to receive chemical weapons from Syria for destruction. The next day, Albanian Prime Minister Edi Rama said his country would not agree to the proposal.

intermediate destruction milestones."

Albania, which had been cited as a leading candidate to accept the Syrian chemical weapons, dashed hopes that the results of the Nov. 15 Executive Council meeting would include the naming of a country to host the destruction of the weapons. During the meeting, Albanian Prime Minister Edi Rama appeared on national television to say that the task was impossible for Albania. In the days before the announcement, thousands of Albanians had taken to the streets to protest the idea of importing the chemical weapons.

The U.S. embassy in Tirana, the Albanian capital, issued a statement saying that the United States "appreciates that the Government of Albania gave serious consideration to supporting the international effort to eliminate Syria's chemical warfare materials in a safe and secure manner" and "remain[s] confident that we will complete elimination of the program

within the timeline agreed upon.”

Norway, which had been seen as another leading contender to host the destruction, ruled itself out in late October. At a Nov. 18 meeting in Brussels of EU foreign and defense ministers, Pieter De Crem, the defense minister of Belgium, which also had been frequently named as a potential host, said his country would not take on the task. At the same meeting, German Foreign Minister Guido Westerwelle also declined.

In theory, the weapons destruction could take place in any number of countries, as the United States and some other countries have developed mobile units that can destroy chemical weapons through incineration or hydrolysis.

Authorization for Removal

Although the Nov. 15 OPCW Executive Council decision did not resolve the question of where the chemical weapons destruction would take place, it appeared to put to rest a potential question about the transfer of Syrian chemical agents to other countries. The question arose because Article I of the CWC bans countries from “transfer[ing], directly or indirectly, chemical weapons to anyone.”

The September UN Security Council resolution that approved

the destruction plan authorizes UN member states to “acquire, control, transport, transfer and destroy” Syrian chemical weapons “consistent with the objective” of the CWC. The accompanying OPCW Executive Council decision, however, does not refer to transfers, leading some observers to argue that the Executive Council would have to take some action to authorize the OPCW Technical Secretariat to engage in an activity that the CWC prohibits. (See *ACT*, November 2013.)

The Nov. 15 Executive Council decision document reports that Syria, in its Oct. 23 declaration to the OPCW, said the destruction would need to take place outside its territory if it were to meet the OPCW-UN timetable. The council document specifies that mustard agent and certain “binary chemical weapons components” are to be removed from Syria by Dec. 31. Those are the priority chemicals that are to be destroyed aboard the U.S. ship.

All other chemicals must be out by Feb. 5. The one exception is isopropanol, which is to be destroyed in Syria by March 1.

For the mustard agent and binary components, “effective destruction” is to be completed by March 31, and “destruction of any resulting reaction mass” is to be completed “by a date to be agreed by the [Executive] Council.” In a Nov. 19 e-mail to

Center For Naval Warfare Studies Naval War College

RESEARCH PROFESSOR Warfare Analysis And Research Department

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OPCW



Sigrid Kaag (left), special coordinator of the joint effort by the Organisation for the Prohibition of Chemical Weapons and the United Nations to oversee the destruction of Syria's chemical weapons, walks with OPCW Director-General Ahmet Üzümcü to the OPCW Executive Council meeting in The Hague on November 15.

Arms Control Today, Jean Pascal Zanders, a former research fellow with the European Union Institute for Security Studies, noted that the term “effective destruction” does not occur in the CWC and is not defined in the council decision or elsewhere.

All other chemicals that Syria has declared must be destroyed by June 30.

The decision document gives OPCW Director-General Ahmet Üzümcü some authority to alter the destruction timetable. If, “in close consultation” with the countries involved in the destruction, he determines that “it will not be possible” to meet the timetable, “he should immediately notify the [Executive] Council, specifying the circumstances, and propose an alternative date for [the council’s] consideration and approval, with a view to completing the destruction as soon as possible.”

In a Nov. 15 OPCW press release on the decision, Üzümcü said it sets “ambitious milestones.”

Paul Walker, director of environmental security and sustainability at Green Cross International, said in a Nov. 20 interview that if the situation comes down to “a choice between arbitrary deadlines and doing it right, do it right.” The timetable for the ultimate destruction of the chemicals is less important than removing them from Syria, said Walker, a member of the Arms Control Association Board of Directors.

In the statement, Üzümcü said the “timely execution” of the effort depends on “a secure environment.” In remarks to the Nov. 15 Executive Council meeting, Kaag said the mission “is

working with the government of Syria to ensure that necessary security arrangements are in place, and we are also in contact with armed opposition groups for this purpose.” She added that the mission was looking for help in that regard from countries “that have influence with all actors...through their lines of formal and informal communication.”

According to the Nov. 15 decision document, Üzümcü is to present the council with a plan “for its consideration” by Dec. 17 for chemical weapons destruction outside Syria, including “provisions for ensuring clear responsibility at each stage for all chemicals.”

The council also specified that Syria “maintains ownership of its chemical weapons until they are destroyed, wherever the destruction might take place” but that “upon removal of declared chemical weapons from its territory, the Syrian Arab Republic no longer has possession, nor jurisdiction, nor control over these chemical weapons.”

Commercial Disposal

The decision document asked Üzümcü to explore options for commercial disposal of certain portions of the Syrian arsenal, and a week later, on Nov. 22, the OPCW issued a document called a request for expressions of interest to determine the level of interest from private firms in the chemical disposal business. It covers chemicals other than the mustard agent and binary chemical weapons components. The covered chemicals total

about 800 metric tons.

In an Oct. 25 report, Üzümcü, citing information that Damascus provided, said that Syria has approximately 1,000 metric tons of Category 1 chemical weapons. Category 1 weapons are based on chemicals and precursors that pose a “high risk” to the CWC. That category includes sulfur mustard and the nerve agents VX and sarin. Üzümcü’s report said the 1,000 metric tons were largely in the form of “binary chemical weapon precursors,” meaning that they had not been mixed as they would be when loaded into munitions for use. Üzümcü said Syria reported 290 metric tons of Category 2 chemical weapons. Such weapons are based on toxic chemicals that pose a “significant” risk to the CWC.

Walker said “a few hundred tons” of the 1,290 metric tons of the chemicals that Syria had declared were isopropanol that will be neutralized in Syria.

The request to companies also covers disposal of effluent from the mustard agent and binary chemical weapons components, totaling about 7.7 million liters, according to the OPCW request document.

In its Nov. 30 press release, the OPCW said 35 companies had responded to the request.

According to a Nov. 19 memo from Üzümcü, the cost of the commercial destruction is projected to be about 35 to 45 million euros (about \$47-61 million). Üzümcü appealed to OPCW member states to defray the cost through a trust fund he established to cover the Syrian chemical destruction effort.

The cost estimate for commercial operations appears to be the first indication from the OPCW of the anticipated costs of

the work in Syria, although it encompasses only one part of the effort. In the memo, Üzümcü said that the cost figure does not include the costs of transporting the chemicals to be destroyed. Those costs are expected to be covered by in-kind contributions, he said.

Facilities Inspected

Earlier in the month, in a Nov. 6 “mission update,” the OPCW said its joint effort with the UN had inspected all but one of the chemical weapons facilities that Syria had declared. In an Oct. 31 press release, the OPCW had reported that 21 of 23 declared facilities had been inspected.

The release said “safety and security concerns” had prevented the team from visiting the two remaining sites.

The most recently inspected site, in the Aleppo region, was inspected “with the support of sealed cameras used by Syrian personnel as per the inspection team’s guidance,” the update said, adding that the OPCW-UN team later verified the location of the site. The team “is now satisfied that it has verified—and seen destroyed—all of Syria’s declared critical production and mixing/filling equipment,” the OPCW said in the release.

In a Nov. 25 update to the Executive Council on the progress of the Syria mission, Üzümcü said the remaining site was one that Syria had declared as inactive. He reported that items previously housed at that site had been moved to “other accessible sites and have been verified” against information that Syria had provided in its declaration. Inspectors plan to visit the site “as soon as conditions permit and following the assessment of the United Nations,” he said.—*DANIEL HORNER*

Herbert Scoville Jr. Peace Fellowship

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The Herbert Scoville Jr. Peace Fellowship invites recent college graduates to apply for six to nine month fellowships in Washington, DC, focusing on arms control, peace, and international security issues. Founded in 1987 to develop and train the next generation of leaders on a range of peace and security issues, the program has awarded 148 fellowships.

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UN Vote Backs Talks on Nuclear Arms Ban

In a sign of rising frustration among states without nuclear weapons at the slow pace of disarmament efforts, the UN's disarmament committee in New York passed a resolution in November with the support of 129 states calling for the "urgent" start of multilateral negotiations to eliminate nuclear weapons and designating Sept. 26 as the international day for their "total elimination."

"Our delegations joined the call of the overwhelming majority of states for more urgency, focus, and new momentum for nuclear disarmament," Ireland's representative said after the Nov. 4 vote, also speaking on behalf of Austria, Liechtenstein, Malta, New Zealand, and San Marino.

First proposed in October, the resolution was meant as a follow-up to the high-level meeting on nuclear disarmament held Sept. 26 in the UN General Assembly. Speaking on behalf of the Non-Aligned Movement, which drafted the language, Indonesia's representative, Desra Percaya, said Nov. 4 that the resolution underlined the strong support expressed at the high-level meeting for taking effective action toward a nuclear-weapons-free world. (See *ACT*, November 2013.)

The resolution, approved by the UN General Assembly First Committee, which deals with nuclear disarmament, calls for the "urgent commencement" of negotiations in the Conference on Disarmament (CD) in Geneva for the "early conclusion" of a comprehensive convention on nuclear weapons to prohibit their "possession, development, production, acquisition, testing, stockpiling, transfer and use or threat of use, and to provide for their destruction."

The resolution also declares Sept. 26 the International Day for the Total Elimination of Nuclear Weapons to "mobilize international efforts" toward a nuclear-weapons-free world and calls for a second UN high-level meeting by 2018 on nuclear disarmament "to review the progress made in this regard."

The resolution was approved by a vote of 129-28 with 19 abstentions and, unlike many of the other resolutions on which votes were taken, commits UN member states to future actions. The General Assembly is scheduled to vote on the resolution Dec. 5; the measure is expected to pass by a similar margin.

The General Assembly approves resolutions by majority vote, but the CD works by consensus. Therefore, no agreement on nuclear weapons elimination can be reached without the support of the five original nuclear-weapon states.

Four of those five—France, Russia, the United Kingdom, and the United States—voted against the resolution. China voted in favor of it, but said that countries with the largest nuclear arsenals should continue to take the lead in reductions. All five states are parties to the nuclear Nonproliferation Treaty (NPT).

In a joint statement, France, the UK, and the United States said that "a practical step[-]by[-]step process is the only way to make real progress" on disarmament and that "there are no short cuts." The states said that they are seeking "early commencement" of negotiations on a fissile material cutoff treaty (FMCT) at the CD and "prompt" entry into force of the Comprehensive Test Ban Treaty (CTBT).

India and Pakistan, which have nuclear weapons but are not

members of the NPT, voted in favor of the resolution.

The other states that voted against the resolution or abstained are members of NATO, such as Germany, which collectively "share" U.S. nuclear weapons, or are "nuclear umbrella" states that have nuclear security agreements with Washington, such as Japan.

Many non-nuclear-weapon states argue that the step-by-step process is not working and, according to a European diplomat, is "not very credible." They point out that the FMCT talks have been stalled in the CD since the late 1990s and the United States has not made progress toward ratification of the CTBT since the Senate voted against ratification in 1999.

Noting that the next NPT review conference will take place in 2015, the joint statement by the three nuclear-weapon states said that planning a conference on nuclear disarmament in 2018 "is not consistent with the NPT agenda" and "risks weakening commitment among states to securing a successful outcome" at the review conference.

Since 1975, NPT review conferences, held every five years, have often been fraught with discord over the slow pace of disarmament efforts. Three of them—in 1980, 1990, and 2005—failed to agree on a final document, considered by many states and independent observers to be a key measure of the success of the month-long meetings. There is widespread concern that the 2015 conference also may fail to reach consensus on a final document.

In their Nov. 4 joint statement, Ireland and the five other countries said they saw the resolution on nuclear weapons elimination as "entirely consistent" with the NPT, noting that Article VI of the treaty requires "effective measures relating to the cessation of the nuclear arms race at an early date and to nuclear disarmament" and that the 2010 NPT Review Conference agreed to "the objective of achieving a world without nuclear weapons."—*TOM Z. COLLINA*



Desra Percaya, Indonesian ambassador to the United Nations, shown in an October 2012 photo, delivered a November 4 statement on behalf of the Non-Aligned Movement in support of a resolution calling for new steps on nuclear disarmament.

UN Photo

UN Creates New Group On Cyberspace Issues

The UN General Assembly First Committee in October and November adopted resolutions creating a new group of governmental experts to follow up on an earlier study that reflected a consensus within a 15-member group of experts on some of the most contentious issues of state behavior in cyberspace.

That study, issued in June, determined that current international law, including the law of armed conflict, applies to state behavior in cyberspace. (See *ACT*, July/August 2013.) The United States and many of its allies had long held that position, but some key countries had argued against it.

Like its predecessor, the new group of experts, which will have 20 members, has a mandate to examine “developments in the field of information and telecommunications in the context of international security.”

In a Nov. 25 interview, James Lewis, a consultant to the group of experts that produced the June report, said many people see the formation of the new group as an opportunity to maintain the momentum from the earlier one. According to the October resolution, the new group will continue to study how current international law applies to the use of cyberspace by states.

Also, for the first time, the experts will specifically study issues related to the use of cyberspace and information technologies during a conflict. Those issues are “sticking points” in determining how to apply existing international laws to cyberconflict, said Lewis, a cybersecurity expert at the Center for Strategic and International Studies. The group is to begin meeting in 2014 and present its findings to the UN General Assembly in 2015.

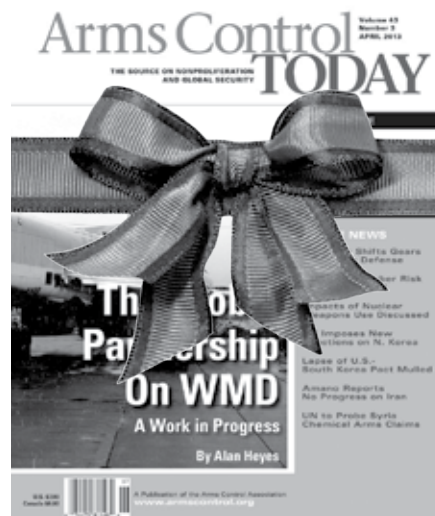
During her remarks at the First Committee on Oct. 30, U.S. representative Michele Markoff said the United States expects future experts groups to “use the results of [the June] report as the foundation for discussion on how international law applies to cyberspace.” The June report reflects “a growing global consensus on core ideas” to create a peaceful and stable environment in which states can operate, said Markoff, a senior policy adviser on cyber affairs at the State Department.

Wu Haitao, head of the Chinese delegation to the First Committee, said during general debate Oct. 8 that although cyberspace was not a lawless domain, existing international law does not cover all aspects of it. China and Russia submitted a draft code of conduct to the 2011 UN General Assembly. Wu said that updating of the draft has been under way and China is ready to work with other countries “to achieve an early consensus on the code of conduct.” (See *ACT*, November 2011.) Reports by groups of governmental experts serve as recommendations on how states should proceed on an issue and can lead to documents such as codes of conduct, which states can make a nonbinding commitment to follow, or international legal instruments.

Markoff said the United States “favors international engagement to develop a consensus on appropriate state behavior in cyberspace, based on existing principles of international law” and “cannot support other approaches that would only serve to legitimize repressive state practices.” She reiterated the U.S. position for an Internet governance model “that is people centered, bottom-up, multi-stakeholder, and transparent.”—TIMOTHY FARNSWORTH

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INSIDE | Arms Trade Treaty Moves to UN Assembly



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Spencer Platt/Getty Images



Secretary of State John Kerry signs the Arms Trade Treaty at the United Nations on September 25.

Arms Trade Treaty Prompts Sharp Debate

A senior State Department official last month defended the Arms Trade Treaty, signed by the U.S. government in September, after 50 senators wrote to President Barack Obama saying they would oppose the pact.

In the Oct. 15 letter, the senators charged that the treaty undermines U.S. credibility, threatens the rights of gun owners, and impinges on U.S. sovereignty. The lawmakers said they “cannot give [their] advice and consent to this treaty” and “do not regard the U.S. as bound to uphold its object and purpose.”

At a Nov. 7 event at the Stimson Center, Thomas Countryman, the lead U.S. representative at the treaty negotiations, rejected the criticisms as “inaccurate.”

The treaty, which establishes common international standards for transfers of conventional arms, “does not imperil the rights of United States citizens, including those secured by the Second Amendment,” said Countryman, assistant secretary of state for international security and nonproliferation. “It does not undermine national sovereignty. It does not require any measure that would impact the rights of American gun owners...[and] it’s fully consistent with existing United States law.”

The White House has not announced when it will send the treaty to the Senate, but the letter signals the hurdles that the ATT will face when the treaty reaches Capitol Hill.

The signatories to the letter, including 46 Republicans and four Democrats, cited six objections.

The first concerned the treaty’s approval by majority vote, not consensus as originally planned, in the UN General Assembly. “We fear that this reversal has done grave damage to the diplomatic credibility of the United States,” the senators said.

ATT supporters point out that U.S. negotiators only abandoned the consensus approach for negotiations in April, after last-minute opposition from Iran, North Korea, and Syria blocked consensus approval of the treaty. Their objections prompted the United States and other countries to present the treaty to the General Assembly, where it was overwhelmingly approved.

The senators argued that the ATT could be amended in the future, leaving the United States subject to provisions that the Senate had not approved. Supporters say that objection is based on a draft of the treaty that was subsequently amended to state that amendments would have no force in any signatory country unless specifically approved by the country.

At the Nov. 7 event, which was organized by the Arms Control Association and the Stimson Center, Countryman said the treaty “reaffirms explicitly the right and responsibility of each country to decide for itself, consistent with its own constitution,...how to deal with conventional arms use exclusively within its own borders.” The senators’ letter called those provisions “weak” and “non-binding.”

The treaty creates a legal responsibility to prevent the diversion of firearms, and that provision “could be used to justify the imposition of controls” within the United States that would violate gun owners’ rights, the senators said.

Countryman disputed that claim, saying, “Our instructions were clear, that we could not agree to any treaty that infringed upon such rights. We did not. This treaty is focused on international trade in conventional weapons.”

The senators also said that the treaty could “hinder the ability of the United States to fulfill its strategic, legal and moral commitments” to selling arms to Israel and Taiwan.

Countryman countered that the treaty is “fully consistent with existing United States law and practice on the international transfer of conventional arms.”

The State Department has offered “to brief senators one at a time or 50 at a time, to listen carefully to their concerns, to express some of the same points that I made today,” Countryman said. “They bear a heavy responsibility in making such a decision.”

Approval of the treaty in the Senate requires a two-thirds majority. Countryman said he did not expect the administration to transmit the treaty to the Senate “in the immediate future.”—

JEFFERSON MORLEY

LOOKING BACK

The U.S.-Russian Uranium Deal: Results and Lessons

In February 1993, Russia and the United States signed an agreement on the disposition of highly enriched uranium (HEU) extracted from Russian nuclear weapons.¹ Under the terms of the deal, Russia undertook to down-blend 500 tons² of HEU, enough to build 20,000 nuclear warheads, over a 20-year period. The two sides agreed that the resulting low-enriched uranium (LEU) would be used as fuel by nuclear power plants in the United States, hence the informal name of the program, “Megatons to Megawatts.”

In January 1994, Russia’s Technobexport (Tenex) and the United States Enrichment Corporation (USEC), the state-run companies authorized by their respective governments to implement the deal, signed the contract. In the U.S. case, that meant that USEC was a supplier of enriched uranium to private utilities. According to assessments made at the time, the value of the entire program was expected to reach about \$12 billion.

Background

The idea of down-blending excess stockpiles of weapons HEU and using the resulting LEU as fuel for nuclear power plants was first proposed in 1991 by Thomas Neff, a senior researcher at the Massachusetts Institute of Technology’s Center for International Studies.³ The idea was received in the U.S. academic community with great enthusiasm and was supported by the Bush

administration in view of the signing in July 1991 of the Soviet-U.S. Strategic Arms Reduction Treaty (START I), which mandated a reduction of the two countries’ nuclear weapons stockpiles by approximately 5,000 warheads apiece.⁴

Given the difficult economic situation in the Soviet Union at the time, Moscow expressed interest in Neff’s proposal, which opened up the prospect of billions of U.S. dollars in hard currency earnings being generated as a by-product of implementing START I. The idea looked attractive to the Russian government, which hoped that some of that money could be used to support the Russian nuclear industry, which, like all other state enterprises, was suffering from a sharp reduction in government funding.

The HEU-LEU agreement differed in an important way from the 1992 Agreement on the Safe and Secure Transportation, Storage and Destruction of Weapons

and the Prevention of Weapons Proliferation, which provided the legal framework for the so-called Nunn-Lugar program. Under the terms of the latter agreement, the United States was the donor and Russia was the recipient of U.S. financial and technical assistance, including money provided to help Russia implement the reductions specified in START I. In contrast, the HEU-LEU agreement was essentially a mutually advantageous commercial deal.

An important element of Neff’s concept was his proposal to down-blend HEU at Russian plants rather than in the United States. The goal of the proposal was to employ as many Russian facilities and people in the post-Soviet nuclear establishment as possible. The Russian side strongly supported this approach, as HEU down-blending on U.S. territory was unacceptable to Russia because the isotopic composition of this material was classified.

The main factor driving the U.S. side was the doubts by many Western experts about the safety and security of the huge Soviet nuclear arsenal after the collapse of the Soviet empire. In addition, a significant part of that arsenal was left on the territory of the newly independent republics of Belarus, Kazakhstan, and Ukraine. The economic and political situation in all three was even worse than in Russia.

Leading Russian scientists, including Yuri Osipov, president of the Russian Academy of Sciences, also gave their backing to the plan. Osipov discussed the proposal with the Russian minister of atomic energy, Viktor Mikhailov, who

Alexander Pavlov is an adviser to the senior vice president of TVEL, a nuclear fuel company, and a member of the editorial board of *The Nuclear Club*, the journal of the Center for Energy and Security Studies in Moscow. He was deputy director of the Department of International Cooperation of the Soviet/Russian Ministry of Atomic Energy from 1983 to 1993. **Vladimir Rybachenkov** is senior research scientist at the Center for Arms Control, Energy and Environment in Moscow. He was a counselor at the Russian Foreign Ministry’s Department for Security and Disarmament Affairs from 1994 to 2003 and a counselor at the Russian Embassy in Washington from 2004 to 2010. The article is based on an article by the authors published in the May 2013 edition of *The Nuclear Club*.



USEC Inc.

Representatives from the United States Enrichment Corporation and Russia's Technobexport sign the commercial contract implementing the U.S.-Russian agreement on highly enriched uranium at USEC's headquarters in Washington on January 14, 1994. Under the agreement, HEU from Russian nuclear weapons was down-blended and then shipped to the United States for use in nuclear power plants.

gave it his full support. After a series of meetings and informal exchanges between Russian and U.S. representatives, the two governments entered into formal negotiations in the summer of 1992. They also set up a joint working group to undertake a comparative analysis of the two sides' proposals regarding the technology of down-blending HEU.

The Choice of Technology

HEU is produced by increasing the content of the fissile isotope uranium-235 from 0.7 percent in natural uranium to levels of 20 percent or more. In modern enrichment plants, enrichment involves running uranium in the form of the gas uranium hexafluoride through a gas centrifuge. At the plant, many thousands of them are installed, forming enrichment cascades.

Fuel for nuclear power plants typically has an enrichment level of about 4-5 percent, which means that it is LEU. In the global market, the enrichment level of the uranium for nuclear power

plants is strictly limited to 5 percent. For weapons use, an enrichment level of 90 percent is desirable.

Stockpiles of HEU were accumulated in the Soviet Union and the United States during the Cold War era. The HEU-LEU agreement contemplated the reduction of the Russian HEU stockpile by 500 tons by down-blending it to LEU that could be used for nuclear power plant fuel.

However simple this looks, the question of down-blending was not a trivial one. Technologically, this could be done in different ways, and the choice of the blendstock and its form was one of the key elements of the process because it determined the final isotopic composition of the product.

One of the issues associated with blending was the possibility of accumulation in the LEU of the U-234 isotope, which is a kind of a poison for nuclear fuel. After detailed elaborations, the working group agreed with a proposal by Russian experts to use gas-phase dilution by mixing HEU

hexafluoride with hexafluoride of slightly enriched uranium. The blendstock of slightly enriched uranium came from depleted uranium produced by uranium enrichment plants and later enriched to 1.5 percent. In this case, the resulting product satisfied the ASTM⁵ requirements for power plant fuel isotopic composition, and the whole process also allowed Russian enrichment plants to continue to be busy with producing slightly enriched uranium.

LEU Production in Russia

The first 186-ton batch of LEU was produced in 1995 at the Urals Electrochemical Combine in the Sverdlovsk region from about 6 tons of HEU.

Another three Russian enrichment plants, which were run by the Ministry of Atomic Energy (the precursor to Rosatom, the Russian state atomic energy corporation), joined the program at a later stage: the Siberian Chemical Combine in the Tomsk region, the

Electrochemical Plant in the Krasnoyarsk territory, and the Angarsk Electrolysis Chemical Combine in the Irkutsk region. As a result, Russia was down-blending 30 tons of HEU every year by 2000 and producing 900 tons of LEU in the process, charging the United States for about 9,000 tons of natural-uranium

products are delivered for payment: the SWUs and natural uranium feed, the raw material from which LEU was produced. In transactions on the uranium market, these two commodities are usually traded separately and have their individual prices.

According to the terms of the deal,

agreement in Washington on the transfer of the natural-uranium component to Russia. They agreed that USEC would return to Russia an equivalent of the natural-uranium component and pay only for the SWU content. In the same agreement, Washington made an exception to its nuclear export law by

The HEU-LEU deal...proves that countries' differences, no matter how great, can be overcome if political interest is accompanied by economic benefit.

component and 5.5 million separative work units (SWUs)—the enrichment services needed to make LEU out of natural uranium—per year. By the time the work under the agreement is completed later this year, Russia will have down-blended 500 tons of HEU and produced a total of 15,200 tons of LEU.

Under the terms of the HEU-LEU agreement, the United States has the right to monitor the HEU down-blending process. In practice, that translates into quantitative monitoring of the flow of uranium hexafluoride in three pipes: two pipes for the HEU and the blendstock inflows and one pipe for the outflow of the LEU produced. U.S. personnel also recorded the U-235 enrichment level in each of these pipes.

In the early years of the agreement, the monitoring was conducted by U.S. inspectors who visited the Russian facilities involved in the program. Later on, however, the United States developed and installed a remote monitoring system at the down-blending facilities, thus eliminating the need for regular visits.

The Problem of Natural Uranium

The natural-uranium component of LEU was an important part of the deal. Essentially, it represents the amount of natural uranium (with 0.7 percent U-235 content) that would have been required to produce a given amount of LEU through natural enrichment rather than by down-blending HEU.

When LEU arrives in the United States under the HEU deal, two market

there were two separate lines in the Tenex-USEC contract for the price of the natural component and the price of SWUs. These were based on the market prices at the time and later were periodically reviewed and adjusted by the parties.

Initially, under the terms of the deal, the United States agreed to pay in full for the SWUs and the uranium component required for the production of the down-blended material. This situation remained until April 1996, when the U.S. Congress passed a bill privatizing USEC. The bill introduced strict quotas on sales of the natural-uranium component on the U.S. market. Essentially, it made it impossible for USEC to pay for that natural-uranium component under the HEU-LEU agreement.

The problem was exacerbated by the fact that Russia and the United States had not signed an agreement for peaceful nuclear cooperation. The absence of that document complicated the return to Russia of the natural-uranium component, which no longer could be sold in the United States.

Moscow and Washington were forced to begin lengthy negotiations to find a mutually acceptable solution. The complications were such that LEU deliveries were interrupted for more than six months and the whole program was on the brink of complete collapse.

The two sides finally found a way out of the deadlock in March 1999. The Russian Ministry of Atomic Energy and the U.S. Department of Energy signed an

allowing the natural uranium associated with the HEU deal to return to Russia even though the United States did not have a nuclear cooperation agreement with that country.

At the same time, Tenex and a group of Western companies (Areva, Cameco, and Nukem) signed an option for the purchase between 2002 and 2013 of the Russian natural-uranium component that was being accumulated on U.S. territory.

This arrangement allowed the deal to proceed, and LEU deliveries restarted in August 1999.

Prospects for Post-2013 Sales

In the United States, some politicians and independent observers had been arguing for proposals to induce Russia to continue the HEU-LEU operation after 2013, citing arms control and nonproliferation benefits. Until recently, there also were economic reasons because of a shortage of domestic enrichment capacity in the United States.

Russia, however, has no intention of extending the HEU-LEU agreement. Senior Rosatom executives have made that clear on more than one occasion, insisting that the remaining Russian excess HEU stockpiles would be needed for Russia's nuclear energy industry.

Considerable uncertainty existed over continued Russian supplies of uranium products to the United States after the HEU deal was finished, taking into account the restrictions imposed in conjunction with the suspension of the anti-dumping investigation agreement

signed by the Russian Ministry of Atomic Energy and the U.S. Department of Commerce in October 1992.

After the breakup of the Soviet Union, Russia and several other former Soviet republics sold many uranium products in the U.S. market at artificially low prices, a practice known as dumping. In response, Washington imposed a high anti-dumping tariff, essentially closing the door to the U.S. market for Russian nuclear suppliers. That door was partially reopened by the 1992 agreement, which created an exemption for the LEU shipments supplied under the HEU-LEU agreement via USEC. It was all but impossible, however, for Russia to provide natural uranium or enriched uranium that was not part of the HEU-LEU agreement, as those exports were not covered by the exemption.

In an effort to resolve that problem, which would have become much more serious for the United States after the supplies under the HEU-LEU had ended,

Rosatom and the Commerce Department in February 2008 signed an amendment to the 1992 agreement, allowing the Russian nuclear industry to supply up to 20 percent of the U.S. market demand for uranium products between 2014 and 2020. Under the amendment, Tenex is to sign contracts directly with U.S. nuclear power plant operators, bypassing USEC. As of last January, the Russian portfolio of contracts signed under this arrangement was worth about \$6 billion.

Criticisms of the Agreement

In the late 1990s, some Russian media outlets launched a campaign of sharp criticism against the HEU-LEU agreement. They quoted analysts as saying that the terms of the deal were daylight robbery because the price Russia was getting for the 500 tons of HEU being down-blended to LEU was an order of magnitude lower than it should have been. Critics also argued that the agreement undermined Russian national

security because it reduced the country's strategic stockpiles of HEU.

That rhetoric culminated in 1999 during a special hearing launched by the Russian State Duma Committee on Geopolitics. The Duma members who presided over the hearing invited representatives of the atomic energy, foreign affairs, and defense ministries to testify. In his opening remarks, the committee's chairman, Alexey Mitrofanov, then a member of the nationalist political party LDPR, essentially repeated the arguments outlined above. He said that the Duma should discuss the question of Russian withdrawal from the agreement because the deal ran counter to Russian national interests.

One of the authors of this article, Vladimir Rybachenkov, was invited to the Duma meeting as the Foreign Ministry representative. He attended the hearing and rebutted criticisms by saying that selling 500 tons of weapons-grade



Cylinders of low-enriched uranium produced under the U.S.-Russian HEU agreement arrive in Baltimore in 2002.

uranium down-blended to LEU would barely have any detrimental effects on Russian defense capabilities. He cited Western assessments that estimated Russia still would have another 700 tons of HEU left in reserve.⁶

U.S. HEU reserves were estimated at about 700 tons. In addition, Washington has declared 209 tons of that amount as being surplus to its national security requirements and stated that it was planning to eliminate that amount of HEU unilaterally over the next few years. Available reports suggest that the United States has already converted about 119 tons of HEU to LEU.⁷

Another argument that Rybachenkov made at the 1999 hearing was that the hard currency revenues generated by the HEU-LEU deal were a vital source of additional funding for the Russian nuclear industry, which was facing a serious deficit of state financing. Finally, he said, the overall value of the agreement was set at \$12 billion based on the global market prices at the time of the signing of the deal.

Moscow possibly could have tried to find a more generous buyer, such as Saddam Hussein, for its weapons-usable uranium. As a depository of the nuclear Nonproliferation Treaty, however, Russia has a commitment “not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.” The Foreign Ministry arguments were echoed by the representatives of the defense and atomic energy ministries.

In the end, the Duma rejected the LDPR initiative to withdraw from the HEU-LEU agreement.

Conclusion

In its implementation, the HEU-LEU agreement has become an effective instrument of irreversible nuclear disarmament. Its historic significance becomes clear when one realizes that for the first time, the two nuclear weapons superpowers turned a part of a nuclear weapons arsenal into something the countries really needed: electric power for Americans and money for Russia. The two countries mutually benefited from the deal in terms of increased security,

thanks to the reduction of their nuclear material stockpiles.

The economic importance of the HEU-LEU deal for the United States can be illustrated by the following figures: For almost 20 years, LEU supplies under the agreement have accounted for about 50 percent of the nuclear fuel consumed by U.S. nuclear power plants. About 10 percent of U.S. electricity is generated from enriched uranium supplied under the HEU-LEU program.

According to a preliminary assessment, the overall revenue the HEU-LEU deal has generated for Russia could be as high as \$17 billion, with about \$13 billion in hard currency going directly to the treasury.⁸ The revenue generated by the program, especially in the 1990s, made a substantial contribution not only to the Russian nuclear industry's bottom line, but to the Russian treasury as well. In 1999, a year after the 1998 financial crisis, proceeds from the HEU-LEU agreement made up almost 3 percent of the Russian federal government's revenues.⁹ The money was partly used to finance programs to improve safety at the Russian nuclear power plants, convert defense industry plants to peaceful uses, and clean up contaminated areas after nuclear activities in previous years, mostly in the area of the Ural Mountains.

The implementation of the HEU-LEU agreement has created a favorable climate for the United States to adopt a reciprocal decision to down-blend some of the U.S. HEU stockpile on a voluntary basis, thereby making its use in weapons impossible.

The agreement has been a useful platform to demonstrate the possibility of using commercial approaches in the implementation of disarmament initiatives. It has also enabled the Russian and U.S. nuclear industries to gain useful experience in working together to facilitate further cooperation in commercial uranium-enrichment services.

Nuclear disarmament by the two oldest and largest nuclear powers is still a challenge and needs to be accelerated before control over nonproliferation is lost and many nuclear newcomer countries become involved in a new spiral of the nuclear weapons race. Only cooperation and joint projects will be

able to stop such a negative development.

The HEU-LEU deal can provide useful lessons in that regard. It proves that countries' differences, no matter how great, can be overcome if political interest is accompanied by economic benefit. Policymakers need to look for projects that combine those features. Finding such projects and implementing the experience gained in the HEU-LEU deal becomes a more urgent task every day.

ENDNOTES

1. Agreement Between the Government of the United States of America and the Government of the Russian Federation Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons, n.d., http://partnershipforglobalsecurity-archive.org/Documents/021893_agreement.pdf.

2. In this article, all tonnages are in metric tons.

3. Thomas L. Neff, “A Grand Uranium Bargain,” *The New York Times*, October 24, 1991.

4. “U.S. Strategic Nuclear Forces, End of 1994,” *The Bulletin of the Atomic Scientists*, January 1995, pp. 69-71.

5. The standards organization formerly known as the American Society for Testing and Materials is now known as ASTM International.

6. Because these figures are classified in Russia, no official data are available. Foreign scholars estimate that the Soviet Union had accumulated about 1,200 tons of weapons-usable uranium. For a recent estimate, see International Panel on Fissile Materials, *Global Fissile Material Report 2011: Nuclear Weapon and Fissile Material Stockpiles and Production*, 2011, p. 9, http://fissilematerials.org/library/2012/01/global_fissile_material_report_5.html.

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9. Gennady Leonov and Albert Shishkin, *Techsnabexport: Years and People* (Moscow: Reform Publishing House, 2009), p. 80 (in Russian).

BOOK REVIEW:

Containment May Be the Best Strategy When It Comes to Iran

Kenneth M. Pollack is nothing if not thorough. In previous exhaustive books, he has dissected the history of the United States and Iran (*The Persian Puzzle*) and made what seemed at the time the definitive case for invading Iraq (*The Threatening Storm*).

In his new book, *Unthinkable: Iran, the Bomb and American Strategy*, the former CIA analyst, National Security Council staffer, and more recently Brookings Institution scholar makes a case for something that is not unthinkable at all: continuing the status quo policy of containment of Iran.

In arguing for this approach to Iran, Pollack appears to be offering a mea culpa for his Iraq book, which convinced some liberal interventionists who otherwise opposed President George W. Bush's policies to support the 2003 U.S. invasion of that country. That said, Pollack performs a major public service by exhaustively laying out all the options on Iran and concluding that the United States and Israel should avoid attacking Iran's nuclear installations if at all possible. Although Pollack does not explicitly take the military option off the table, he lists so many downsides to it that he effectively does.

First, he dismantles the argument that Israel could strike Iran on its own and achieve enough success to make the risks of such a strike worth taking. Pollack suggests that Israel has already missed its chance to significantly degrade the Iranian program, which

has become increasingly hardened and dispersed. He recalls the warnings of former Israeli Defense Minister Ehud Barak in 2011 about Iran entering a "zone of immunity" if it completed the underground facility at Fordow.¹ That facility, buried 260 feet inside a mountain, has been operational for more than two years and would be very difficult to destroy.

Pollack notes the challenges Israel would face in terms of distance, the size of its air force, and refueling capability. "The problems of airspace and distance mean, at best, Israel would get one strike during one night, with no more than 125 tactical strike aircraft," Pollack writes. "Various factors starting with refueling could reduce that number significantly." The best description of Israel's military dilemma comes from the mouth of an unnamed Israeli fighter squadron commander quoted by Pollack: "We can't do it. We don't have the horses. If someone is going to destroy the Iranian nuclear program, it is going to have to be [the United States]."

The United States obviously has a much more robust capability to hit Iran and wreak significant damage. Yet, Pollack does not seem enthusiastic about

that option either. When he lists all the uncertainties and downsides of the U.S. military option, beginning with a lack of clarity about how long U.S. strikes would retard Iran's program, it is clear that he is more dove than hawk on Iran.

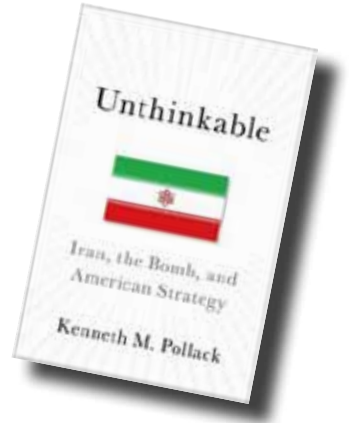
He says a major concern is that the international community would not support any U.S. strike unless it was in response to a clear provocation. The absence of a UN Security Council resolution or other wide multinational backing "could cripple the sanctions, inspections and other measures currently hamstringing Iran's nuclear progress, all of which would be crucial after a strike to impede or prevent Iran from rebuilding," he writes. According to Pollack, containment would be even more necessary after striking Iran than before.

Pollack also notes the possibility that Iran would retaliate asymmetrically through terrorism against the United States and its allies. Furthermore, airstrikes could convince Iran to quit the nuclear Nonproliferation Treaty, kick out inspectors, and actually build bombs, forcing the United States to decide whether to accept a nuclear Iran or escalate the war, he writes.

Far better, he says, to use other means

Unthinkable: Iran, the Bomb, and American Strategy

By Kenneth Pollack
Simon & Schuster, 2013, 560 pp.



Barbara Slavin is a senior fellow at the Atlantic Council, where she directs a task force on Iran. The author of *Bitter Friends, Bosom Enemies: Iran, the U.S., and the Twisted Path to Confrontation* (2007), she is also the Washington correspondent for *Al-Monitor*, a website devoted to news from and about the Middle East.

to try to limit Iran to “a theoretical breakout capability.” He defines this as a situation in which Iran continues to enrich limited amounts of uranium to a low level under tough scrutiny by the International Atomic Energy Agency (IAEA). Pollack’s description of the end state looks much like the potential compromise that could emerge from current negotiations between Iran and the five permanent members of the UN Security Council and Germany. Pollack says, “The two sides might be able to reach agreement that would give Iran the right to enrich, allow it a small stockpile of LEU [low-enriched uranium] and limited numbers of centrifuges, the right to manufacture fuel for its civilian reactors and a lifting of sanctions in return for a renewed Iranian commitment not to weaponize, agreement not to enrich beyond those terms and an acceptance of a highly intrusive and comprehensive monitoring and inspections program.”

If no settlement is forthcoming and even if Iran develops nuclear weapons, Pollack would still opt for containment, the policy the United States has followed toward Iran since the 1979 revolution. The most serious drawback, Pollack writes, is the damage a nuclear Iran would do to U.S. credibility after all that the United States has “invested in preventing Iran from acquiring a nuclear weapons capability.” Nevertheless, it will be far easier to contain Iran than it was to contain the old Soviet Union, he says. After four decades of increasing isolation and economic pressure, “Iran is weak, isolated, internally divided and externally embattled.”

Countering what he calls the “hysteria” of those who see Iran as an undeterrable hegemon, Pollack writes that Tehran is “no threat to the territorial integrity of any other country and its unconventional warfare campaigns have tended to be lethal nuisances” rather than significant threats. Although he would expect an Iran with nuclear weapons to be more aggressive than one without such weapons, Pollack says that is not “a compelling argument in favor of going to war with Iran.”

Pollack credits many of Washington’s best-known Iran specialists with helping him write this book, but unfortunately,

there are several errors that should have been caught before publication.

- Pollack refers to Iranian President Hassan Rouhani as “the most anti-establishment figure among the six candidates” who were on the ballot in June 2013. Rouhani might have been the most moderate sounding, but he is not anti-establishment. Indeed, he recalls the Woody Allen movie character Zelig in having been involved in most of the major foreign policy decisions of the Iranian government since 1979. A longtime close associate and representative of Supreme Leader Ayatollah Ali Khamenei, Rouhani has served on all the government’s most important national security bodies and would not have been allowed to run for president or win the election if he were anti-establishment.

- Pollack writes that the IAEA referred Iran’s nuclear program to the UN Security Council in June 2004 when the actual referral came in February 2006.

- According to Pollack, IAEA inspectors “travel to Iran every two months” and inspect Iran’s nuclear facilities every six to eight weeks. In fact, they are in the country 365

days a year and visit declared Iranian enrichment sites on average once a week. That does not mean Iran cannot kick the inspectors out and race for a bomb, but it does mean that, currently, outside knowledge of Iran’s program is pretty good. Under a new agreement with the IAEA signed on November 11, inspectors’ access to previously poorly monitored sites such as a heavy-water production plant at Arak should improve.

- Pollack says that the United States and Iran achieved a tentative accord on a confidence-building deal in 2009 in Vienna. The agreement, which would have sent out most of Iran’s LEU stockpile but subsequently fell apart under domestic Iranian political pressure, was reached in Geneva.

Such errors aside, the book should be required reading for the policy community and, in particular, members of Congress and their staffs. Creative in finding draconian new sanctions to impose on Iran, Congress has been far less imaginative in considering incentives that might convince Iran to resolve the crisis.

Pollack suggests that sweeter carrots could play an important role in



Israeli Prime Minister Benjamin Netanyahu uses an illustration during his description of Iran’s nuclear program during an address to the UN General Assembly on September 27, 2012.

Don Emmert/AFP/Getty Images

convincing Iran to limit its nuclear infrastructure. He mentions several possible inducements, including more loans from international financial institutions; lifting U.S. and international sanctions; providing trade credits and investment guarantees to U.S. companies returning to the Iranian market; offering development assistance for Iran's agriculture, energy, and environmental sectors; and including Iran in a new security architecture for the Persian Gulf.

Pollack warns that piling on more sanctions is not a good idea at this time, an argument that Obama administration officials have also been making. Sanctions already in place have helped bring Iran back to the negotiating table, but new ones could be counterproductive, he says. "There comes a point when [sanctions] do no more good and can do great harm, both to the people of Iran and to the strategy they are meant to enforce," Pollack writes. If Iran can be persuaded to stop at a "theoretical" breakout capability, Pollack says, this would show that it was pursuing the program only to deter an attack on its territory "since that is all such a breakout capability is good for." If Iran goes all the way to nuclear weapons, however, containment is still the right strategy, Pollack says.

He argues that containment is not appeasement, as it has sometimes been portrayed, but an active set of policies that includes sanctions, extended deterrence for U.S. allies, covert actions such as cyberattacks, and support for Iranian dissident groups.

Although a diplomatic agreement with Iran is the best solution, containing Iran is the best of the other alternatives. Eventually, like the old Soviet Union, Iran will change its ways, if not its government, and containment can bring about that outcome more effectively than war.

ENDNOTES

1. "Fareed Zakaria GPS: New Phase of Global Geopolitics; Interview With Ehud Barak; Interview With Bruce Bueno de Mesquita; A Look at Europe's Far Right," CNN, November 20, 2011, <http://edition.cnn.com/TRANSCRIPTS/1111/20/fzgps.01.html>.

Books OF NOTE

Command and Control: Nuclear Weapons, the Damascus Accident, and the Illusion of Safety

Eric Schlosser, Penguin Press, 2013, 632 pp.

In *Command and Control*, investigative journalist Eric Schlosser conducts an ambitious stocktaking of nuclear weapons stewardship, organized around one of the nuclear era's most harrowing accidents—the September 1980 explosion of a Titan II intercontinental ballistic missile (ICBM) in Damascus, Ark. The accident killed an Air Force airman, severely injured several other service members, and destroyed the silo in which the missile was deployed. The missile's nine-megaton-yield warhead was thrown into a nearby field. Schlosser's deep dive into the lives of the individuals involved and his detailed description of the technology they sought to control provides an entrée into the entire nuclear weapons enterprise. His nearly 500 pages of text include fascinating excursions, from the Strategic Air Command of Gen. Curtis LeMay (1948-1957) to the Soviet KGB's intensive, worldwide effort in 1983 to detect U.S. preparations for a surprise nuclear attack. Schlosser moves adeptly from discussions of grand strategy to the emotions of the people handling the actual weapons. Many other nuclear accidents are recounted in addition to the title event, including losses of operational nuclear weapons at sea and near-detonations on land. For those inclined to dismiss safety incidents as ancient history, Schlosser recalls more-recent U.S. security lapses such as the six nuclear-armed cruise missiles that went missing for a day and a half in 2007 and the nearly one-hour loss of communications with 50 Minutemen III ICBMs in 2010. Schlosser's prose is not polemical, but the sentiment he voices at the book's end is unmistakable: "Every [nuclear weapon] is an accident waiting to happen, a potential act of mass murder."—GREG THIELMANN

Technology Transfers and Non-Proliferation: Between Control and Cooperation

Oliver Meier, ed., Routledge Global Security Studies, 2013, 280 pp.

The title of a section of one chapter in this volume is "Disarmament and development: a decades-old and continuing tension." That turn of phrase, from the chapter by independent disarmament analyst Jean Pascal Zanders, aptly summarizes a main theme of the book: the difficulty of taking steps to tighten export control regimes without running afoul of the legal and political need to avoid unduly restricting access to the relevant technology. As many of the authors note, the issue is common to the biological, chemical, and nuclear nonproliferation regimes. In the concluding chapter, the book's editor, Oliver Meier, an associate at the German Institute for International and Security Affairs (and a former international correspondent for *Arms Control Today*), argues that cooperation should be "de-politicized," as it "appears to work better the less it is framed in a non-proliferation context." Another recurring theme of the book is the rapid pace of technological change, perhaps most notably in the biological sciences, and the inability of control regimes to keep up with it. In her chapter on cooperation in biosecurity, Jo Husbands of the U.S. National Academy of Sciences advocates greater cooperation involving scientists and scientific organizations. She argues that "[e]ffectively engaging scientists in monitoring and assessment could... help ensure that controls and limitations are focused where they are the most feasible and where they can do the most good."—DANIEL HORNER

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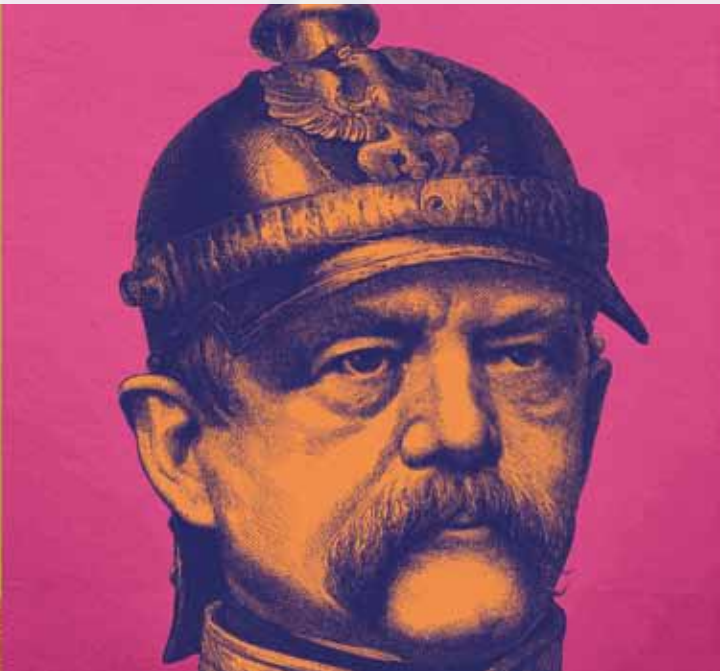


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