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The IAEA’s state-level concept was intended to be the next logical step in the evolution of safeguards, but it appears to have inadvertently provided a vehicle for a rearguard attack on long-standing measures for strengthened safeguards. IAEA member states should fend off this attack and reaffirm their commitment to effective safeguards.

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Book Review:
Posture Matters, but Stability Matters More
In Nuclear Strategy in the Modern Era, Vipin Narang argues that more-aggressive nuclear postures provide a better deterrent, but reviewer Douglas B. Shaw cautions policymakers against using this advice to justify changes in nuclear posture.

Cover photo: At Iran’s Natanz uranium-enrichment plant, an inspector from the International Atomic Energy Agency disconnects the connections between the twin cascades for 20 percent enrichment on January 20. Photo credit: Kazem Ghane/AFP/Getty Images
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The congressional review period for a U.S.-Vietnamese civilian nuclear agreement is almost finished, and action seems unlikely. Some congressional sources say broader issues raised by the pact could resurface.

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For the past five years, the State Department has hosted an annual conference on arms control and disarmament to heighten interest in the issue among students and young professionals.

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At a July 30 hearing, members of Congress questioned the Obama administration’s policy toward negotiations with North Korea over its nuclear program.
long-sought, comprehensive deal between Iran and the P5+1 (China, France, Germany, Russia, the United Kingdom, and the United States) to ensure Iran’s nuclear program is exclusively peaceful is within reach. Both sides have been negotiating seriously, but some big gaps must still be bridged before the Nov. 24 deadline.

To succeed, both sides must seek creative trade-offs, particularly on the toughest issue: Iran’s uranium-enrichment capacity.

In previous rounds of talks, the two sides reached a basic understanding on several key issues, including strengthening International Atomic Energy Agency (IAEA) inspections to guard against a secret weapons program and modifying the Arak heavy-water reactor project to drastically cut its plutonium output.

The two sides also agreed that Iran need not enrich uranium to levels above 5 percent fissionable uranium-235 and that the Fordow enrichment plant would be limited to a research role, but they could not bridge their differences regarding the overall scale of Iran’s enrichment program.

Today, Iran has about 18,000 IR-1 first-generation centrifuge machines at two sites, of which about 10,200 are operational. Iran has also installed 1,008 more-advanced IR-2M centrifuges at the Natanz enrichment plant.

Theoretically, Iran’s operating IR-1 machines could allow Tehran to use natural uranium to produce a quantity of weapons-grade uranium gas sufficient for one nuclear bomb (25 kilograms) in about two to three months if such an effort were not detected and slowed or halted first. Even so, if Iran tried to build a militarily significant nuclear arsenal, it would take considerably more than a year.

For the next several years, Iran’s practical needs for enrichment are limited. Iran already has enough fuel for its Tehran Research Reactor, which produces medical isotopes, for several years. If the Arak reactor is modified to use 3.5 percent-enriched uranium fuel, it might require no more than 1,000 IR-1 centrifuges to provide for its fuel requirements.

Iran’s light-water reactor at Bushehr, which has a power-generation capacity of about 1,000 megawatts electric, uses fuel supplied by Russia under a 10-year deal that could be extended past its 2021 end date. Russia is obliged to supply fuel unless Iran chooses not to renew the contract. But Iran’s leaders are under heavy political pressure to reduce the country’s reliance on foreign energy suppliers and to maintain a uranium-enrichment program that could be expanded if and when the country’s nuclear energy needs grow.

By the close of the last round of talks in July, Iran was still pushing for an industrial-scale enrichment capacity. The P5+1 was insisting on a drastic reduction of Iran’s enrichment capacity—to about 1,500 IR-1 centrifuges—for an extended period.

Negotiators can square the circle in a number of ways. The International Crisis Group and the Arms Control Association recently outlined a formula that would increase the time Iran would require to produce enough weapons-grade material for one bomb and still provide Iran with more than sufficient capacity for its civilian nuclear program over a period of 11 to 16 years. Key elements of the proposal include:

- Reducing Iran’s current enrichment capacity by half for a period of three to five years. Combined with a reduction in the size of Iran’s enriched-uranium stocks, this would increase the time it would take Iran to produce enough weapons-grade enriched-uranium gas to 12 months or more. Iran’s operating enrichment capacity could return to current levels by 2021 and for the duration of any agreement, but only if Iran can demonstrate that it has discontinued any experiments with possible military dimensions.

- Limiting Iran’s working stockpile of low-enriched uranium hexafluoride gas to less than 200 kilograms and converting any excess into an oxide powder, which is more proliferation resistant, for removal to a third country, conversion into fuel for the Arak reactor or a light-water reactor, or some combination of those options. Iran would be barred from building a reconversion line that could reverse the process.

- Removing and storing under IAEA seal most of Iran’s IR-1 centrifuges and replacing some with a smaller number of IR2-M centrifuges. Research on machines that are even more advanced would be limited over the course of any agreement. This would allow Iranian scientists to make the desired shift to more cost-effective machines, but still constrain Iran’s overall enrichment capacity.

- Providing strong guarantees to Iran to help meet its future energy needs, including predelivery of fuel for operation of the Bushehr reactor beyond 2021. By that time, the IAEA and Iran could begin a technical assistance project on reactor fuel fabrication.

Such an agreement may not deliver everything each side wants, but it would deliver what each side needs. The P5+1 would put in place significant, verifiable, long-term constraints on Iran’s capacity to build nuclear weapons and be able to detect and deter any such effort before Tehran could do so. Iran would be able to ease the burden of nuclear-related sanctions and pursue a realistic civilian nuclear program. It is a win-win formula that both sides should embrace. ACT
InBRIEF

Notable Quotable

“When I compare this with the situation of looking for WMD [weapons of mass destruction] in Iraq, my comparison is that in Iraq, we spent a trillion dollars, lost more than 4,000 American lives, many Iraqi lives, and destroyed zero tons of WMD. In Syria, we’ve spent less than 1 percent of that amount, a couple hundred million dollars; we have not lost any American lives; and we will succeed by the end of the summer in destroying well over a thousand tons of WMD. That’s a pretty damn good cost-benefit calculus for what’s been accomplished.”


Fifteen Years Ago in ACT

Illuminating Global Interests: The UN and Arms Control

I think a demonstration of the political will of the nuclear-weapon states toward making deep cuts in their nuclear arsenals—either through a statement or through actual negotiations—would greatly help to allay the concerns of the non-nuclear-weapon states.

—Jayantha Dhanapala (interview), September/October 1999

BY THE NUMBERS

Iranian Stockpile of 20 Percent-Enriched Uranium Hexafluoride Gas Under the Joint Plan of Action in 2014

209 kilograms on Jan. 20

54 kilograms on April 17

0 kilograms on July 20

The Joint Plan of Action, an agreement between Iran and six world powers, was concluded last November. Its six-month term began in January. The term has been extended by four months.

Source: International Atomic Energy Agency
Senators Push Nonproliferation Budget

Twenty-six senators sent a letter to the Obama administration requesting increased funding for nuclear nonproliferation programs in the fiscal year 2016 budget for the Energy Department.

The signatories of the Aug. 13 letter, led by Sens. Dianne Feinstein (D-Calif.) and Jeff Merkley (D-Ore.), urged Shaun Donovan, director of the Office of Management and Budget, to “seek increased funding for vital nuclear material security and nonproliferation programs.”

The letter noted that the administration “proposed cuts to these programs over the last several years.”

The Obama administration’s budget for fiscal year 2015 would cut the Energy Department’s nonproliferation programs by $399 million from the fiscal year 2014 appropriation. Fiscal year 2014 ends Sept. 30.

It is “not the time to pull back on nonproliferation,” the letter said, noting that recent terrorist actions serve as a reminder of the importance of “ensuring that terrorist groups and rogue states” do not obtain nuclear weapons and materials.

The Senate Appropriations energy and water subcommittee, chaired by Feinstein, increased funding for nonproliferation activities to nearly $2.0 billion, $423 million above the president’s request for fiscal year 2015. The subcommittee released its bill and draft report July 24, but no further action has been taken on the bill.

The increases include an additional $136 million for the Global Threat Reduction Initiative (GTRI) and $50 million for the International Nuclear Materials Protection and Cooperation program.

The letter said the GTRI played an important role in eliminating nuclear materials from 13 countries since 2009 and that “significant work remains” to secure nuclear material at “hundreds of sites spread across 30 countries.”

The senators urged the administration to work with the Senate to “ensure that critical nuclear material security” programs have the necessary resources. The letter urged the administration, in next year’s budget request, to build on the funding levels that the appropriations subcommittee approved for fiscal year 2015.

In addition to Feinstein and Merkley, the signers of the letter included 20 Democrats, Republican Sens. Lamar Alexander (Tenn.) and Lindsey Graham (S.C.), and independents Bernie Sanders (Vt.) and Angus King (Maine).—KELSEY DAVENPORT

Creedon Takes Office at NNSA

Madelyn Creedon was sworn in on Aug. 7 by Energy Secretary Ernest Moniz as the principal deputy administrator of the National Nuclear Security Administration (NNSA), a semiautonomous part of the Energy Department.

Creedon, who was confirmed by the Senate on July 23, will assist NNSA Administrator Frank Klotz in the management and operation of the NNSA, according to an NNSA statement. President Barack Obama nominated her last November. (See ACT, December 2013.)

She most recently served as assistant secretary of defense for global strategic affairs, overseeing U.S. nuclear forces and missile defense policy.

The administration is still seeking confirmation of other senior officials for positions dealing with nuclear weapons policy, including Adam Scheinman, currently senior adviser to the State Department’s Bureau of International Security and Nonproliferation, to be special representative of the president for nuclear nonproliferation; Frank Rose, deputy assistant secretary of state for space and defense policy, to be assistant secretary for arms control, verification, and compliance; and Elizabeth Sherwood-Randall, the top nuclear proliferation and defense policy official on the National Security Council (NSC), to be deputy secretary of energy.

On July 28, the Senate confirmed Brian McKeon, who had served as NSC staff director, as the principal deputy undersecretary of defense for policy. The Senate had held up McKeon’s nomination over concerns that he had withheld information from Congress regarding Russia’s alleged violation of the Intermediate-Range Nuclear Forces Treaty. (See ACT, April 2014.)—TOM Z. COLLINA

China Conducts ASAT Test, U.S. Says

China conducted “a non-destructive test of a missile designed to destroy satellites” on July 23, according to the U.S. State Department.

The U.S. comment appeared to differ from the Chinese statement on the test. According to Xinhua, China’s official news agency, the Chinese defense ministry called the test a “land-based anti-missile technology experiment,” suggesting that it was a test of a missile defense system rather than of an anti-satellite (ASAT) weapon.

During his Aug. 13 remarks at the U.S. Strategic Command Deterrence Symposium in Omaha, Neb., Frank Rose, U.S. dep-
Utility assistant secretary of state for space and defense policy, said the United States “has high confidence in its assessment” that China was testing an ASAT weapon.

Neither China nor the United States provided additional details to support its characterization of the test. China said the test took place within its territory and successfully reached the anticipated goal. The U.S. statement called on China to “refrain from destabilizing actions” that threaten the security and sustainability of space.

Also in its statement, the State Department said that, in the test, China had used the same missile system as in a 2007 test in which China shot down one of its own weather satellites. That event, which created thousands of pieces of debris that continue to present a danger in space, used an SC-19 missile. (See ACT, March 2007.)

China has claimed that subsequent tests of its SC-19 missile in 2010 and January 2013 were part of an effort to develop and understand missile-interceptor technology, not to develop ASAT capabilities, but the two technologies are very similar. (See ACT, March 2013.)

In an Aug. 12 e-mail to Arms Control Today, Brian Weeden, a technical adviser to the Secure World Foundation, said the July 23 U.S. statement marked the first time since the 2007 test that the State Department had publicly declared that China conducted an ASAT test. The United States has never publicly acknowledged the 2010 test or two tests in 2005 and 2006, Weeden said. Information related to those tests was made public after the website WikiLeaks published a 2010 State Department cable about the 2010 test.

Weeden, a former U.S. Air Force space analyst, pointed out the lack of specific details from Washington and Beijing about the July 2014 test, saying that, after the 2010 and January 2013 tests, both countries mentioned another missile that had been launched as a target. The lack of information about the target for the recent test makes it unclear whether this was actually another test of the SC-19 missile tested in 2007, 2010, and 2013 or possibly a test of a new ASAT system—believed to be in development and capable of reaching geostationary orbit, about 36,000 kilometers above the earth—that might have been tested in May 2013. (See ACT, April 2014.)

The State Department’s description of the recent test as nondestructive, combined with the lack of details from Beijing about the test, could point to the testing of this new ASAT weapon in geostationary orbit, Weeden said. “It would be distinct enough from a missile defense profile to allow the US to confidently characterize it as an ASAT test,” said Weeden. As the second test of a new system, it would be consistent with the pattern that China followed for the SC-19, carrying out two nondestructive tests in 2005 and 2006 before conducting an actual intercept in 2007, he said.—TImothy Farnsworth

U.S.-UK Nuclear Pact Revised

The United States and the United Kingdom revised and extended their long-standing nuclear forces cooperation agreement in July, with President Barack Obama declaring that “continu(ing) to assist the United Kingdom in maintaining a credible nuclear deterrent” is in the U.S. national interest.

A July 24 White House statement said the changes would “ensure consistency with current United States and United Kingdom policies and practice regarding nuclear threat reduction, naval nuclear propulsion, and personnel security.” Because portions of the new agreement are secret, Obama sent classified and unclassified versions of the agreement to Congress, according to the statement.

As the UK debates the long-range future of its submarine-based Trident nuclear forces, the renewed agreement authorizes U.S. support through 2024. A 1958 mutual defense pact between the two countries allows transfer of “classified information concerning atomic weapons; nuclear technology and controlled nuclear information; material and equipment for the development of defense plans; training of personnel; evaluation of potential enemy capability; development of delivery systems; and the research, development, and design of military reactors,” according to the White House.—JEFFERSON MORLEY

On the Calendar

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Reports of Note

Innovating Verification: New Tools and New Actors to Reduce Nuclear Risks

Nuclear Threat Initiative, July 2014

This report by the Nuclear Threat Initiative highlights verification as a key mechanism for building confidence in the disarmament and nuclear nonproliferation effort. “[V]erification can serve as the brake or the engine for arms control, and much capacity and participation are needed now and in the future for long term success,” NTI Co-Chairman and Chief Executive Officer Sam Nunn says in his foreword. The NTI assembled expert groups in three areas—baseline declarations, societal verification, and enhancement of global capacity—and devotes a volume to each of them. The report’s overview highlights some common themes. For example, the report urges the international community “to build and sustain a global cadre of verification experts” and to develop a new framework for sensitive information so that cooperation can take place without compromising security. It argues that collaborative work on verification should begin now. According to the report, one role of verification is to meet policymakers’ demands, but it also can help stimulate demand: “Showing what is verifiable can strengthen the resolve of policymakers to seek new commitments or inspire new thinking on what is possible.”—JONAH ABONI

Limiting Armed Drone Proliferation

Micah Zenko and Sarah Kreps, Council on Foreign Relations, June 2014

In this report, Micah Zenko and Sarah Kreps of the Council on Foreign Relations address the prospect of armed drone proliferation and its implications for U.S. policymakers and interests. Zenko and Kreps contend that although the consequences of drone proliferation are years away, the failure to establish “rules of the road” now will have “grave consequences” for U.S. efforts to prevent armed conflict, promote human rights, and strengthen international law and norms. The authors say the unique qualities of drones—their ability to hover over a target and strike time-sensitive targets without risk to the pilot—make militarized disputes more likely by lowering the threshold for the use of force and increasing the risk of miscalculation. Zenko and Kreps question whether the Missile Technology Control Regime (MTCR) is adequate to curb the proliferation of armed drones because its guidelines are nonbinding and its membership does not include all countries that produce drones or aspire to do so. Another concern, Zenko and Kreps say, is that small-payload drones that do not qualify for restrictive Category I handling under the MTCR guidelines could still prove destabilizing. The authors recommend that the U.S. government adopt seven requirements for approving the export of armed drones and that it increase transparency in the use of armed drones, particularly in the criteria for targeting U.S. citizens and foreign nationals.—JEFFERSON MORLEY

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Arms Control Association
For nearly a year, negotiations on Iran’s nuclear program have been underway between Iran and the EU3+3 (China, France, Germany, Russia, the United Kingdom, and the United States). The two sides in the negotiations, which the European Union has facilitated, are seeking a “mutually-agreed long-term comprehensive solution that would ensure Iran’s nuclear programme will be exclusively peaceful.”

In November 2013, the sides agreed to an arrangement known as the Joint Plan of Action, under which Iran has taken substantial steps to address proliferation concerns about its nuclear activities. In particular, under International Atomic Energy Agency (IAEA) safeguards supplemented by additional IAEA monitoring and verification pursuant to the Joint Plan of Action, Iran has halted the production of uranium enriched to 20 percent uranium-235 and down-blended half its entire stock of that material to below 5 percent U-235 while converting the rest to uranium oxide, which cannot be immediately used for enrichment. In addition, Iran has capped the production of 5 percent-enriched uranium and accepted daily IAEA inspector access at its uranium-enrichment facilities at Natanz and Fordow and monthly access at the under-construction Arak heavy-water reactor, among other measures.

In July, the sides agreed to extend the arrangement until November 24, exactly one year since it was finalized, to provide additional time to conclude the comprehensive agreement.

This article provides a brief review of the Iran nuclear issue as it has developed since 2002, covers the ongoing IAEA verification, addresses the allegations of nuclear weaponization activities, and concludes with some recommendations on the way forward in reaching a long-term solution.

Background
Concerns about Iran’s nuclear activities came to a head in August 2002 when an exile group using information supplied by unidentified states revealed enrichment activities in Iran that had not been declared to the IAEA as required by Iran’s safeguards agreement. Subsequent investigation by the IAEA led to Iran

Tariq Rauf heads the Disarmament, Arms Control and Non-Proliferation Programme at the Stockholm International Peace Research Institute (SIPRI). From 2002 to 2011, he was head of verification and security policy coordination, reporting to the director-general, at the International Atomic Energy Agency (IAEA). Robert Kelley, an associated senior research fellow at SIPRI, worked on documenting nuclear weapons programs in Iraq, Libya, and South Africa for the IAEA and was a director of the IAEA Iraq Action Team. He previously worked at the Los Alamos National Laboratory and the Lawrence Livermore National Laboratory in the United States. He also was director of the U.S. Department of Energy’s Remote Sensing Laboratory.
submitting an updated declaration to the IAEA. On the basis of this updated declaration, the IAEA reported that Iran had developed a nearly complete front end of the nuclear fuel cycle, including uranium mining and milling; facilities for uranium conversion, uranium enrichment, separation of plutonium from targets, fuel fabrication, and heavy-water production; a light-water reactor; a large heavy-water research reactor; and associated research and development facilities.4

IAEA Director-General Mohamed ElBaradei concluded that Iran had failed in a number of instances over an extended period of time to meet its obligations under its comprehensive, or full-scope, safeguards agreement.5 ElBaradei called on Iran to take the required corrective measures.

In September 2005, the IAEA Board of Governors adopted a resolution in which it concluded that “Iran’s many failures and breaches of its obligations to comply with its NPT [nuclear Nonproliferation Treaty] Safeguards Agreement...constitute non-compliance in the context of Article XII.C of the Agency’s Statute.”6 This referred to the previously undeclared part of Iran’s nuclear program, namely enrichment and reprocessing activities and the import and use of nuclear material, which Iran had concealed from the IAEA. The resolution also concluded “that the history of concealment of Iran’s nuclear activities referred to in the Director General’s report, the nature of these activities, issues brought to light in the course of the Agency’s verification of declarations made by Iran since September 2002 and the resulting absence of confidence that Iran’s nuclear programme is exclusively for peaceful purposes have given rise to questions that are within the competence of the [UN] Security Council, as the organ bearing the main responsibility for the maintenance of international peace and security.”

In February 2006, Iran resumed enrichment activities, which it had suspended from 2003 to 2006 as a “voluntary and non-legally binding” confidence-building measure under an agreement with France, Germany, and the UK. In response, the IAEA board decided to report to the Security Council that Iran was required to “implement transparency measures, as requested by the Director General...which extend beyond the formal requirements of the Safeguards Agreement and Additional Protocol, and include such access to individuals, documentation relating to procurement, dual use equipment, certain military-owned workshops and research and development as the Agency may request in support of its ongoing investigations.”7

Over the next 28 months, in particular after agreement on the work plan between the IAEA and Iran in August 2007, the IAEA was able to clarify past enrichment activities and to put in place the safeguards approach for the Natanz enrichment plants. In late May 2008, ElBaradei reported that the plants had
been operating as declared.8

Unresolved questions remained regarding allegations that there were “possible military dimensions” to Iran’s nuclear program and that the IAEA had not detected the actual use of nuclear material in this regard.9 The allegations were based on information provided by more than 1,000 pages of information on this issue by certain Western states, but they have prohibited the IAEA from giving Iran copies of the bulk of such information, citing the need to protect sources and methods. The number of pages is misleading in that a significant fraction is computer printouts of IAEA entered into force on May 15, 1974.18 As an NPT party that is a non-nuclear-weapon state, Iran has accepted the obligation to use nuclear energy exclusively for peaceful purposes and to allow verification of nuclear material in all nuclear activities “for the exclusive purpose of verifying that such material

several states.

The IAEA has limited means to determine the veracity of such information independently because, in many instances, the states concerned do not give the agency access to the origins of the information, the original documentation, or the sources of the documentation. There were several notable instances regarding Iraq in which the IAEA was given fabricated or false information. Nevertheless, the IAEA critically assesses all information provided to it, in part by corroboration with information available to the agency from other sources and from the agency’s own findings. To the extent possible, the IAEA shares such information with the state concerned with a view to obtaining clarification. This process is based strictly on the rights and obligations of the IAEA Secretariat enshrined in the safeguards agreement (and additional protocol, for states that have adopted one) with the state and in certain cases in pursuance of a request of the Security Council.10

ElBaradei noted that the constraints placed by some member states on the sharing of information with Iran were making it more difficult for the IAEA to conduct detailed discussions with Iran on the possible military dimensions of its nuclear program.11 In the case of Iran, the IAEA has been provided with repetitive calculations of little practical interest. In May 2008, ElBaradei reported that although the IAEA “had been shown the documents...it was not in possession of the documents and was therefore unfortunately unable to make them available to Iran.”12 Iran consistently has maintained that this information is “baseless,”13 “fabricated,”14 or “forged” or based on publicly available information15 on the location and activities of certain nuclear and military facilities.

The IAEA has continued to verify the nondiversion of declared nuclear material in Iran,16 but the director-general cannot conclude that all nuclear material and activities are in peaceful uses. This is the same conclusion he must draw for all states that do not have an additional protocol.

The Joint Plan of Action addresses civilian nuclear activities in Iran that could be used to produce highly enriched uranium or separated plutonium, which are the nuclear materials needed for a nuclear weapon. The plan does not address the questions of possible weaponization. Those questions must be addressed directly between the IAEA and Iran.17

Safeguards Implementation

Iran is an original party to the NPT; its safeguards agreement with the is not diverted to nuclear weapons or other nuclear explosive devices.”19 The underlying premise is that, without access to weapons-usable nuclear material, there can be no weapons. For its part, the IAEA has the corresponding right and obligation to verify not only that Iran’s declarations of nuclear material subject to safeguards are “correct,” accurately describing the types and quantities of the declared nuclear material holdings, but also that they are “complete” and include all material that should have been declared pursuant to its comprehensive safeguards agreement.

The secretariat has defined three safeguards objectives20 that are common to all states with comprehensive safeguards agreements. The IAEA seeks to detect undeclared nuclear material and activities, undeclared production or processing of nuclear material at facilities and at “locations outside facilities,”21 and diversion of declared nuclear material at facilities and locations outside facilities. To meet these objectives, the IAEA determines an optimized combination of safeguards measures based on a comprehensive state evaluation that takes state-specific factors into consideration at all stages of safeguards implementation (fig. 1). Presently, in accordance with these objectives, the IAEA is implementing safeguards at 18 nuclear

A novel idea could be to make the Natanz and Fordow facilities into examples of state-of-the-art monitoring and verification of centrifuge enrichment plants and implement a combination of overlapping verification measures that later could be implemented in all such plants under safeguards.
Figure 1: State-Level Objectives of IAEA Safeguards

Under a comprehensive safeguards agreement, International Atomic Energy Agency (IAEA) safeguards are to be applied to all nuclear material in all peaceful nuclear activities of a state for the exclusive purpose of verifying that such material is not diverted to use in nuclear weapons or other explosive devices. In order to apply effective safeguards under comprehensive safeguards agreements, the IAEA identifies and conducts safeguards activities to address generic state-level safeguards objectives that are common to all states with those agreements, such as Iran.

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<td>Features Common to the Three Objectives</td>
<td>Follow-up activities defined and carried out to ascertain whether the identified discrepancies, anomalies, and inconsistencies indicate the possible presence of undeclared nuclear material or activities or the diversion of nuclear material from peaceful activities</td>
<td></td>
</tr>
</tbody>
</table>

*This category includes locations such as hospitals and small laboratories where the amount of nuclear material in compounds or solutions is less than one kilogram.


facilities and nine locations outside facilities in Iran (fig. 2).

To restore international confidence in the peaceful nature of all Iranian nuclear activities, Tehran would have to take a number of steps in addition to full implementation of its comprehensive safeguards agreement. Tehran would have to revert to full implementation of modified Code 3.1 of the subsidiary arrangements to its comprehensive safeguards agreement, under which a country must provide early design information on modifications to existing nuclear facilities or construction of new ones. Under the old requirement, countries had to provide such information 180 days prior to the introduction of nuclear material into the facility.

In addition, Iran would have to revert to the implementation of the additional protocol to its safeguards agreement. Iran signed the protocol in December 2003 and provisionally implemented it until March 2006. The Majlis, Iran’s parliament, rejected ratification in response to the IAEA board decision in February 2006 to report the Iran nuclear file to the UN Security Council.

Of the nuclear facilities, the ones of immediate proliferation concern are the enrichment plants at Natanz and Fordow and the Arak heavy-water reactor. Iran is constructing the indigenously designed Arak reactor to produce medical isotopes. That reactor is intended eventually to replace the aging Tehran Research Reactor, originally supplied by the United States under President Dwight Eisenhower’s Atoms for Peace plan.

All reactors can be used to produce plutonium, but certain heavy-water reactors are considered to be especially useful for producing weapons-usable plutonium. Plutonium obtained from the reprocessing of fuel or targets from a research reactor or a production reactor can be more easily optimized for weapons use than plutonium from a power reactor. Many countries are concerned about the plutonium-production potential of the Arak reactor. Any plutonium produced in the fuel irradiated in the Arak reactor would need to be reprocessed to separate plutonium, and thus far, the IAEA has consistently reported that there are no reprocessing activities being carried out at the facilities to which it has access in Iran.

The U.S. Department of State goes further to note that Iran did not construct a facility capable of reprocessing.

Verification of Enrichment

The technical objective of IAEA safeguards is the timely detection of diversion of significant quantities of nuclear material from peaceful activities and deterrence of such diversion by the risk of early detection.

The enhanced monitoring and verification measures under the Joint Plan of Action implemented at Natanz and Fordow, along with routine safeguards involving weekly or biweekly inspections, are completely adequate for verification of the peaceful nature of Iran’s nuclear program. Iran and the EU3+3 should cover the added costs to the IAEA for monitoring and verification, which go beyond normal safeguards.

For centrifuge enrichment plants such as Natanz and Fordow, the main safeguards concerns are production
of a significant quantity of uranium enriched to a level higher than declared, in particular highly enriched uranium (HEU); diversion of a significant quantity of declared uranium; and production of low-enriched uranium (LEU) in excess of declared quantities. The early detection of undeclared HEU production is of the greatest importance, as HEU is a direct-use material for a weapon.

To achieve its safeguards objectives, the IAEA successfully utilizes a number of verification and monitoring measures at centrifuge enrichment plants in Iran, as well as elsewhere, to provide a high level of confidence in and knowledge of a country’s enrichment activities. These measures include plant design verification, nuclear material accountability, material balance areas, sampling, containment and surveillance (seals, cameras, and monitors), physical inventory verification, routine inspections, limited frequency unannounced access, and short-notice random inspections. The combination of these measures with those under the Joint Plan of Action, such as daily access by IAEA inspectors to Natanz and Fordow, a ban on production of uranium with an enrichment level above 5 percent U-235, and continuing full IAEA access to the cascade halls of the enrichment facilities, can provide assurance against diversion or undeclared production of enriched uranium in Iran.

IAEA inspectors have a greater level of access to enrichment plants in Iran than they do at similar plants in Brazil and Japan and those operated by Urenco in Germany, the Netherlands, and the UK. A novel idea could be to make the Natanz and Fordow facilities into examples of state-of-the-art monitoring and verification of centrifuge enrichment plants and implement a combination of overlapping verification measures that later could be implemented in all such plants under safeguards. These additional measures could include continuous online enrichment monitors, tamper-indicating devices, and centrifuge and cylinder tracking.

Under the latter measures, in addition to centrifuges, cylinders of enriched uranium hexafluoride and depleted uranium hexafluoride can be individually tracked using bar codes and radio-frequency identification devices to maintain continuity of knowledge for verification and security purposes. Such tracking can ensure that only declared centrifuges and cylinders are introduced for use in the cascades and autoclaves at the Natanz and Fordow plants and that the IAEA can ensure continuity of knowledge there. In this way, the IAEA could further ensure that the enrichment plants in Iran are not misused to divert material or to produce undeclared LEU or HEU and are even more effectively safeguarded than at present.

**Heavy-Water Reactors**

As noted above, the IAEA has been reporting for several years that it can confirm that there are no ongoing reprocessing-related activities with respect to the Tehran Research Reactor and the other facilities to which it has access in Iran. Iran has declared that the Arak reactor will be used for the production of radioisotopes for medical uses, like the Tehran reactor. That reactor, which originally burned HEU enriched to 93 percent U-235 supplied by the United States, has been converted to run on LEU. The Arak reactor is to be fueled by natural uranium although Iran has indicated the reactor could be converted to use LEU fuel to reduce its plutonium-production potential.

The most effective way to monitor the Arak reactor and verify its actual plutonium content in irradiated nuclear fuel is to have a full and correct declaration by Iran of the initial supply of fuel and targets in the reactor core. Knowledge of irradiation time and an accurate mass balance for the core material balance area will allow the IAEA to determine the quantity of plutonium being produced in spent fuel and targets and the isotopic composition of the plutonium. As the concentration of the isotope plutonium-239 drops, the suitability for weapons use drops as well.

The IAEA and Iran are working on devising an effective and efficient safeguards approach for the Arak reactor. If Iran modified the reactor to burn 3 percent-enriched LEU rather than natural uranium, the plutonium content would be significantly reduced. Frequent IAEA inspector access, short-notice random inspections, and unattended instrumentation such as surveillance cameras and reactor power monitors could ensure that the reactor is operated to produce medical isotopes, which is a legitimate need of Iran. In addition, novel technologies could be explored, such as anti-neutrino monitoring to detect and monitor the plutonium content in the reactor’s core.

**Allegations of Military Activities**

In addition to the talks between Iran and

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Iran’s uranium-enrichment plant at Natanz, seen in this April 2007 photo, plays a central role in the negotiations between Iran and the six-country group.
the EU3+3, negotiations between Iran and the IAEA over a possible weapons program have continued over the years. The focus of the EU3+3 negotiations has been the fear that the ultimate goal of Iran’s declared nuclear program is development of a nuclear weapon, a charge Iran vigorously denies. Discussions with the IAEA over the program’s possible military dimensions have become unusually acrimonious and a major stumbling block to making progress.

The IAEA director-general has provided a report to the Board of Governors every three months since 2003 on implementation of safeguards in Iran. In his November 2011 report, Director-General Yukiya Amano added an annex describing all of the information the IAEA had suggesting that there is a clandestine military dimension to Iran’s nuclear program.28

The issue of discovering possible weapons activities is much more difficult to resolve than the normal safeguards issues described above. The information on this issue comes from a number of sources that provide information and hearsay that the IAEA cannot verify. Much of the information is old and exaggerated, and the most recent items are among those that are not from verifiable sources. The annex gives great weight to experiments with high explosives and detonators suitable for a nuclear weapon in the 2002-2004 time frame. In 2007 the United States concluded that Iran had had weapons ambitions but gave them up in the fall of 2003.29

The technologies under discussion are complex and are outside the experience of most IAEA safeguards staff and all upper management. For example, according to the annex, the IAEA “recognizes that there exist non-nuclear applications, albeit few, for detonators like [exploding bridge wire devices].” In fact, there is a large civilian and non-nuclear market for such devices.30

The IAEA claims that its weaponization information is “highly consistent” because it comes from 10 or more countries.31 An examination of the claims in the annex, much of which was leaked to the press even before the IAEA report was published,32 shows that the majority comes from two or three countries. A postulated list of 10 or more countries that the IAEA claims have provided the weaponization information has to include all countries that provided information on the finances and travel of the supply network headed by Pakistani metallurgist Abdul Qadeer Khan, but this does not directly concern alleged weaponization studies. Rather than being highly consistent, the information seems to be thinly sourced when limited to weaponization, the subject of the annex, rather than foreign assistance with centrifuges. In addition, multiple countries held identical sets of documents.

Iran is accused of receiving, although not requesting, a document on uranium metallurgy from the Khan network describing processes for converting uranium compounds into metal and the production of uranium metal hemispheres, such as might be used in the core of a nuclear weapon. This information has been in the public domain since at least the 1950s.33 Yet, Iran, which voluntarily showed this document to the IAEA, is accused of pursuing a weapons program because it received the document from Khan. Experts in material processing should examine this information to see if there is anything new and explain why Iran’s possession of the document is of proliferation significance.

Adding Expertise to the IAEA

In 1991 the UN Security Council gave the IAEA the task of forming a special unit, the Iraq Action Team, to investigate nuclear activities in Iraq that had come to light as a result of the Persian Gulf War. The IAEA had been inspecting nuclear activities in Iraq for many years and had not detected undeclared activities to produce nuclear materials.

The IAEA mandate, as interpreted at
of verifying that nuclear material is not diverted to nuclear weapons or other nuclear explosive devices.34

The IAEA board should...appoint a qualified group of external experts to review contentious issues and information [related to Iran’s alleged weaponization activities].

The failure in Iraq led to a new initiative by the Board of Governors to interpret the IAEA mandate under comprehensive safeguards agreements as giving the agency the authority to look for undeclared nuclear materials and activities and to show more curiosity and initiative in its safeguards activities. This realignment of safeguards, called Programme 93+2, resulted in the promulgation of the Model Additional Protocol in May 1997.

The situation in 1991, however, led to the IAEA’s total lack of preparation to investigate Iraq’s nuclear activities in the postwar environment. To ensure a new approach, a new unit that was established under UN Security Council auspices had two components. First, IAEA career safeguards staff worked to re-establish knowledge of nuclear materials that had previously been safeguarded in Iraq. Second, as new materials were discovered in large quantities, the materials verification teams produced excellent new accountability records and brought those materials under safeguards.

In all of the inspections in other areas, such as gas centrifuges and electromagnetic separation, high explosives, detonators, hydrodynamic testing, weaponization, procurement, and machine tools, the analysis and verification were done by specialist outsiders recruited to work in or with the Iraq Action Team, of which one of the authors was a director. For example, in the area of gas centrifuges, the investigation was managed by experts from Urenco. They were assisted in their analysis by experts from U.S. national laboratories, the UK Ministry of Defence, France’s atomic energy commission, and elsewhere.

The outside experts came armed with technical knowledge, a detailed understanding of the gas centrifuge process, detailed prior knowledge of Iraq’s centrifuge procurement activities gained from intelligence, and a team-building attitude. They carried out dozens of inspections of equipment and facilities and put together a very coherent picture of Iraq’s centrifuge program. In the process, they sensitized IAEA personnel to proliferation indicators of centrifuge technology so that they would know when to ask for help in the future.

The process for analyzing the extensive Iraqi electromagnetic separation program was similar. The solutions came almost entirely from the U.S. nuclear laboratories because the technology, which was old and considered to be obsolete until Iraq revived it, originated in the United States. U.S. experts from the Savannah River Laboratory built an environmental radioactive material sampling network for the IAEA. They designed the network, provided assistance in taking samples, and analyzed the samples.

In the area of nuclear weapons analysis, the work was done entirely by outside experts. Due to the sensitivity of weapons design information, the outsiders only summarized their findings to the IAEA and UN Security Council. The results were examined cooperatively, however, by experts from the nuclear-weapon states. Their summary assessment of Iraq’s nuclear weapon design was adequate for the Iraq Action Team to inform the Security Council that the task had been completed; the details remained in classified channels.

The IAEA Department of Safeguards used a similar approach in South Africa for a weapons assessment. Because South Africa had actually built nuclear weapons, it was important to restrict access to South Africa’s design documentation to avoid making the IAEA a conduit for proliferation-sensitive information.

In the area of alleged Iranian weaponization, the IAEA needs to replicate its experience in Iraq by recruiting an unbiased team of specialized experts to analyze data. The IAEA has made a major issue of alleged high-explosive experiments by Iran that could significantly improve and miniaturize a nuclear weapon. Unfortunately, the IAEA shared the information on this improved nuclear weapons concept with Iran. The Iranians said they did not understand it.35 An international team of weapons experts would have recognized that giving Iran details of better designs is not in the best interests of nonproliferation.

The Parchin Controversy

The IAEA has reported that weaponization experiments were carried out at a site called Marivan in the far west of Iran.36 Instead of visiting Marivan, the IAEA has demanded access to a defense facility at Parchin. There are hundreds of buildings at Parchin involved in all aspects of Iran’s conventional military programs. The IAEA has visited Parchin twice, inspecting a total of 10 buildings of its choice. The IAEA sampled the site for radioactive contamination and found none.

Radioactive contamination is only one small indicator of a nuclear weapons program. Equally important in a weapons development complex are the many other indicators, such as explosive testing, initiator development, ultra-fast diagnostics, and metallurgy. The IAEA does not normally hire staff with skills in
these areas.

Clearly, privileged information about alleged weaponization and enrichment activities in Iran has been leaked or otherwise made available to sources outside the IAEA. In many cases, the leaks are selectively designed to support weaponization theories. Because of the many leaks, Iran is not interested in letting the IAEA continue to inspect the Parchin site. This has produced an impasse of massive proportions, with the IAEA fishing for information about items such as high explosives and exploding bridge wire detonators, areas outside IAEA expertise.

Iran has been accused of carrying out unspecified weaponization experiments in a large chamber in a building at Parchin. Extensive earth moving, paving, and road building for a kilometer on the northeast side of the alleged containment building began shortly after the IAEA first publicly indicated interest in the building. As a result of this activity, Amano said in a November 2012 report to the board that when the IAEA “gains access to the location, its ability to conduct effective verification will have been seriously undermined,” a reference to sanitizing the site to remove putative traces of uranium.

There are many flaws in this analysis, which could be better addressed by experts in construction, environmental sampling, satellite imagery analysis, and civil engineering. At the same time, Iran should be encouraged not to create uncertainty by conducting earth-moving activities nearby until the issue is resolved.

Similarly, information that a 19-meter-long cylinder devised to contain alleged high-explosive experiments involving uranium and weighing more than 100 tons was still being designed in the year 2000 but was fabricated and installed at the Parchin facility in the same year is implausible. Mechanical engineers and experts in explosive containment chambers are needed to correct such a faulty assessment.

In the weaponization annex, exaggeration, innuendo, and careful choices of words make the data look much more significant than they are. The chamber “was said to have been put in place in 2000,” according to the report. In the report, the IAEA says it has acquired commercial satellite images “that are consistent with this information.” Experienced intelligence analysts would not be satisfied with vague phrasing of this kind. They would not be satisfied with settling on one scenario to the exclusion of all others for an undistinguished rectangular building, as the annex does repeatedly. A team of experts that should review the weaponization data needs to tighten up language to reflect what is known, not what is said to be.

The IAEA is not subject to independent external review and does not have to respond to challenges to its technical conclusions. The IAEA board should correct this flaw and appoint a qualified group of external experts to review contentious issues and information. In academia and intelligence, peer review and “red-teaming” are essential tools to avoid groupthink.

**The Question of Breakout**

One objective of the Joint Plan of Action is to improve the quality and timeliness of IAEA activities in the verification of declared nuclear materials. It does not relate to undeclared materials or activities. Some observers are mistakenly using the term “breakout” as the metric for constraining a hypothetical Iranian nuclear weapons program. This is incorrect.

Breakout concerns a case in which a state makes a sudden and unexpected move that gives it a strategic advantage. An example is the sudden resumption of nuclear testing by the Soviet Union in 1961, which caught the United States completely off guard. In Iran, it would be the discovery of a mature and clandestine parallel nuclear materials production and weaponization program.

The Joint Plan of Action is concerned with prolonging Iran’s projected capability threshold, but the definition of the capability that constitutes the threshold varies from observer to observer. Accumulating sufficient fissile material for a weapons program is a slow, steady process in a way that is being monitored and reported by IAEA inspections is not breakout. Applying that term in such a situation is a misuse of this well-defined concept in arms control.

The IAEA is the world’s eyes and ears in Iran. All that is known about Iran’s declared nuclear materials programs qualitatively and quantitatively comes from IAEA safeguards and inspections. If this vital source of real-time, verified information on the main issue of nuclear material is compromised or sidetracked because of confrontations over weaponization issues, it will be a significant and irreversible loss.

Resolution of the outstanding questions about possible Iranian weaponization requires a broad
set of skills. If a very small team of accountancy experts, unfamiliar with conventional arms, construction sites, and common practices in nuclear weapons studies is allowed to analyze the data, the team may envision nuclear activities because that is all it knows. This led to the disaster of U.S. claims that aluminum tubes destined for Iraq in 2002 were for centrifuges when they actually were for rockets, and it can happen again.

Iran should be encouraged to end its ban on accepting inspectors from France, the UK, and the United States and other countries, now that the EU3+3 negotiations have been ongoing for some 10 months. By forcing the IAEA to rely on inspectors with little or no nuclear weapons experience, Iran is obstructing IAEA efforts in a way that works against Iran’s interest in reaching a comprehensive agreement and resolution of the open questions.

In November 2013, the IAEA and Iran agreed on a work plan to cooperate further with respect to verification activities to resolve all present and past issues and to proceed with such activities step by step. A dedicated Iran Verification Team should be established at the IAEA. The team should comprise experienced specialists from the five nuclear-weapon states and Iran to work with the IAEA safeguards team to assess and resolve questions related to alleged weaponization activities. The IAEA and Iran then would consider the findings for possible finalization.

**Conclusions**

With the declarations and access provided to the IAEA, the whole world knows the precise number and types of centrifuges in operation, as well as the quantities and enrichment levels of enriched uranium produced by Iran at those facilities. None of this is in question; the question is the purported use of these capabilities.

Only the IAEA is positioned to legally and definitively reach a conclusion about the exclusively peaceful nature of Iran’s nuclear program, much as it has done in the cases of Japan, South Korea, and Taiwan. States may have defectors, other intelligence sources, analysts, and aerial and satellite imagery, but it is only IAEA safeguards inspectors that have access to states’ declarations, operating records, sampling results, facilities, and personnel. A satellite image may be worth a thousand words, but it cannot show what is inside a building or facility. That is where IAEA safeguards are invaluable.

Under the legal authority available to the IAEA from Iran’s comprehensive safeguards agreement and the IAEA Statute, the IAEA is positioned, if it receives Iran’s full and proactive cooperation, to sort out the questions related to alleged military activities. As noted above, the IAEA would need to supplement its safeguards personnel with nuclear weapons experts.

A long-term comprehensive agreement between Iran and the EU3+3 would be a good basis for facilitating a technical resolution of the open issues between the IAEA and Iran regarding possible military dimensions to Iran’s nuclear program. If Iran does its part in safeguards and verification implementation, it eventually should be no different from Argentina, Brazil, Germany, Japan, or the Netherlands, with an enrichment capability fully accountable under IAEA safeguards and in accordance with the NPT.

In 2003 and 2005, Iran and the EU3+3 missed opportunities for resolving the issues surrounding Iran’s nuclear program through negotiations. In fall 2013, negotiations resumed after eight lost years of recriminations and posturing. Now, both sides appear to have come to the logical conclusion that the only credible course is negotiation of a long-term comprehensive agreement that address all the concerns of both sides. For its part, Iran would continue to limit its nuclear program to reduce its proliferation potential, continue with stringent IAEA safeguards, and cooperate proactively with the IAEA in resolving open questions. The EU3+3 would refrain from threats of use of force and remove all multilateral and national sanctions against Iran. There is no rational alternative.

**ENDNOTES**

1. The six-country group is also known as the P5+1.


25. A significant quantity is used in establishing the quantity component of IAEA inspection goals. The IAEA defines a significant quantity as the approximate amount of nuclear material for which the possibility of manufacturing a nuclear explosive device cannot be excluded: 8 kilograms of plutonium, 8 kilograms of uranium-233, and 25 kilograms of highly enriched uranium (U-235). IAEA, “IAEA Safeguards Glossary, 2001 Edition,” International Nuclear Verification Series, No. 3 (2002).


33. For example, see A.B. McIntosh and T.J. Heal, eds., Materials for Nuclear Engineers (New York: Interscience Publishers, 1960).

34. IAEA, “The Structure and Content of Agreements Between the Agency and States Required in Connection With the Treaty on the Non-Proliferation of Nuclear Weapons,” INFCIRC/153 (Corrected), June 1972, paras. 1-2.


36. Ibid.


40. Ibid.

Even before the 2011 Fukushima nuclear disaster shut down all 48 Japanese nuclear reactors, Japan’s plan to reprocess its spent nuclear fuel and use the recovered plutonium and uranium as mixed-oxide (MOX) fuel in its nuclear power plants suffered from significant delays.

The country now has a stockpile of some 44 metric tons of plutonium, with more than nine metric tons in Japan and about 35 metric tons in Europe that must eventually be returned to Japan. With formidable challenges precluding any quick or easy route for using or disposing of this material, Japan has a major plutonium problem on its hands.

This problem not only has produced a national test for managing Japan’s plutonium, but also has intensified apprehensions by neighboring states about Japan’s nuclear weapons ambitions. Nonproliferation analysts have expressed concerns that such a stockpile sets a poor example for the global nonproliferation regime and increases the risks of nuclear theft. Reducing or eliminating this stockpile will be daunting and take many years to accomplish, but Japan could alleviate international apprehensions and strengthen the global nonproliferation regime by placing its excess plutonium under the custody of the International Atomic Energy Agency (IAEA).

Obstacles to the Abe Policy
On April 11, Japanese Prime Minister Shinzo Abe announced the latest Basic Energy Plan, which calls for the restart of nuclear power plants that satisfy rigorous post-Fukushima regulatory standards, the start-up of the Rokkasho reprocessing plant, and the use of MOX fuel in Japanese reactors. The plan stated that the Japanese government “remains committed to the policy of not possessing reserves of plutonium of which use is undetermined on the premise of peaceful use of plutonium. In order to achieve this policy effectively, the government will conduct an appropriate management and utilization of plutonium while paying due consideration to an appropriate balance between separation and utilization of plutonium.”

The Federation of Electric Power Companies of Japan (FEPC) announced that Japanese utilities would clarify a plutonium-utilization plan before plutonium would be recovered at the Rokkasho plant. Yet, it will be challenging to run the plant and reduce or at least not increase Japan’s plutonium stockpiles.

The Nuclear Regulation Authority (NRA) has been reviewing 18 reactors to determine whether they meet the new post-Fukushima safety regulations. On July 15, the NRA declared that two reactors meet the new safety standards, and the local community has appeared to favor a restart. According to estimates in the Japanese media, the entire process
Work on the construction of an ice wall at the Fukushima Daiichi nuclear power plant proceeds on July 9. The ice wall is designed to stop radiation-contaminated water from flowing to the sea from reactors at the Fukushima site, which were damaged in an accident triggered by a tsunami on March 11, 2011.

should conclude around October. Even if the NRA determines that reactors meet the new safety standards, however, the Japanese utility operators have agreed to consult with local jurisdictions before they make a final decision on resuming operation of any reactor. Nevertheless, the federal government has been clear that it alone has the final say on whether nuclear power plants operate. Recent polls reveal that opponents of restarting the nuclear program outnumber supporters by about two to one.

Some local governments support nuclear power because it brings jobs and government subsidies to their communities. Other localities are strongly opposed. Thus, any plans to restart reactors could be undermined by local opposition. One city has sought a court injunction to prevent a nuclear plant from being built. Adding to the uncertainty was a ruling in May by a Japanese court against restarting reactors 3 and 4 at the Ohi nuclear plant in Fukui prefecture.

A Reuters analysis concluded that only one-third of the 48 idled reactors are likely to pass Japan’s new, more stringent safety standards and meet the seismological, economic, logistical, and political hurdles needed for restart. In addition, the reactor restarts are facing significant implementation costs ranging from $700 million to $1 billion per unit. A March estimate put the cost at $12.3 billion.

The Japanese plan to burn the plutonium as fuel is further complicated by the government’s decision to halt the Monju prototype fast-neutron breeder reactor project, which was to play a central role in utilizing Japanese plutonium. Finally, Japan Nuclear Fuel Limited (JNFL)—a private company involved in producing nuclear fuel, reprocessing and storing spent fuel, and disposing of nuclear waste—plans to start up the Rokkasho plant this October. Further delay is still possible, however, because the NRA review of the plant’s compatibility with the new safety regulations has been delayed and it is still uncertain when the plant will be completed.

An International Problem
Japan’s plutonium stockpile is not merely a national political and program-management problem. Countries in East Asia have long expressed concerns that Japan’s reprocessing and recycle policy has made Japan a plutonium superpower and put Tokyo in a position to develop nuclear weapons very quickly, should it decide to do so.

In answering what was an obviously staged question last January about press reports that Japan would return several hundred kilograms of weapons-grade nuclear material to the United States, a spokeswoman for the Chinese Foreign Ministry, Hua Chunying, made several sharply critical points about Japan’s plutonium policy.

Japan’s large stockpile of nuclear materials including weapons-grade materials on its territory is an issue concerning nuclear material security, proliferation risks and big supply-demand imbalance. Only when
there is such a balance, there can be no hidden dangers that may risk peaceful use of nuclear energy....

We also urge Japan to take concrete steps to tell the international community how it is going to redress

the big supply-demand imbalance of nuclear materials on its territory as required by the IAEA.14

Hua also said that the IAEA “requires all parties to maintain a best possible balance of supply and demand of nuclear materials as contained in the Guidelines for the Management of Plutonium.” Under those guidelines, states are to increase transparency of their plutonium stocks by publishing annual statements of their holdings of unirradiated plutonium and periodic statements explaining their national nuclear power strategies.15 Japan and eight other states agreed to follow the guidelines, which are voluntary.

According to press reports, the Japanese government failed to include 640 kilograms of plutonium in its annual statement to the IAEA in 2012 and 2013. In response, Hua said, “It is Japan who should answer the question of whether it is an unintentional omission or a deliberate concealment. Japan is not only required but also obligated to report faithfully its storage and usage of nuclear materials to the IAEA.” She added,

The Japanese side has long been holding a large amount of sensitive nuclear materials that far exceeds its actual needs, which is a matter of grave concern for the international community. We hope that the Japanese side can give an earnest response to the concern of the international community, take concrete actions as soon as possible to address the supply-demand imbalance of sensitive nuclear materials at an early date and refrain from, in balancing supply and demand, including demand for reasonable working stocks for nuclear operations, as soon as practical.”16

Japan voluntarily agreed to manage its civilian plutonium responsibly, including taking into account “the importance of very material, like separated plutonium, that we’re trying to keep away from terrorists.”17 The communiqué of the March 2014 nuclear security summit in The Hague also encouraged countries to minimize their stocks of highly enriched

uranium and “to keep their stockpile of separated plutonium to the minimum level, both as consistent with national requirements.”18

An Alternative Path
Opposition to the closed fuel cycle— which involves reprocessing of spent fuel and recycling of the plutonium into fresh fuel—has also been virtually universal in the nonproliferation and arms control community, which criticizes reprocessing as an uneconomical approach posing significant risks of proliferation and nuclear theft. In a recent article, two critics urged Japan to adopt an approach, known as the once-through fuel cycle, in which spent fuel is not reprocessed but stored and eventually disposed of. More specifically, the article included the following steps:

- negotiating with the prefectural and local governments that host nuclear power plants for on-site dry-cask storage of spent fuel;
- renegotiating the deal with Aomori prefecture and the village of Rokkasho concerning the construction and operation of the reprocessing plant and the MOX fuel fabrication facility;
- having the central government take responsibility for final disposal of spent fuel away from the nuclear utilities and the operator of the Rokkasho plant; and
- disposing directly of Japan’s 44 tons of already separated plutonium instead of using it in MOX fuel in

Japan’s plutonium stockpile is not merely a national political and program-management problem.
Japan’s nuclear power plants.

A once-through fuel-cycle strategy would avoid an increase in Japanese stockpiles. Yet, any attempt to adopt all or even some aspects of this strategy would be a bumpy, grueling, and protracted ride. It would require convincing local communities to keep spent fuel at reactor sites; renegotiating agreements with Aomori prefecture, which supports reprocessing and MOX fuel fabrication; changing the law governing the national Reprocessing Fund, which bars repayment of loans for the construction of the Rokkasho plant unless the JNFL, whose majority shareholder is the FEPC, commits to operating the reprocessing plant, taking responsibility for final disposal of spent fuel away from itself and the nuclear utilities; and directly disposing of plutonium. Because industry, politicians, and local communities would fiercely resist these steps, implementing them is not likely to be any easier or quicker than putting the Abe administration’s program into effect.

Thus, although Japan should make every effort to reduce its plutonium stockpile and will sooner or later find a path—or, more likely, paths—toward this objective, its plutonium stocks are unlikely to go away anytime soon, no matter what policy or combination of policies Tokyo pursues.

The Custodial Regime

In the meantime, how should Japan deal with concerns that it is accumulating its stockpile as part of a “bomb in the basement” strategy or as a warning to China and North Korea that it is capable of developing nuclear weapons?

The charges that Japan is seeking nuclear weapons are not credible. It has become a cliché that the Japanese, as the only victims of nuclear weapons use, have a widespread and deeply felt opposition to nuclear weapons. Japan’s Atomic Energy Basic Law of 1956 restricts research, development, and utilization of nuclear power to peaceful uses. Japan is a strong supporter of all elements of the global nonproliferation regime, is a party in compliance with the nuclear Nonproliferation Treaty (NPT), and has a comprehensive safeguards agreement with the IAEA. It is not plausible that Japan would seek nuclear weapons as long as Tokyo has confidence in the security guarantee that the United States provides in its 1960 treaty with Japan.

There is no sign U.S.-Japanese ties are going to weaken. They are likely to be cemented in the coming years as U.S. policy rebalances to Asia and as Chinese-Japanese relations become more contentious. Nevertheless, given the rising tensions in East Asia and the portrayal of Japan’s plutonium policy by some as a strategy to develop a nuclear weapons capability, Tokyo needs to take steps to reassure the region and the global community of its peaceful nuclear intentions.

One step that Japan could take to demonstrate its commitment to use its plutonium for exclusively civilian purposes would be to place its excess plutonium under the custody of the IAEA. Article XII of the agency’s statute provides that the IAEA has the right “to require deposit with the Agency of any excess of any fissionable materials recovered or produced as a by-product over what is needed for [peaceful purposes]...in order to prevent stockpiling of these materials.” The statute also provides that, “[a]t the request of the member or members concerned special fissionable materials so deposited with the Agency shall be returned promptly to the member or members concerned,” provided that the material is used for peaceful purposes under continuing IAEA safeguards.

Although this provision has been in the statute since the agency’s inception in 1957, it never has been implemented. An IAEA experts group on international plutonium storage held several meetings from 1978 until 1982, but failed to reach agreement on an IAEA storage regime.

It may be time for Japan to consider concluding an agreement with the IAEA for a custodial regime for its excess plutonium. The details of such an agreement would have to be negotiated between Japan and the IAEA, and the agreement would have to be approved by the agency’s Board of Governors. It should have the following broad characteristics:

- Japan would determine the amount of plutonium to be placed under IAEA custody, but there would be a presumption that material not being used or not designated for use within a specified period of time would be excess and be deposited with the agency.
- Japan and the IAEA would agree on the location of storage sites, presumably co-located with Japanese reprocessing and MOX fuel fabrication facilities.
- The agency would retain custody of the excess plutonium until the Japanese government requests...
The IAEA custodial regime would go beyond classical safeguards because it would afford the agency the legal authority to bar Japan from removing the material from its custody unless it met certain conditions for release.

it submitted to the IAEA a request for release of a specified quantity accompanied by an end-use certificate. The certificate of use would contain the following assurances and information:

- an assurance that the material would be used for exclusively peaceful, nonexplosive purposes;
- an assurance that the plutonium would be subject to continuing IAEA safeguards in accordance with the provisions of the IAEA-Japanese safeguards agreement or, if the material were to be exported to another country, that it would be subject to the safeguards agreement between the IAEA and that country;
- an assurance that the material would remain under effective physical protection in accordance with accepted international standards;
- a description of the quantity and composition of the material to be released from custody;
- the approximate date of delivery;
- the timetable foreseen for utilization; and
- the destination and end use: fabrication into MOX fuel assemblies and prompt irradiation in a designated reactor, use in some research application, or immobilization and disposal.

An IAEA-Japanese custodial agreement would need to provide that the release of the plutonium from agency custody would be only for a declared, specific, immediate, and peaceful use and that the timing of release and the quantity and form of the material would be consistent with the declared end use and thus not result in stockpiling. The decision to release plutonium from custody should not be subject to debate by the IAEA board, as release would be a routine matter based on the provision of a certificate of use.

IAEA custody of the plutonium would not change most of the basic physical arrangements; operational, safety, and physical protection responsibilities; or nonproliferation conditions under which Japanese plutonium is now stored. The plutonium would not be moved to a separate IAEA facility, but would remain in storage under IAEA custody at sites such as Rokkasho or other locations where plutonium is normally stored. The title to the plutonium would remain with Japan; ownership would not be transferred to the IAEA. Japanese companies owning plutonium-storage facilities would retain responsibility for their management and operation.

In addition, safety and physical protection would remain the responsibility of Japanese authorities. The IAEA would apply safeguards at sites where Japanese plutonium is under IAEA custody as part of the agency’s normal safeguards responsibilities. The plutonium would remain subject to all nonproliferation assurances and conditions required by the NPT or by the suppliers of the nuclear material or equipment from which the plutonium had been produced. If the IAEA custodial regime were extended to Japanese plutonium located in the United Kingdom or France, the same conditions would apply. In other words, the relevant French or UK entities or authorities would have responsibilities for management, operation, safety, and physical protection of Japanese plutonium under IAEA custody on their territories.

Benefits of IAEA Custody
The proposed IAEA custodial regime would offer several benefits over and above the agency’s traditional safeguards system and other elements of the global nonproliferation regime.

Elimination of national stockpiling. It would remove excess plutonium from the sole control of Japan by placing it under the legal custody of an international organization.

Strengthened barriers to diversion. The purpose of traditional IAEA safeguards is to detect the diversion of a significant quantity of nuclear material and to deter such diversion by the threat of early detection. The IAEA custodial regime would go beyond classical safeguards because it would afford the agency the legal authority to bar Japan from removing the material from its custody unless it met certain conditions for release. Unauthorized removal of the plutonium would require seizing the material in defiance of the international custodial authorities.

The establishment of IAEA legal custody over the material pending specified peaceful use would thus erect a significant new legal barrier to diversion. There could also be a physical barrier to removal,
such as a two-key system that would require action by an IAEA official and a Japanese official for release of material from IAEA custody. In such a case, the operator should have the right to remove material from IAEA custody in emergency circumstances such as a fire. Any emergency entry would have to involve an immediate notice to the IAEA.

Increased transparency. The IAEA would verify that the location, form, and composition of material that it allowed to be released would be consistent with the declared use. Provided it does not compromise security and proprietary requirements, the IAEA should publish information on the quantity, form, and locations of the plutonium under its custody and on any of the material released from its custody, including the specific peaceful uses or disposition of such material in Japanese facilities. (Plutonium holdings published under the IAEA plutonium management guidelines are self-reported and are given on a countrywide basis.) After release of the plutonium from IAEA custody, the agency would apply safeguards to verify the ongoing peaceful, nonexplosive use of the material and confirm that it is being used for the particular application specified by Japan.

Increased assurance of effective physical protection and safety. Japanese physical protection measures have come under considerable criticism. In reaction to the September 11 attacks in the United States, Japan has improved security at its facilities, but still has much more to do. Japan was one of 35 countries that signed the initiative on strengthening nuclear security at the March nuclear security summit. The signers pledged to “meet the intent” of various IAEA recommendations on physical protection and nuclear security guidelines and “to embed the objectives of the nuclear security fundamentals and the IAEA recommendations in national rules and regulations and to host peer reviews to ensure effective implementation.”

Japan has recently deposited its instrument of acceptance of the 2005 amendment to the Convention on the Physical Protection of Nuclear Material with the IAEA. An IAEA-Japanese custodial agreement should require that the physical protection and safety measures for plutonium meet international standards while under the agency’s custody and during transport and use. The IAEA should verify that these standards are being met.

Minimal cost. The proposed custodial regime should not be particularly burdensome or costly to Japan or the IAEA. Because Japan is already a party to the NPT, its plutonium is already under IAEA safeguards. The incremental costs of administering a custodial regime should be relatively small. Although they could be covered by the agency’s budget, it would be prudent for Japan to pay for the additional expenses.

Plutonium in Japan and Europe

Unirradiated plutonium in Japan should be the prime candidate for submission to IAEA custody. That should include plutonium that has been fabricated into MOX fuel elements or assemblies but has no scheduled, near-term use.

The IAEA custodial regime also could encompass Japanese plutonium stocks located in France and the UK. Expanding the undertaking in this way clearly would be desirable from a nonproliferation point of view. Japan should explore the willingness of the French and UK governments to negotiate appropriate custodial arrangements with the IAEA and Japan for Japanese plutonium on their territories.

Even if London or Paris proves unwilling to put Japanese plutonium on its territory under IAEA custody, Tokyo should move ahead with placing plutonium on Japanese territory under such a custodial regime.

A Model for Others

If the custodial regime works well in Japan, it might serve as a model for other states with large plutonium stocks to place their excess civilian plutonium under IAEA custody.

Like Japan, some NPT nuclear-weapon states have substantial stocks of unirradiated civilian plutonium with no short-term or easy path for its disposition. Although it would take a radical change in mind-set for the nuclear-weapon states to place their excess civilian plutonium under IAEA custody, it would be a meaningful step toward fulfilling their disarmament commitments under Article VI of the NPT.

NPT nuclear-weapon states may withdraw material from their voluntary safeguards agreements for national security reasons. If their excess civilian plutonium were under an IAEA custodial regime, it could be released from its custody only for peaceful, nonexplosive purposes and could not be returned to military use. Such a step would help respond to the recommendations of the 2010 NPT Review Conference for increased transparency of nuclear materials in nuclear-weapon states.

An IAEA custodial regime for Japanese plutonium stocks is admittedly a modest step. It would not help Japan shrink its plutonium stocks. Tokyo must move as expeditiously as possible to fulfill its promises to reduce its plutonium stocks, and an IAEA custody regime should not be used as a justification for continued stockpiling. Such a regime, however, might alleviate international concerns and regional tensions over this issue until
an option or options for reducing and eliminating Japanese plutonium stocks can be implemented. In addition, it could establish a good nonproliferation model for other countries with excess civilian plutonium stocks.

ENDNOTES

1. In its latest declaration to the International Atomic Energy Agency (IAEA), the Japan Atomic Energy Commission reported that as of December 31, 2012, Japan held 44,241 kilograms of separated unirradiated plutonium, of which 9,295 kilograms was stored in Japan and 34,946 kilograms was stored in France and the United Kingdom. IAEA, “Communication Received From Japan Concerning Its Policies Regarding the Management of Plutonium,” INFCIRC/549/Add.1/15, October 3, 2012.


10. Saito, Sheldrick, and Hamada, “Japan May Only Be Able to Restart One-Third of Its Nuclear Reactors.”


12. The government plans to convert the facility into a center for research on reducing the volume of nuclear waste and improving technologies related to nonproliferation.

13. The agreement to transfer the material was announced in March at the nuclear security summit in The Hague.


17. INFCIRC/549.

18. The material was located at an idle reactor in the form of mixed-oxide (MOX) fuel. Nevertheless, the plutonium was unirradiated, and Japan should have reported it to the IAEA as it agreed to do under the plutonium guidelines. “Japan Fails to Include 640 kg of Unused Plutonium in Report to IAEA,” Kyodo News, June 7, 2014.


24. The IAEA considers eight kilograms of plutonium to be a significant quantity. For highly enriched uranium, the amount is 25 kilograms.

25. In addition, Japanese Prime Minister Shinzo Abe pledged at the March nuclear security summit to strengthen security measures for Japanese nuclear materials and facilities and indicated that Japan would invite a visit by the IAEA International Physical Protection Advisory Service by the spring of 2015.

26. Article VI of the nuclear Nonproliferation Treaty (NPT) 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.”

27. The final document from the 2010 NPT Review Conference contains an action plan that includes the following items:

Action 16: The nuclear-weapon States are encouraged to commit to declare, as appropriate, to the International Atomic Energy Agency (IAEA) all fissile material designated by each of them as no longer required for military purposes and to place such material as soon as practicable under IAEA or other relevant international verification and arrangements for the disposition of such material for peaceful purposes, to ensure that such material remains permanently outside military programmes.

Action 17: In the context of action 16, all States are encouraged to support the development of appropriate legally binding verification arrangements, within the context of IAEA, to ensure the irreversible removal of fissile material designated by each nuclear-weapon State as no longer required for military purposes.

In September 2013, the International Atomic Energy Agency (IAEA) Board of Governors reviewed a report by Director-General Yukiya Amano on efforts to further strengthen the effectiveness of safeguards and increase their efficiency.¹ The report described an approach to the implementation of safeguards that had come to be known as the “state-level concept.”

Rather than being received as intended—as a blueprint for the next logical step in the evolution of safeguards—the paper and, more specifically, the concept it described triggered a decidedly vitriolic response. Some member states have used this opportunity to call into question important measures to strengthen safeguards that have been in place since the early 1990s. Most disconcerting have been challenges to IAEA authority under comprehensive safeguards agreements to verify the nondiversion of declared nuclear material and the absence of undeclared nuclear material and activities in a state with such an agreement.

The IAEA board and General Conference will have another opportunity to address this issue when they convene again this month to discuss the state-level concept. The purpose of this article is to assist the parties involved in those deliberations in understanding the legal basis for IAEA authority to verify the correctness and completeness of state declarations under comprehensive safeguards agreements and, in doing so, to call attention to the possible unintended consequences of those deliberations if the recent challenges to that authority are allowed to prevail.

**The State-Level Concept**

The state-level concept has its roots in efforts by the IAEA and its member states to strengthen safeguards in the aftermath of the discovery in 1991 of a clandestine nuclear weapons program in Iraq. This discovery triggered a reassessment of the then-conventional, ill-founded belief that the IAEA’s legal authority under comprehensive safeguards agreements pursuant to the nuclear Nonproliferation Treaty (NPT) was limited to verifying nuclear material and facilities declared by the state.

For the first 20 years of the implementation of comprehensive safeguards agreements, IAEA safeguards activities were, as a practical rather than legal matter, focused primarily on verifying declared nuclear material at declared facilities. Safeguards were implemented and evaluated on a facility-by-facility basis, rather than by examination of the state as a whole. As a consequence of this approach, although the agency routinely sought to verify...
that there was no undeclared production of nuclear material at declared facilities, in particular at research reactors, it did not seek to verify that there was no undeclared nuclear material elsewhere in the state.

The flaw in that facility-level approach became evident with the discovery of Iraq’s undeclared nuclear activities in 1991.

Between 1991 and 1993, the IAEA board and General Conference made a number of decisions reaffirming the agency’s right and obligation to ensure that, in a state with a comprehensive safeguards agreement, no nuclear material, whether declared or undeclared, is diverted to nuclear weapons or other nuclear explosive devices. In other words, the objective of IAEA inspections under such agreements is verification of not just the nondiversion of declared nuclear material (the correctness of state declarations), but also the absence of undeclared nuclear material and activities (the completeness of state declarations).

At the end of 1993, the IAEA Secretariat, at the request of the board, embarked on an ambitious program, known as Programme 93+2, to develop a comprehensive set of measures for strengthening safeguards. These measures, which were presented to the board in 1995, comprised two parts. The first part consisted of measures that could be implemented under the existing legal authority of comprehensive safeguards agreements. The most significant of these measures was a profound change in the IAEA’s evaluation of information available to it about a state. Instead of assessing the results of its verification activities separately for each individual facility in a state, the IAEA would visualize the state’s nuclear program in a coherent and connected way by looking at the state as a whole.

The second part consisted of measures that the secretariat proposed be implemented on the basis of a new legal instrument. These measures were eventually transformed into the Model Additional Protocol, which the board approved in May 1997.

As described in the secretariat’s reports on Programme 93+2, an important consequence of these strengthening measures was that they would not only improve safeguards effectiveness, but also permit the IAEA to introduce efficiencies in safeguards implementation. If the IAEA was able to conclude that a state’s declarations under its comprehensive safeguards agreement were correct and complete, commonly referred to as “the broader conclusion,” it could consider reducing its in-field inspection effort on those parts of the nuclear fuel cycle that were less proliferation sensitive. For example, if the agency was able to assure itself that there was no undeclared reprocessing in a state, it could reduce the frequency of inspections at a power reactor using low-enriched uranium from four times a year to one.

In 2002 the conceptual framework for this process, known as integrated safeguards, was presented to the board. The board took note of it, and the secretariat proceeded to implement it. Within this framework, the IAEA took into account state-specific characteristics and features and all other safeguards-relevant information available to it about the state concerned and, in consultation with the state, developed a customized...
Although many board members expressed support for [IAEA Director-General Yukiya Amano’s] report, the state-level concept was far from an unqualified success.

first used with reference to this process in a board document in the director-general’s 2005 report on safeguards implementation during 2004.1 As the report noted, the state-level concept was already being implemented for states with integrated safeguards, and it would eventually be extended to all other states with comprehensive safeguards agreements. The report also said that the next step would be the evolution of safeguards to take full advantage of the information available to the IAEA in order to better focus safeguards activities in all comprehensive safeguards agreements, given the environment of increasing verification demands and a static safeguards budget.

So entered into the lexicon of safeguards the state-level concept, simply another way of referring to the agency’s practice, well established by then, of evaluating all safeguards-relevant information about a state as a whole and, where possible, tailoring safeguards to fit the state concerned.

In 2010 the Department of Safeguards presented the results of its long-term strategic plan for 2012-2023,4 in which it stated that, in its efforts to focus its activities and resources where they mattered most in terms of achieving safeguards objectives, it would further develop the state-level concept and extend its application to all states.

There were no serious challenges to the implementation of that concept until 2012 when, for reasons that were not entirely apparent, Russia actively challenged the state-level concept.5 Although some of its concerns were shared by other states, the challenges were particularly surprising because, as a nuclear-weapon state, Russia does not have a comprehensive safeguards agreement in force and because it had previously supported all of the early efforts to strengthen safeguards.

Among the issues raised by these states during the 2012 General Conference were the prospect that application of the state-level concept could result in the IAEA making political and subjective judgments about states; the need for further definition of specific elements of the concept, such as what constituted safeguards-relevant information and safeguards objectives; and the authority of the secretariat to implement the concept without approval of the board or General Conference. Clearly, further clarifications and information by the secretariat were necessary for states to fully understand the state-level concept.

A remarkable aspect of the discussion during the General Conference was the tone of suspicion and distrust directed at the secretariat, triggered by a perceived lack of transparency on the part of the secretariat and reportedly exacerbated by external political factors unrelated to strengthening safeguards. This mistrust spawned further suspicions about the real intentions behind the state-level concept, as reflected in suggestions that states were being asked to agree to measures not covered by their safeguards agreements and in implications that decisions about state-level approaches were being taken by the secretariat “behind closed doors.”6

Against that backdrop, the General Conference in its 2012 safeguards resolution requested the director-general to report to the board on “the conceptualization and development of the evolution of safeguards. The report described the secretariat’s development of state-level approaches under the state-level concept and their implementation in states with comprehensive safeguards agreements.

As in the case of the 2002 report to the board on integrated safeguards, the board was asked at its September 2013 meeting only to take note of the director-general’s report, rather than to approve it. Although many board members expressed support for the report, the state-level concept was far from an unqualified success. The board ultimately took note of the report and of Amano’s statement that he would produce, in consultation with member states, a supplementary document on the state-level concept for consideration by the board before the General Conference met in September 2014.

During the General Conference that took place immediately after that board meeting, member states considered the matter again. The overall tone of the critical comments seemed to reflect skepticism and an unwillingness to acknowledge any merit in the secretariat’s responses. Nevertheless, the General Conference took note of the report and the director-general’s intention to produce the supplementary document.7

Challenges to IAEA Authority

In developing the state-level concept, the secretariat understood that it was doing what it had been tasked with...
doing; continuously looking for ways to improve the effectiveness and efficiency of safeguards implementation. In resolutions dating from 2006, the General Conference had urged the secretariat to continue to do so through the use of state-level approaches.

Debates on the state-level concept provided an opportunity for states to express genuine concerns. Unfortunately, they also provided a platform for some states to call into question the most fundamental principle in the implementation of the comprehensive safeguards agreements: that the right and obligation of the IAEA to verify the correctness and completeness of state declarations derives from the agreements themselves.

All comprehensive safeguards agreements are based on INFCIRC/153, an IAEA document negotiated in 1970-1971 by a board committee open to all member states of the agency. A plain reading of INFCIRC/153 makes clear that a comprehensive safeguards agreement requires the IAEA to provide assurances that all declared nuclear material of a state is under safeguards and that the state has declared and placed under safeguards all nuclear material that is required to be declared. Paragraph 2 of INFCIRC/153 provides that the IAEA “has the right and the obligation to ensure that safeguards will be applied...on all source or special fissionable material.” The drafters of INFCIRC/153 agreed on this formulation after due consideration and explicit rejection of a proposal by one member state that “safeguarding and inspection...shall be concerned solely with the material reported upon by the state concerned.”

Well before Programme 93+2 was initiated or the Model Additional Protocol even contemplated, the board made a number of decisions confirming that the IAEA had not just the right but the obligation to verify that all nuclear material required to be safeguarded under a comprehensive safeguards agreement was under safeguards and that, in fulfilling that obligation, the agency had the right to use all relevant information available to it about the state concerned. These decisions addressed a range of countries and issues.

South Africa. In September 1991, IAEA member states, in resolutions adopted by the board and the General Conference, requested the director-general to verify the “correctness and completeness of the inventory of South Africa’s nuclear installations and material” under its newly approved comprehensive safeguards agreement.

Special inspections. In February 1992, the board, acting through a chairman’s summary, reaffirmed the IAEA’s right under comprehensive safeguards agreements to ensure that all nuclear material in all peaceful nuclear activities is under safeguards.

Romania. In June 1992, the board, again acting through a chairman’s summary, took note of Director-General Hans Blix’s report on noncompliance by the former regime in Romania with certain provisions of its comprehensive safeguards agreement, brought to the IAEA’s attention by the successor Romanian government, and requested that the director-general report the noncompliance to the UN Security Council “for information purposes.”

Strengthening safeguards. The General Conference in September 1992 adopted a resolution in which it noted the “decisions taken by the Board over the preceding 12 months to strengthen the safeguards system” and called on member states to cooperate with the IAEA in implementing those decisions.

Finally, in late February 1993, Blix submitted a report to the board informing it of an anomaly the secretariat had discovered in North Korea. The anomaly had given rise to doubts about the completeness of the country’s initial report of nuclear material under its comprehensive safeguards agreement. Based on the director-general’s report and a detailed secretariat briefing, the board adopted a resolution in which it stressed that it was “essential to verify the correctness and assess the completeness” of North Korea’s initial report and decided that the access to additional information and locations requested by the director-general was “essential and urgent in order to resolve differences and to ensure verification of compliance” by North Korea with its comprehensive safeguards agreement.

It is simply disingenuous to contend, as a few states have recently, that the above examples of decisions by the board and the General Conference are not germane to the issue of IAEA authority under comprehensive safeguards agreements either because they were related to the implementation of safeguards in specific states or because the acceptance of a chairman’s summary does not constitute a formal decision. The safeguards agreements of South Africa and North Korea are substantively identical, as are all comprehensive safeguards agreements.
agreements. Furthermore, the board has made decisions on many occasions through the mechanism of a chairman’s summary of its deliberations, including decisions with respect to the most sensitive of issues, noncompliance. This was the case for Iraq as well as Romania.20

It is particularly difficult to understand how any state, let alone states that participated in deliberations by the board or General Conference between 1991 and 1993, can argue that the IAEA’s obligation under a comprehensive safeguards agreement to verify completeness derives exclusively from an additional protocol. The push by member states for the IAEA to provide assurances of the absence of undeclared nuclear material and activities under such agreements—and, indeed, the board and General Conference decisions confirming IAEA authority to do so—predated even the contemplation of new legal authority.

Some states question the need for an additional protocol if the IAEA already has the right to verify completeness of a state’s declarations under a comprehensive safeguards agreement. The answer is straightforward: the IAEA’s right and obligation to verify correctness and completeness derive from the comprehensive safeguards agreement, but in such an agreement, there are limited tools for doing so, such as special inspections. An additional protocol secures for the IAEA broader access to information and locations on a more routine, predictable, and reliable basis. This permits the IAEA to detect indications of undeclared nuclear material and activities earlier and more effectively than it otherwise would.

Another challenge to IAEA authority to verify the absence of undeclared nuclear material and activities in a state has been that proving a negative is impossible. In one of his reports to the board on Iraq to the UN Security Council, in which it acknowledged that proving a negative was not possible even with the authority granted under Security Council resolutions.22

Yet, the IAEA could look for indications of undeclared activities. In the case of Iraq, having sought such indications and not found any, the agency could conclude with a high degree of confidence that Iraq had not resumed its nuclear weapons program. As it turned out, the IAEA was right.

Some critics have articulated a somewhat more nuanced argument. Although the IAEA has the right to follow up on indications of undeclared nuclear material and activities, it does not have the right to look for such indications. Again, the argument is disingenuous. If one does not look for something, one is not likely to find it. Would critics of completeness efforts conclude that the IAEA should not even try to determine whether such indications exist? Blix addressed that point in 1995 by invoking a person “looking for a lost key near a lighted street lamp who, when asked whether he was sure he had lost the key there, said ‘No, but it’s easier to look here.’”23

Managing the Consequences

IAEA safeguards are not based on confidence; they are designed to create confidence. The degree of confidence created is directly dependent on the scope and reliability of the verification process. The real issue at stake here is not the state-level concept, but the risk of dramatic damage to effective safeguards implementation. There is a further risk that the damage could creep into the NPT review process.

The confluence of external political circumstances with IAEA efforts to further strengthen safeguards may
are not technical. They are a lack of knowledge about the history of safeguards and a misrepresentation of the history that capitalizes on that lack of knowledge. It is possible to correct the former and to limit the impact of the latter through education and communication by raising the level of knowledge about safeguards and the history of their evolution. It is incumbent on all parties to understand what has already been achieved in strengthening safeguards so that it is not necessary to reinvent those achievements.

During the agency’s September deliberations on the state-level concept, member states should make a renewed and explicit commitment to effective IAEA safeguards and reaffirm the IAEA’s right and obligation to verify not just the correctness but the completeness of state declarations under comprehensive safeguards agreements.

ENDNOTES


3. IAEA, “Model Protocol Additional to the Agreement(s) Between State(s) and the International Atomic Energy Agency for the Application of Safeguards,” INFCIRC/540 (Corrected), September 1997.


5. IAEA, “Conceptualization and Development of Safeguards Implementation at the State Level.”


9. IAEA, “Conceptualization and Development of Safeguards Implementation at the State Level.”


11. IAEA, “The Structure and Content of Agreements Between the Agency and States Required in Connection With the Treaty on the Non-Proliferation of Nuclear Weapons,” INFCIRC/153 (Corrected), June 1972.


18. IAEA Board of Governors, “Report on the Implementation of the Agreement Between the Agency and the Democratic People’s Republic of Korea for the Application of Safeguards in Connection With the Treaty on the Non-Proliferation of Nuclear Weapons,” GOV/2636, February 26, 1993. The draft resolution was adopted without a vote. The director-general’s report and the official records of the board’s discussion, which was held in closed session, have not been publicly released by the IAEA.


20. In July and September 1991, the board found that Iraq’s failure to declare nuclear material and facilities in connection with its clandestine uranium-enrichment and plutonium-separation programs constituted noncompliance with its comprehensive safeguards agreement and requested the director-general to report the matter to the UN Security Council. The first decision was taken by a resolution, and the second decision was made through the mechanism of consensus adoption of a chairman’s summary of the board’s deliberations. IAEA, “Iraq’s Non-Compliance With Its Safeguards Obligations,” GC(XXXV)/978, September 16, 1991; IAEA, “Iraq’s Non-Compliance With Its Safeguards Obligations,” GC(XXXV)/978/Add.1, September 16, 1991.


22. “It is important to emphasize that there is always some degree of uncertainty in the verification process, and the Agency cannot provide absolute guarantees regarding the absence of small-scale nuclear activities, such as simulations on personal computers or lab work by a few scientists (or indeed, direct acquisition by a state of weapons usable nuclear material)…. Nevertheless, an intrusive inspection system [such as the one that the IAEA was implementing in Iraq] can minimize the risk of prohibited activities going undetected, and deter, through the risk of early detection, the revival of a nuclear weapons programme.” UN Security Council, “Letter Dated 19 March 2003 From the Secretary-General Addressed to the President of the Security Council,” S/2003/342, 20 March 2003 (containing the IAEA work program in Iraq pursuant to Security Council Resolution 1284).

Russia Breaches INF Treaty, U.S. Says

After months of speculation, the U.S. State Department announced in July that it had found Russia to be in violation of the Intermediate-Range Nuclear Forces (INF) Treaty over Moscow’s testing of a new medium-range, ground-launched cruise missile (GLCM). The accusation comes at a time of heightened U.S.-Russian tensions over Moscow’s support for separatist forces in Ukraine.

“We have been attempting to address this very serious matter with Russia for some time, as the United States is wholly committed to the continued viability of the INF Treaty,” Rose Gottemoeller, undersecretary of state for arms control and international security, said Aug. 14. In remarks to a symposium at U.S. Strategic Command in Omaha, Nebraska, she said the Obama administration was “asking Russia to return to compliance with the treaty in a verifiable manner.”

Gottemoeller said that the two countries previously “have been down the road of needless, costly, and destabilizing arms races.” She added, “We know where that road leads and we are fortunate that our past leaders had the wisdom and strength to turn us in a new direction.”

The INF Treaty, signed by President Ronald Reagan and Soviet leader Mikhail Gorbachev in 1987, marked the first time the two superpowers agreed to reduce their nuclear arsenals and utilize extensive on-site inspections for verification. The treaty, which is still in force, eliminated almost 2,700 intermediate-range ballistic and cruise missiles, most of them Russia’s.
U.S. President Barack Obama and Russian President Vladimir Putin spoke by telephone about the INF Treaty on Aug. 1, according to the White House.

According to a July 28 New York Times report, Obama sent Putin a letter that day in which Obama asked for a high-level dialogue with Moscow to discuss ways to preserve the treaty and bring Russia back into compliance.

In an interview in early August, a diplomatic source familiar with the treaty controversy said senior Russian and U.S. officials are expected to meet in September to discuss the issue.

U.S. Allegation Unspecified
The Obama administration alleges that Russia is violating its INF Treaty obligation “not to possess, produce, or flight-test” a GLCM with a range of 500 to 5,500 kilometers or “to possess or produce launchers of such missiles,” as a State Department report sent to Congress in July summarized it.

At a meeting in early July, the Principals Committee, which includes the national security adviser, the defense secretary, the chairman of the Joint Chiefs of Staff, the secretary of state, and the CIA director, “unanimously agreed” that the cruise missile flight test was a “serious violation,” the Times said. A senior administration official told Arms Control Today on July 29 that the intelligence community has “high confidence” in the assessment.

The State Department report, which surveys compliance with arms control agreements by the United States and other countries, did not specify the type of cruise missile in question or say how many tests have been conducted or when they occurred. The senior administration official said that the testing took place at the Kapustin Yar test site in western Russia. According to the Times story, Russia began testing the cruise missile as early as 2008, and the administration concluded that it was a compliance concern by the end of 2011, although officials do not believe the missile has been deployed. Gottemoeller first raised the issue with Russian officials in May 2013, according to the Times.

Unconfirmed reports have focused on Russia’s R-500 Iskander-K short-range cruise missile as the missile that precipitated the U.S. allegation. That system uses a road-mobile launcher, similar to the Iskander-M, which is a short-range, nuclear-capable ballistic missile. Russia reportedly is deploying the Iskander-M near Luga, south of St. Petersburg, near Russia’s borders with NATO member countries in response to U.S. missile defense plans. (See ACT, January/February 2014.) It is not clear if the range of the R-500 exceeds the lower limit of the INF Treaty.

In the August interview, the diplomatic source said that according to the United States, the R-500 is not the focus of the allegation. That appears to be consistent with other available information on the allegation and the history of the R-500. According to the Times report, the GLCM considered to be a violation was first tested in 2008 and has not been deployed. The R-500 reportedly was first tested in May 2007 and deployed in 2013.

At an April 29 congressional hearing, Rep. Brad Sherman (D-Calif.) offered an alternative explanation of the nature of the alleged violation and the platform involved. He said that Russia claims to have tested a new intermediate-range missile for use at sea, which is allowed under the INF Treaty if the missile is tested from a test launcher, but that Moscow used “what appears to be an operational, usable ground-based launcher,” which is not allowed. Sherman said that “it appears as if [the Russians] were developing a ground-based capacity for this intermediate-range missile.” (See ACT, June 2014.)
Russia Denies Charges

Russia denies that it is breaching the INF treaty. The Russian Foreign Ministry said in a July 28 statement that the allegations are “as baseless as all of Washington’s claims that have lately been reaching Moscow. Absolutely no proof has been provided.” The United States has accused Moscow of providing military support to rebel forces in eastern Ukraine, including the surface-to-air missile that shot down Malaysia Airlines Flight 17 in July.

“We have many complaints to make to the United States with regard to the [INF] Treaty,” the statement continued. “These include missile defense target missiles having characteristics similar to those of shorter- and intermediate-range missiles and the production by the Americans of armed drones which clearly fall under the [category of] land-based cruise missiles” in the INF Treaty, the ministry said.

Russia’s top general, Valery Gerasimov, told Gen. Martin Dempsey, the chairman of the U.S. Joint Chiefs of Staff on July 31 that Moscow was committed to adhering to the INF Treaty, Reuters reported.

According to the diplomatic source, Gerasimov expressed concern about U.S. plans to field the Mark-41 (MK-41) missile launcher in Romania and Poland as part of the European Phased Adaptive Approach, the Obama administration’s policy for missile defense in Europe. According to an Aug. 1 statement by the Russian Foreign Ministry, the sea-based MK-41 “can be used to launch intermediate-range cruise missiles, but [its] ground-launched version will be a gross violation of the INF Treaty.”

The MK-41 is currently used on U.S. Navy ships to launch missile defense interceptors, such as the Standard Missile-3, but it is also used to launch the Tomahawk intermediate-range cruise missile. As a sea-based missile, the Tomahawk does not run afoul of the INF Treaty. But once the MK-41 is based on land, as the United States plans to do next year, it would, in Russia’s view, conflict with the INF Treaty’s prohibition on possessing a ground-based launcher for intermediate-range cruise missiles.

The United States has not responded publicly to the Russian allegations. It is not clear if the land-based MK-41 would maintain its capability to launch intermediate-range cruise missiles or if the United States intends to modify the launcher to eliminate this capability.

Hill Response

In response to the State Department’s charge against Russia, Sen. Marco Rubio (R-Fla.) said in a July 31 press release that Russia’s action “cannot go unanswered.” Along with Sens. Jim Risch (R-Idaho) and Orrin Hatch (R-Utah), Rubio introduced legislation that would, among other things, initiate U.S. research and development on missiles banned by the INF Treaty. Such work is allowed under the pact.

Congress does not appear to be pressuring the administration to withdraw from the INF Treaty to protest Russia’s actions, in part because there is an apparent political consensus that the best outcome for the United States would be for Moscow to come back into compliance. “I do not believe the appropriate remedy in this case is for the United States to withdraw from the treaty,” Stephen Rademaker, an official in the George W. Bush administration, told the House Armed Services Committee on July 17. “Rather, since Russia so clearly wants out, we should make sure that they alone pay the political and diplomatic price of terminating the treaty.”

Last summer, Sergey Ivanov, the Kremlin chief of staff, publicly questioned the value of the treaty, saying Russia has more potential threats on its borders than the United States does. “The Americans have no need for this class of weapon[,] they didn’t need it before and they don’t need it now,” Ivanov said, according to RIA Novosti. “They could theoretically only attack Mexico and Canada with them, because their effective radius doesn’t extend to Europe.”

Russia has indicated that another answer to its concerns might be to expand the membership of the treaty. In 2007, Russia and the United States issued a statement at the UN General Assembly reaffirming their “support” for the treaty and calling on all other states to join them in renouncing the missiles banned by the treaty.—TOM Z. COLLINA

U.S., EU Sanction Russia’s Arms Sector

In response to Russian intervention in Ukraine, the Obama administration and the European Union have imposed sanctions on Russia’s weapons and defense sector. In an announcement on July 29, the EU banned new EU-Russian military equipment transactions for one year while the Obama administration blacklisted eight Russian defense firms, two separatist groups, and a Ukrainian oil facility.

The European Commission, the executive body of the EU, called the measures “a strong warning [that] illegal annexation of territory and deliberate

Russian President Vladimir Putin speaks during an awards ceremony in the Kremlin on July 31, days after the United States and European Union imposed additional sanctions on Russia for its actions in Ukraine.
destabilisation of a neighbouring sovereign country cannot be accepted in 21st century Europe.” The U.S. Commerce Department cited “Russia’s continued policy of destabilization in eastern Ukraine and ongoing occupation of Crimea and Sevastopol” as reasons to block transactions with the 11 entities “engaged in activities that are contrary to the national security or foreign policy interests of the United States.”

Any U.S. firm seeking a license to do business with these organizations will face a presumption of denial, according to the Commerce Department. The U.S. sanctions, first authorized by an executive order issued in March by President Barack Obama, also block these entities from transferring any assets, receiving payments, or processing withdrawals in the United States.

The sanctioned Russian firms include Concern Almaz-Antey, Russia’s leading defense contractor; KBPO, which manufactures the anti-aircraft system believed to have destroyed a Malaysia Airlines plane in July; and Kalashnikov Concern, which manufactures the assault rifle of the same name. Kalashnikov exported at least 10,000 rifles to the United States in 2013, according to the Wisconsin Project on Nuclear Arms Control, which monitors the global arms trade.

**Russia Responds**

It is not clear what the impact of the sanctions will be. European arms exports to Russia are relatively small, totaling around $400 million in 2013, according to the EU. But exports of dual-use goods to Russia last year were worth an estimated $26 billion. European firms supplied lasers and advanced electronics and materials, which Russia may find difficult to replace, according to sources quoted by *The Wall Street Journal*.

On Aug. 6, *Izvestia* cited sources in Russia’s Federal Space Agency as saying its aerospace and military-industrial enterprises will purchase electronic components totaling several billion dollars from China. The sources said China Aerospace Science and Industry Corp. had offered “a direct alternative to, or slight modifications of the elements [Russia] will no longer be able to acquire because of the sanctions introduced by the United States,” according to *Izvestia*.

In addition to the EU sanctions, the German government canceled an ongoing deal involving Rheinmetall, a German defense firm supplying parts for a Russian military training facility. The deal has been suspended, and no more deliveries will occur, according to the German embassy in Washington. “We wanted to go beyond the EU sanctions,” a spokesman said in Aug. 11 phone interview.

Despite criticism from other European countries, France is going ahead with a $1.6 billion deal to sell two Mistral amphibious warships to the Russian defense firm Rosoboronexport. DCNS, a French naval defense company, signed the deal in June 2011. The company says it will deliver the first carrier to Russia in October. According to news reports, 400 Russian sailors trained this summer at the port of Saint-Nazaire, in northwestern France, learning how to operate the vessel.

The U.S. House of Representatives approved a defense appropriations bill in May with an amendment by Rep. Rosa DeLauro (D-Conn.) barring the Defense Department from contracting or subcontracting for helicopters or other weapons with Rosoboronexport. The Senate is expected to take up similar legislation in September.

Republican Sens. John Cornyn (Texas) and Dan Coats (Ind.) have called for the cancellation of all Pentagon contracts or subcontracting for helicopters or other weapons with Rosoboronexport. The Pentagon has paid the company more than $1 billion for a fleet of Russian-made Mi-17 helicopters, which the United States is providing to Afghan security forces.—JEFFERSON MORLEY

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**What Sanctioned Russian Firms Make**

- Joint Stock Company (JSC) Concern Almaz-Antey is Russia’s largest defense contractor and the 12th largest in the world, with revenues of $8 billion in 2013.

- Kalashnikov Concern makes the durable Kalashnikov assault rifle, one of the world’s most popular weapons. Kalishnikov Concern has exported almost 10,000 rifles to the United States in the first six months of 2014.

- KBPO (Konstruktorske Obyedineniye Protibornoe Obshchestvo) manufactures high-precision weapons, anti-tank missiles, and anti-aircraft systems, including the vehicle-mounted Buk missile system that Western defense analysts say destroyed Malaysia Airlines Flight 17 in July, killing 298 people.

- The State Scientific Production Enterprise Bazalt builds aircraft, ground, and marine munitions.

- JSC Concern Radio-Electronic Technologies focuses on electronic warfare.

- JSC Concern Sozvezdie focuses on electronic warfare.

- JSC Military-Industrial Corporation NPO Mashinostroyenia builds advanced space and rocketry equipment.

- Uralvagonzavod produces combat vehicles, tanks, and ordnance.

*Source: Defense News, U.S. Commerce Department, Wisconsin Project on Nuclear Arms Control*.

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Syrian Chemicals Destroyed on U.S. Ship

The destruction of the most dangerous of Syria’s chemical weapons materials was completed Aug. 18 aboard a U.S. ship in the Mediterranean Sea, President Barack Obama announced in a statement that day.

The MV Cape Ray neutralized about 600 metric tons of Syrian chemicals using two mobile units of the Field Deployable Hydrolysis System, a technology developed by the Defense Department. About 20 metric tons was weapons-usable sulfur mustard, and the rest was a sarin precursor known as DF, according to figures from the Defense Department and the Organisation for the Prohibition of Chemical Weapons (OPCW).

The announcement of the milestone in the ongoing effort to destroy Syria’s chemical weapons program came a few days before the one-year anniversary of a chemical attack on the Damascus suburb of Ghouta, the catalyst for the sequence of events that led to Syrian chemical weapons materials being destroyed on a U.S. ship.

In response to that attack, which the United States, other governments, and most independent analysts attributed to the regime of Syrian President Bashar al-Assad, the Obama administration appeared poised to launch punitive military strikes against Syria. But Secretary of State John Kerry and Russian Foreign Minister Sergey Lavrov negotiated a deal under which Syria, which has ties close to Russia, agreed to join the Chemical Weapons Convention (CWC) and destroy its chemical arsenal under an expedited schedule. (See ACT, October 2013.)

The OPCW Executive Council and the UN Security Council subsequently endorsed the plan.

Parties to the CWC are responsible for destroying chemical weapons components that they possess, but the plan allowed for the possibility of destruction outside Syria, in part because of the civil war that has been taking place in Syria since early 2011. Several countries were seen as candidates for hosting destruction facilities, but all of them declined, making shipboard destruction an attractive option, particularly for the most dangerous chemicals.

In an Aug. 19 statement congratulating the United States, OPCW Director-General Ahmet Üzümcü reported that “OPCW inspectors aboard the ship verified that no chemicals of any kind escaped into the sea or otherwise impacted the environment.”

Some of the lower-priority chemicals, as well as the effluent from the Cape Ray operation, are being processed in land facilities in Europe and the United States.

Of the 1,300 metric tons of chemical weapons material that Syria declared when it joined the CWC, approximately 90 percent was removed from the country for destruction. About 130 metric tons of isopropanol were destroyed in Syria.

The removal of the material proceeded sporadically, and Syria fell months behind the timetable set by the OPCW and the United Nations. Syria and Russia blamed the civil war and the resulting dangers to overland transport. Other countries...
assigned much of the blame to the Syrian government; Robert Mikulak, the U.S. ambassador to the OPCW, said Syria was “drag[ging] its feet.” (See ACT, March 2014.)

The chemicals had to be gathered from across the country to the port of Latakia, where an international convoy picked them up for delivery to the Cape Ray and other destruction locations. An OPCW-UN mission oversaw the operation.

**Beating the Schedule**

As Obama and Üzümcü noted in their statements, the chemical destruction on the Cape Ray was completed ahead of schedule. The estimates varied somewhat, but generally had projected that the task would require about two months.

In an Aug. 26 e-mail to Arms Control Today, a Defense Department official said the original estimates were 45 to 90 days, with the range later narrowing to 45 to 60 days once officials had a better idea of the quantities the Cape Ray would be handling. The Pentagon maintained 60 days as the publicly announced figure to avoid “external pressure to meet an ‘artificial’ deadline,” the official said.

The 60-day figure built in some time for delays the official said, noting that the Cape Ray operation marked the first time chemical weapons neutralization was carried out at sea.

The hydrolysis units operated 24 hours a day for six days a week, with one day set aside for activities such as maintenance and testing, the official said, adding that there were no “major problems or delays.”

In an Aug. 18 press release, the Pentagon said Defense Secretary Chuck Hagel had called the ship to congratulate the crew on its work.

**Production Facilities**

Several weeks before the Cape Ray completed its task, the OPCW announced an agreement on a long-running, contentious issue, the destruction of Syria’s 12 remaining chemical weapons production facilities. In a July 24 statement following an Executive Council meeting earlier that day, the OPCW said that seven hangars would be “razed to the ground” and five underground structures, which are part of a system of tunnels, would be “sealed permanently to make them inaccessible.”

Syria had previously insisted on converting the facilities to other uses rather than destroying them. (See ACT, July/August 2014, Web Extra.) The CWC allows countries to do so, with the approval of their fellow parties to the treaty.

The council’s decision document and an addendum from Üzümcü, which were not publicly released but were obtained by Arms Control Today, provide some details on the upcoming steps for the production facilities. The addendum describes a “fill and plug” process that would essentially destroy the parts of the underground structures that were directly related to chemical weapons production.

Sensors will be installed “to monitor the integrity of the interior plug.” The OPCW Technical Secretariat will have the right to inspect the closed portions for five years after the filling and plugging operation is completed, the addendum says.

No “toxic chemical activities” are allowed in the parts of the structures that remain usable.

According to the decision document, the destruction of the hangars is to start within 60 days of July 24, and destruction of the underground facilities within 90 days.

In his Aug. 18 statement, Obama said, “Going forward, we will watch closely to see that Syria fulfills its commitment to destroy its remaining declared chemical weapons production facilities.” He also cited “serious questions” about “omissions and discrepancies in Syria’s declaration to the OPCW” and “continued allegations of use,” apparently a reference to allegations of weapons use of chlorine in Syria earlier this year. The OPCW is investigating those allegations.—DANIEL HORNER

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**Iran, P5+1 Extend Nuclear Talks**

Iran and six-country group known as the P5+1 agreed in July to extend negotiations over Iran’s nuclear program through Nov. 24, a step officials said they hope will give the parties enough time to find solutions to the remaining gaps and reach a comprehensive nuclear agreement.

The negotiators originally aimed to conclude a comprehensive agreement by July 20, which marked the end of the implementation of a six-month interim agreement. But the interim accord, which the parties reached last Nov. 24, allows for the initial six-month time period to be extended if all parties agree. (See ACT, December 2013.)

In a joint statement announcing the extension in Vienna on July 19, Iranian Foreign Minister and lead nuclear negotiator Mohammad Javad Zarif and Catherine Ashton, EU foreign policy chief and lead negotiator for the P5+1 (China, France, Germany, Russia, the
United Kingdom, and the United States, said they had made “tangible progress” in some areas but that “significant gaps on core issues” will require “more time and effort” to reach an agreement.

The statement did not give an exact date for the resumption of negotiations, but said that the parties would reconvene “in the coming weeks in different formats.”

On Aug. 7, U.S. officials, led by Wendy Sherman, the lead U.S. negotiator and undersecretary of state for political affairs, met with Iranian officials in Geneva to discuss the nuclear negotiations.

A European diplomat familiar with the talks told Arms Control Today in an Aug. 14 e-mail that negotiators would likely meet before the UN General Assembly convenes Sept. 16. A ministerial-level meeting during the General Assembly is probable, he said.

He said both sides “remained entrenched” on the issue of Iran’s uranium-enrichment program. A comprehensive agreement is unlikely unless both sides are willing to move away from “extreme positions” on what uranium-enrichment capacity Iran needs in the years to come, he said.

Iranian officials have opposed any cuts to the current capacity, which is about 10,200 operating first-generation centrifuges, and want to build up a program that will allow them to provide enriched-uranium fuel for its nuclear power reactors. Tehran says it plans to build. Iran currently has one nuclear power reactor, Bushehr, and has a contract with Russia for the reactor’s fuel through 2021.

The P5+1 wants to cut Iran’s current capacity and maintain strict limits on uranium enrichment for a number of years.

U.S. Secretary of State John Kerry, who joined negotiators July 13-15 in Vienna, said in a statement after the extension announcement that, despite the gaps, there is a “path forward.”

Both sides committed to continue implementation of the measures from the six-month interim agreement and agreed to take several additional steps before Nov. 24. For example, Iran agreed to convert 25 kilograms of 20 percent-enriched uranium powder into fuel assemblies for its Tehran Research Reactor.

During the term of the interim agreement, Iran neutralized its stockpile of 20 percent-enriched uranium gas by diluting half to reactor-grade enrichment levels of less than 5 percent and converting the other half to powder form for fuel assemblies. Kerry said that implementation of the interim agreement was a “clear success” and rolled back parts of Iran’s nuclear program for the first time in a decade.

The stockpile of 20 percent-enriched uranium in gas form was a particular concern to the P5+1 because uranium enriched to this level is more easily enriched further to weapons grade.

The P5+1 committed to allow Iran to transfer $2.8 billion of its funds locked up in overseas accounts back into the country over the course of the four-month extension. U.S. sanctions have prohibited foreign banks from transferring payments for Iranian exports such as oil to Iranian banks. (See ACT, July/August 2012.)

IAEA-Iran Cooperation

Meanwhile, Yukiya Amano, director-general of the International Atomic Energy Agency (IAEA), visited Tehran on Aug. 17 to discuss how to “strengthen cooperation and dialogue” between the agency and Iran, according to an Aug. 15 IAEA press release.

During his one-day visit, Amano met with President Hassan Rouhani, Zarif, and Ali Akbar Salehi, chairman of the
Atomic Energy Organization of Iran.

In comments to the press during his visit, Amano said he discussed with Iranian officials how to “move ahead with existing practical measures.”

He was referring to a May 21 joint announcement in which Tehran pledged to provide the agency with information in five areas of concern to the IAEA by Aug. 25. (See ACT, June 2014.) Amano said implementation of these measures had begun and he expected further progress to be made over the next week.

These actions are part of a November agreement, the Framework for Cooperation, in which Iran and the IAEA committed to “resolve all present and past issues.” (See ACT, December 2013.) The IAEA laid out its concerns, including allegations of activities with possible relevance for developing nuclear weapons, in detail in its November 2011 report to the agency’s Board of Governors. (See ACT, December 2011.)

As one of the May actions, Tehran was to provide the IAEA with information addressing allegations that Iran conducted experiments with certain kinds of high explosives that could be relevant to nuclear weapons. Iran also said it would provide information on studies “in Iran in relation to neutron transport and associated modeling and calculations and their alleged application to compressed materials,” another area with direct connections to nuclear weapons development.

**Detonators**

Under one provision of the November framework agreement, Iran provided the IAEA with information by May on its past work on exploding bridge wire detonators, which is one of the activities relevant to developing nuclear weapons. Iran maintained in its communications to the agency that the detonators were developed for use in the oil and gas industry. (See ACT, June 2014.)

Amano said the IAEA “followed up” on issues related to the information Iran provided on the exploding bridge wire detonators during his visit. Salehi told reporters on Aug. 17 that Iran “responded to all of the questions” Amano asked about the detonators and said he hoped Amano would “wrap up” this topic. Salehi said future steps would be easier if the topic were closed.

Amano, however, said that to assess Iran’s need for the detonators, the agency will need to consider “all past outstanding issues” and assess them as an entire system.

Amano said he and Iranian officials also discussed new measures that Iran is to take “in the near future” to address the agency’s unresolved concerns about Tehran’s nuclear program.

Iran’s ambassador to the IAEA, Reza Najafi, who was in Tehran during Amano’s visit, said on Aug. 18 that Iran is trying to resolve its problems with the agency while protecting Iran’s “principles, interests, and national security.” He said he hoped this cooperation would continue but that some IAEA requests are “irrational” and unacceptable to Iran.

Iran has provided the IAEA with information to address 13 areas of concern since the November agreement. After the August talks, Amano said he was glad to hear “from the highest levels [of the Iranian government] a firm commitment to implementation” of the November agreement.

Amano said that the IAEA remains committed to “resolve all past and present issues.”—KELSEY DAVENPORT

Kelsey Davenport’s reporting from Vienna was supported by a grant from the Heinrich Böll Foundation North America.

Ali Akbar Salehi, chairman of the Atomic Energy Organization of Iran (left), and IAEA Director-General Yukiya Amano participate in a press conference in Tehran on August 17.
White House Reviewing Nuclear Budget

Faced with increasing pressure to reduce military spending, the White House is overseeing an interagency review of multibillion-dollar plans to modernize the U.S. nuclear arsenal, an Obama administration spokesman said in August.

This review will inform the administration’s fiscal year 2016 budget request to Congress, Ned Price of the National Security Council (NSC) said in an Aug. 22 e-mail to Arms Control Today. The NSC staff is leading the review, Price said.

The budget request is to be submitted to Congress early next year.

Meanwhile, a bipartisan, independent report commissioned by Congress and the Defense Department and released July 31 calls the administration’s plans to rebuild the nuclear arsenal “unaffordable” and a threat to “needed improvements in conventional forces.”

The report, “Ensuring a Strong U.S. Defense for the Future” by the National Defense Panel, which focuses primarily on broader defense issues, finds that current plans to modernize all three legs of the nuclear triad—land-based missiles, submarines, and bombers—would have a “substantial cost” of $600 billion to $1 trillion over 30 years. Although the panel supports retaining the triad, it states that “the merits of some aspects of this expensive recapitalization can be debated.”

The panel, co-chaired by former Secretary of Defense William Perry and retired Gen. John P. Abizaid, former commander of U.S. Central Command, says that the U.S. nuclear arsenal “could be reduced” if future arms control agreements required that. Either way, the United States will have to stop the “neglect” that has existed since the end of the Cold War and make some “reasonable decisions” about modernization of delivery systems and life extension of nuclear warheads, the report says.

The administration and Congress should “urgently and jointly” conduct a nuclear review to “examine the intellectual underpinnings of our strategic deterrence policy” and to “find cost-efficient ways to modernize the force,” the report says.

Big Plans, Smaller Budgets

Military spending is slowing at the same time as the departments of Defense and Energy are making long-term decisions about how many new missiles, submarines, bombers, and nuclear warheads the United States will build over the next 50 years.

The Navy wants to buy 12 new, nuclear-armed ballistic missile submarines with a total production cost of about $100 billion. The Air Force is seeking up to 100 new, nuclear-armed strategic bombers that are expected to cost at least $55 billion, as well as a new fleet of land-based intercontinental ballistic missiles and air-launched cruise missiles (ALCMs). The Energy Department’s semi-autonomous National Nuclear Security Administration (NNSA) is pursuing a $60 billion plan to upgrade five nuclear warhead types, including the B61 gravity bomb. (See ACT, May 2014.)

In June 2013, President Barack Obama announced he would pursue a new agreement with Russia to reduce strategic nuclear weapons, and the U.S. military leadership has determined it can reduce the number of deployed strategic warheads to 1,000-1,100, or about one-third lower than the levels set by the 2010 New Strategic Arms Reduction Treaty. Russia showed little interest in further arms reductions, even before U.S.-Russian relations worsened over Russia’s annexation of Crimea and actions to support rebels in Ukraine.

At the same time, the administration’s nuclear modernization plans have started to run into trouble as the 2011 Budget Control Act’s limits on defense spending have begun to bite. For example, the defense budget still needs to be cut by $115 billion for fiscal years 2016-2019 to meet the act’s requirements.

As a result, the administration has had to delay producing the Navy’s new submarines by two years, delay certifying the new bombers to carry nuclear weapons, delay developing a new nuclear-armed ALCM by three years, delay rebuilding nuclear warheads, and cancel plans to build a new warhead production facility in New Mexico.

Questions on New Cruise Missile

Seeking to cut spending, Congress has begun to scrutinize
administration budget requests for nuclear weapons more closely. Last year, the Senate Appropriations energy and water subcommittee reduced the administration’s funding request for the B61 bomb life extension program by half, only to have the budget restored by a last-minute political compromise. (See ACT, March 2014.)

This year, that panel and the House and Senate Appropriations defense subcommittees all cut the administration’s request for the new ALCM.

In its June 17 report accompanying the bill, the Senate Appropriations energy and water subcommittee said it is “reluctant to provide funding for a new cruise missile warhead when the Air Force cannot identify sufficient funding in its budget planning documents to design and procure a cruise missile to deliver a refurbished warhead.”

To shore up support for the weapon, Frank Kendall, chairman of the joint Pentagon-NNSA Nuclear Weapons Council, wrote a June 24 letter to Senate Appropriations Committee Chairwoman Barbara Mikulski (D-Md.) stating that a bomber force armed with nuclear cruise missiles provides the president with “uniquely flexible options in an extreme crisis, particularly the ability to signal intent and control escalation.”

No date has been set for a vote in the full Senate on the defense and energy appropriations bills.—TOM Z. COLLINA

Vietnam Pact Nears End of Hill Review

A U.S.-Vietnamese agreement for civilian nuclear cooperation is on the verge of clearing its main hurdle in the United States, as Congress seems unlikely to complete the action it would need to take to block or revise the pact in the little remaining time left to do so.

Legislation that would have altered the duration of the Vietnam pact and some other agreements passed the Senate, and when the Senate Foreign Relations Committee had marked up the legislation, it considered but did not approve amendments that would have made changes that are more far-reaching.

In interviews since then, congressional staffers indicated that although the Senate bill is very unlikely to become law during the current Congress, its key provision and the amendments considered by the committee could resurface in some form. That is because they set standards for nuclear cooperation agreements rather than specifically changing the Vietnam accord, the staffers said.

Under current law, nuclear cooperation agreements that meet nine basic nonproliferation requirements can enter into force without a congressional vote of approval if they lie before Congress for 90 days of so-called continuous session without Congress blocking them. Most agreements, including the one with Vietnam, are in this category.

The 90-day clock for the Vietnam pact began when President Barack Obama submitted the agreement to Congress on May 8 and ran until Congress adjourned for its August recess, leaving only two of the 90 days when Congress returns in early September, according to congressional sources. House action on the legislation within that time is seen as extremely unlikely.

The agreement with Vietnam is the first in what could be a series of agreements with countries that are considering launching nuclear power programs. For nonproliferation advocates in Congress and elsewhere, a key issue is how hard the United States should press these countries to forgo uranium enrichment and spent fuel reprocessing, activities that are considered sensitive because they can be used to produce nuclear explosive material.

The legislation approved by the Senate would require most new agreements to be reviewed by Congress every 30 years. The Vietnam agreement has an initial duration of 30 years “and shall continue in force thereafter for additional periods of five years each.” Either party can terminate the agreement at the end of those periods.

Changes Contemplated

When the Foreign Relations Committee marked up legislation July 22, it considered amendments by Sens. Bob Corker (R-Tenn.) and Edward Markey (D-Mass.) that would have made broader changes in U.S. law.

Corker’s amendment would have added a 10th item to the nonproliferation
list, a “guaranty” that the country would not “engage in activities related to the enrichment or reprocessing of material.”

At the markup, Corker noted that adding the language does not mean that countries necessarily would be required to forgo enrichment and reprocessing. But if they did not agree to that condition, the agreement would require congressional approval, a much higher political hurdle than lying before Congress for 90 days without being disapproved.

Markey’s amendment would bar funding for U.S. nuclear cooperation with countries that take certain actions, including pursuing development of enrichment and reprocessing programs unless such programs are authorized by the country’s nuclear cooperation agreement with the United States.

Markey’s amendment failed by a vote of 11-5; Corker’s lost on a voice vote. Committee Chairman Robert Menendez (D-N.J.) told Corker and Markey that he supported their “aspirations” but not the amendments. He said he would be willing to work with the two lawmakers to come up with language that was more likely to win support in the Senate.

Menendez is the author of the language requiring the 30-year review, which was incorporated into a resolution of approval for the Vietnam agreement.

In an Aug. 6 interview, a senior Senate staffer said the resolution had been crafted to recognize the different roles of Congress and the administration. Negotiating agreements is the responsibility of the executive branch, and it is “not our job to change the agreement that is negotiated,” he said.

Congress has “other powers,” namely the ability to establish in law the standards that agreements must meet, he said.

Seeking Clarity
Late last year, the Obama administration completed a three-year internal review of its policy on civilian nuclear cooperation. A senior administration official last December described the policy as “principled...but also pragmatic and practical.” (See ACT, January/February 2014.) The administration did not issue the documents that typically accompany such a policy announcement, leading to questions in Congress and elsewhere about the specifics of the policy.

At a Jan. 30 Foreign Relations Committee hearing, Menendez and Corker pressed administration witnesses to provide a clear explanation of the U.S. policy on nuclear cooperation, particularly with regard to restricting enrichment and reprocessing.

Menendez said he wanted to know what criteria the administration would be using to determine whether to push a country to refrain from enrichment and reprocessing activities. Corker said there was a “great inconsistency across agreements.”

In the Aug. 6 interview, the staffer said the absence of clearly articulated criteria means that Congress has no baseline for judging if the administration “got as much as [it] could” in negotiating nonproliferation conditions with other countries. “We don’t enjoy that,” he said.

At a July 10 hearing before the House Foreign Affairs Committee, Daniel Lipman of the Nuclear Energy Institute argued against “inflexible preconditions to U.S. nuclear cooperation with potential partners, especially nontraditional preconditions that potential partners refuse to accept and other supplier nations do not require,” a description that would apply to the proposals to press countries to renounce enrichment and reprocessing activities. Lipman, the institute’s executive director for policy development and supplier programs, said enrichment- and reprocessing-related provisions in U.S. nuclear cooperation agreements should “reflect the unique circumstances of each bilateral relationship.”

But he said that the nuclear industry “has no quarrel” with a 30-year limit on the duration of civilian nuclear agreements. The most important issue with regard to the term of the agreements is that renewal negotiations begin early enough to avoid situations in which “an agreement is ready run out” and the renewal agreement has not been completed. “The term to us is, to some degree, immaterial,” he said.

Congress is in the midst of a wave of new and renewed nuclear cooperation agreements. Renewal agreements with Taiwan and the International Atomic Energy Agency recently entered into force. Earlier this year, the United States and South Korea agreed to a two-year extension while they sought to resolve issues preventing a longer-term agreement.

The United States also is in various stages of negotiations with a number of other countries, including China, Jordan, and Saudi Arabia. China’s agreement expires next year; the ones with Jordan and Saudi Arabia would be new ones.—DANIEL HORNER

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**Profile**

State Dept. Targets ‘Generation Prague’

Since 2010, the State Department has hosted an annual conference on arms control and disarmament to support President Barack Obama’s vision of a world without nuclear weapons, with students and young professionals in the field as its principal target audience.

In interviews, participants in the conferences praised the meetings while suggesting ways to strengthen the effort.

The State Department uses the term “Generation Prague” to refer to the conferences and the next generation of professionals working in arms control. The term is an allusion to Obama’s speech outlining nuclear policy in Prague on April 5, 2009.

The State Department created the Generation Prague concept in 2010 to provide a “forum and framework for collaboration” with young professionals, students, and foreign governments that were energized by the Prague speech, Erin Harbaugh, outreach officer for the State Department’s Bureau of International Security and
Nonproliferation, told Arms Control Today in an Aug. 25 e-mail. Now in its fifth year, Generation Prague is an event for “educating and empowering the next generation,” Alexandra Bell, director for strategic outreach in the Office of the Undersecretary for Arms Control and International Security, said in the same e-mail.

Young people view nuclear weapons “through a completely different lens” in comparison to other generations because many were born after the Cold War, Bell said. The conferences give emerging leaders an opportunity to discuss nuclear policies that will fit in a more interconnected world, she said.

Making Disarmament ‘Relatable’
Participants at the conference said they benefited from the experience. For Brenna Gautam, a senior at the University of Notre Dame who attended the conference while working as an intern in Washington, the gathering presented “a more relatable image of the issue of disarmament and arms control.” Gautam, a co-founder of her university’s Global Zero chapter, said in an Aug. 20 e-mail that this is important because she feels that nuclear disarmament is “not a very personal issue” for her generation.

Erin Corcoran, a recent college graduate with an interest in the field, said in an Aug. 21 e-mail that, for young professionals to continue making progress in reducing the threat of nuclear weapons, it is important to learn about the gravity of the threat posed by these weapons from “predecessors who lived and worked through the Cold War.”

Officials also say they benefit from the conferences. An Energy Department official said in a July 28 interview that the students and young professionals at Generation Prague have “challenged and broadened his thinking.” He said experts need to be reminded that youth “view the value of nuclear weapons differently” because the weapons do not have the same deterrent value today as they did during the Cold War.

One of the young professionals he mentioned was Kingston Reif, who participated in a 2011 panel and is now the director of nuclear nonproliferation at the Center for Arms Control and Non-Proliferation.

Reif said in an Aug. 20 e-mail that he was motivated to participate because nuclear threat reduction is the responsibility not only of previous generations, “but our generation and future generations as well.”

Although the conferences bring in high-level officials such as Rose Gottemoeller, undersecretary of state for arms control and international security, and Energy Secretary Ernest Moniz, Bell said the State Department has also worked to bring in experts from the “policy trenches” to ensure that the “audience gets an idea of how policy is working from top to bottom.”

Shane Mason said he appreciated the opportunity to meet experts who have been in the field for five to 10 years and support high-level officials. Mason, a research associate at the Stimson Center, said in an Aug. 20 e-mail that these experts provide “practical insights” about finding jobs and developing the necessary skills for the field.

Increasing Participation
Mason said that barriers to careers, particularly at the State Department, “seem pretty insurmountable at times.” Although he acknowledged that budget constraints make hiring difficult, Mason said that young people will not stay in the field if they cannot find jobs.

Bell said a “key driver” for reaching out to young people is
demographics, as many experts who “built the arms control and nonproliferation regimes” are reaching retirement age. The State Department “wants to recruit their replacements” and is looking for new ways to hire the next generation of leaders, she said.

Despite the difficulties finding jobs, the number of young people involved in nuclear issues at the global level apparently is growing. Meena Singelee, who has tracked participation by young experts attending conferences that are part of the review process for the nuclear Nonproliferation Treaty, said the numbers have “gradually increased” since 2010, due in part to “renewed momentum” on disarmament issues and “new priorities” in areas such as nuclear security.

Singelee, executive director of the International Network Emerging Nuclear Specialists, said there remains a “lack of significant participation by young experts from developing countries,” she said.

The State Department is looking to expand Generation Prague to reach international audiences. Bell noted that the State Department has paired with international partners such as the Organisation for the Prohibition of Chemical Weapons and representatives from countries including Kazakhstan and Ukraine. Harbaugh said that the State Department sees Generation Prague as “one part of a larger push to engage global youth” and welcomes collaborators.

Moving Forward
Several participants agreed that the conferences could accomplish more. Corcoran said that small-group discussions at future conferences might be useful so that there would be more opportunities to “directly engage” with some of the experts. Reif suggested that the State Department work with universities on events that bring officials to campuses to “demonstrate that nuclear weapons are not just a problem of the past.”

Gautam agreed and suggested that the State Department work with pre-existing clubs on college campuses that are dedicated to arms control issues. She said a stronger online presence could be helpful in reaching out to students who cannot attend events such as the annual conference in Washington. Streaming the conference live would be a good step, she said.

Harbaugh said that the State Department wants to partner with universities and nongovernmental organizations to “offer more opportunities through the year, in and out of Washington.”

She said plans are already underway for next year’s conference and that organizers hope to make it more “interactive.”—KELSEY DAVENPORT

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The Herbert Scoville Jr. Peace Fellowship invites recent college and grad school 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 154 fellowships.

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The audience at the July 10 Generation Prague conference listens to a presentation.
Members of Congress questioned the Obama administration’s policy toward negotiations with North Korea over its nuclear program at a July 30 hearing and expressed concern about Pyongyang’s growing nuclear and ballistic missile programs.

Rep. Steve Chabot (R-Ohio), chairman of the House Foreign Affairs Subcommittee on Asia and the Pacific, said the administration’s “so-called strategic patience policy is crumbling to pieces” and that North Korea’s nuclear weapons program “continues unfettered.”

As described by U.S. officials, the strategic patience policy seeks to hobble North Korean nuclear and missile programs through U.S. and international efforts to prevent the import and export of proliferation-sensitive materials and restart negotiations after Pyongyang demonstrates its commitment to dismantling its nuclear weapons program. For more than a decade, North Korea has had intermittent talks with the United States and its four negotiating partners—China, Japan, Russia, and South Korea—in the so-called six-party talks.

Glyn Davies, special representative for North Korea policy at the State Department, defended the administration’s approach at the hearing, saying that because North Korea “increasingly rejects meaningful negotiations,” the United States is looking for meaningful actions by North Korea before restarting talks. Davies said these actions could include steps by North Korea such as freezing its nuclear program and inviting inspectors from the International Atomic Energy Agency back into the country.

Davies said it might take continued diplomatic overtures combined with “the patient application of increasing amounts of pressure” to make North Korea realize its current path is “leading [it] nowhere.”

Rep. Brad Sherman (D-Calif.) said that “both carrots and sticks” are necessary to change North Korea’s behavior. He said the United States should discuss a nonaggression pact with North Korea and work with China to stem the “enormous subsidies” that Beijing sends to Pyongyang.

Davies said that negotiations with North Korea are a “multilateral task” and the United States is making progress working with countries in the region, including China, to push North Korea to take steps toward denuclearization in order to resume negotiations. Washington is also unilaterally tightening sanctions that “increase the cost” of North Korea’s illicit activities, he said.

North Korea committed to denuclearization in a 2005 joint statement with the other members of the six-party talks, but more recently, Pyongyang has said that it wants negotiations on its nuclear program to resume without any preconditions. (See ACT, November 2013.)

Those talks began in 2003 with the goal of dismantling North Korea’s nuclear program. The multilateral negotiations were held intermittently until North Korea announced in April 2009 that it would no longer participate.

Washington has also negotiated bilaterally with North Korea in the past. Pyongyang is believed to possess the nuclear material for approximately four to eight nuclear weapons and is working to increase its stockpile of weapons-usable nuclear material. (See ACT, January/February 2014.)—KELSEY DAVENPORT

Glyn Davies, the State Department’s special representative for North Korea policy, testifies before the House Foreign Affairs Subcommittee on Asia and the Pacific on July 30.
BOOK REVIEW:
Posture Matters, but Stability Matters More

Vipin Narang’s new book, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict*, is an important step forward in understanding the emerging global landscape of nuclear weapons policies that could point in a dangerous direction. The book fills a gaping hole in the literature on nuclear weapons by offering a plausible explanation for why new nuclear states choose the nuclear postures that they do.

It also demolishes the common assumption that possession of a nuclear weapon provides deterrence. Narang deploys sophisticated quantitative methods to demonstrate that the ability to deter conventional attack varies with the nuclear postures that states select. In so doing, Narang’s argument could encourage states to consider more-aggressive nuclear postures.

Narang, an associate professor of political science at the Massachusetts Institute of Technology (MIT) and a member of the school’s Security Studies Program, improves scholarly understanding of 21st-century nuclear strategy in several additional ways. He has chosen an important, policy-relevant topic for academic research; challenged entrenched biases; categorized emerging nuclear postures; rigorously observed the reasons that states choose their nuclear postures and the effect of these posture choices on international conflict; described the specific nuclear postures of several states; and, one hopes, provided the spark for a wider scholarly consideration of nuclear policy.

Narang goes against the grain in both respects and identifies a troubling, important issue: “[t]he effect of nuclear weapons on deterring conflict remains fundamentally unclear.” Given the prospective effect of deterrence failure on international conflict, the dangers of inadvertent or unauthorized use of nuclear weapons, the destructive potential of nuclear weapons, and the security, economic, and human costs of maintaining nuclear arsenals, this is a public policy consideration of the first order.

Narang applies rigorous analytical methodologies to the topic of nuclear posture—the forces, doctrines, plans, and rules for the use of nuclear weapons. He confronts problems in the literature such as a “Cold War hangover” of overemphasis on the experience of the superpowers with nuclear deterrence and an “existential bias” characterized by “focusing almost exclusively on a state’s acquisition or test of its first nuclear weapon.” He contends that his findings “fundamentally challenge the assumption that the mere possession of nuclear weapons provides substantial deterrence benefits.”

He proceeds to offer three “mutually exclusive and empirically exhaustive” categories of nuclear postures into which he sorts the practices of non-superpower nuclear-armed states. These are “a catalytic strategy that attempts to catalyze superpower intervention on the state’s behalf; an assured retaliation strategy that threatens certain nuclear retaliation in the event a state suffers a nuclear attack; and an asymmetric escalation strategy that threatens the first use of nuclear weapons against conventional attack” (italics in original). This useful contribution provides an intuitive and descriptive

Douglas B. Shaw is associate dean for planning, research, and external relations at The George Washington University’s Elliott School of International Affairs, where he also is an assistant professor of international affairs. During the Clinton administration, he served in the U.S. Arms Control and Disarmament Agency and the Department of Energy. He holds a Ph.D. in international relations from Georgetown University.
Narang’s “posture optimization theory” describes the conditions driving states to select among the three postures he defines. According to Narang’s theory, four sequenced variables about a state with nuclear weapons allow an observer to predict the state’s nuclear posture. If the state perceives “the availability of a reliable third-party patron” to guarantee its security from aggression, it will select a catalytic nuclear posture to reinforce that positive security assurance. If no powerful patron is available and a state faces a “conventionally-superior proximate offensive threat,” Narang’s theory predicts that the state will adopt an asymmetric escalation nuclear posture. If the state has neither a powerful patron nor a threatening neighbor with superior conventional forces, then Narang expects its nuclear posture to depend on its “civil-military arrangements.” He distinguishes between two types of these arrangements: “assertive,” in which civilian political authorities exercise tight control over the military, and “delegative,” in which the military enjoys wide freedom of action in questions of defense policy.

Narang theorizes that assertive civil-military arrangements favor a nuclear posture of assured retaliation while delegative civil-military arrangements leave a state’s choice of nuclear posture open to the question of resource constraint. If such a state has the money, it may choose asymmetric escalation; otherwise, Narang predicts, it will choose assured retaliation. Narang assumes an asymmetric escalation posture to be more expensive than an assured retaliation posture. This assumption is intuitively attractive because historical experience suggests that changing to an asymmetric escalation posture requires more and more-diverse nuclear forces. Yet, by not quantifying this difference in expense or exploring the possible advantages of more-expensive variants of assured retaliation, Narang leaves a door open to additional research.

Narang demonstrates the superior explanatory power of his theory against three alternatives across six empirical cases. Narang’s first alternative explanation for nuclear posture is structural realism, relying on the distribution of power in the international system. Technological determinism, in which a state’s capabilities determine its nuclear posture, is Narang’s second alternative. In describing it, he misses an important opportunity to recall the crippling blow that his MIT security studies faculty predecessor, the late Stephen Meyer, dealt to this idea in his 1986 book, *The Dynamics of Nuclear Proliferation,* and the persistent nonproliferation puzzle of states that have the technical capability to acquire nuclear weapons but have not done so. Finally, Narang evaluates strategic culture, finding it to be an intervening variable—a factor that exerts influence through another factor—by influencing nuclear posture “through a state’s civil-military relations.” He finds that the observed nuclear postures of states in his case studies are more reliably aligned with his posture optimization theory than with any of the three alternatives and that his theory offers additional insight into when states may choose to change their nuclear posture.
nuclear postures. On this basis, Narang argues that posture optimization theory will predict future posture decisions of regional nuclear powers.

Rich with careful observation and historical context, the six case studies augment the importance of this book for any reader interested in nuclear policy. These chapters concentrate and explain the findings of a voluminous secondary literature on each case, making the book a useful and convenient primer on contemporary nuclear strategy, even for readers who might not have great interest in the book’s discussion of Narang’s research methods. For those readers, however, the methodologically driven exclusion of the United Kingdom and North Korea from the list of cases explored is frustrating.

Historical perspective on U.S. nuclear posture during the Cold War would also be interesting to explore in parallel. Nonetheless, the six case-study chapters—Pakistan, India, China, France, Israel, and South Africa—constitute a thought-provoking vehicle to explore the drivers and characteristics of nuclear posture as a globalizing phenomenon.

Narang argues that the states he studies “enjoy” a “reduction in armed conflict at every level of intensity, compared to both non-nuclear states and states that adopt other nuclear postures” only when they exhibit an asymmetric escalation nuclear posture. This finding is important and troubling. In claiming to overturn a widely held assumption that the mere existence of nuclear weapons provides deterrence, Narang’s work seems to raise the prospect that this discovery will prompt more states to adopt more-aggressive nuclear postures. This might be dangerous. The unique benefits of asymmetric escalation postures may not persist if these benefits are more widely understood and additional states seek an attendant increase in the risk of inadvertent nuclear use.”

Acknowledgment of this danger begs for more research to understand, in Narang’s terms, when states should “trade off some ‘deterrent power’ for arsenal security.” The prospect of deterring conventional or terrorist attack will be attractive to many, possibly leading some nuclear states to undervalue security against the prospect of inadvertency. Overturning widely held assumptions may itself be dangerous, even if the assumptions are false, in an area such as nuclear posture, in which the consequences of miscalculation and miscommunication are as catastrophic as misapprehension. On the other hand, significant new findings such as Narang’s may prove more beneficial for international security in the context of practitioners’ perspectives on best practices in promoting crisis stability, confidence, and effective negative control of nuclear weapons.

Additional research extending Narang’s theoretical approach to states that have not yet acquired nuclear weapons could reveal further insights. For example, Narang describes Japan as a “standby nuclear state,” raising the question of why this is not another possible value of his “nuclear posture” variable. Could the threat of future proliferation be sufficient to catalyze greater resolve in a patron to defend a near-nuclear state? Tristan Volpe, a Ph.D. candidate at The George Washington University, observes that states with the latent capacity to produce nuclear weapons often wait in a restrained yet costly preweapon stage of “nuclear limbo” to reap coercive bargaining advantages against friends and enemies alike. Arrangements for nuclear sharing within an alliance, reliance on a nuclear umbrella without seeking an independent nuclear weapons capability, or membership in nuclear-weapon-free-zone agreements might widen the potential variation of “nuclear posture” further.

If Narang’s theory or some adaptation of it also drives the defense posture decisions of countries that are nuclear Nonproliferation Treaty (NPT) non-nuclear-weapon states, it could illuminate nonproliferation behavior within NATO and by other close U.S. allies. This would be of great interest to policymakers and might enable improvements in extended deterrence policy for nuclear nonproliferation. Specifically, if a superpower guarantor is always preferred to an independent nuclear weapons capability, what should the United States do to manage the risk of proliferation? Variation of the “resource constraint” variable should be explored further. Narang indicates that it is relative to a prospective adversary. For example, it is low in India’s case because “anything Pakistan can afford, India can surely also afford.” This is an insufficiently clear criterion for reliably observing variation in resource constraint for three reasons. First, states sometimes assign a very high priority to nuclear weapons capabilities, as in Pakistani Prime Minister Zulfikar Ali Bhutto’s 1965 pledge that Pakistan would “eat grass” to match an Indian nuclear capability. Similarly, Narang says, France was “forced to adopt an asymmetric escalation posture before it was fully capable of doing so.”

Second, multiple adversaries may be implicated in a state’s nuclear strategy. For example, China is relevant to the Indian case, but with greater resources than Pakistan. That fact could alter the

Narang deploys sophisticated quantitative methods to demonstrate that the ability to deter conventional attack varies with the nuclear postures that states select.
way that resources affect Indian posture choices.

Third, when Narang observes that resource constraint makes a state cautious to avoid an arms race that “could bankrupt the state or render it vulnerable,” it seems that a security dilemma, in which actions by one state to increase its security decrease the security of others, may be doing more work to explain that state’s restraint than budget pressure. Variation in resource constraint is already suppressed in Narang’s study by including only states that possess nuclear weapons, which Narang observes are not cheap. If resource constraint does not prevent proliferation, why should one expect it to prevent aggressive postures rather than, for example, allowing these postures with subpar negative controls against unauthorized use? Narang does not demonstrate the existence of states rich enough to build a bomb but too poor to choose a strategy for its employment. Instead, he finds that “the asymmetric escalation nuclear posture is both the curse of the severely threatened and the luxury of the rich and stable,” as France was forced to adopt this posture to face a vastly superior Soviet Union but free to retain it after the Soviet collapse because its domestic civil-military relations support a delegative command structure.

Narang repeatedly notes the inherent risk of the asymmetric escalation posture, but his theory seems to explain a world in which policymakers do not consider this risk in selecting a posture, which seems dangerous.

Political constraint imposed by other states seems to matter to Narang’s narrative explanations, but it is not included in his theory. Narang’s posture optimization theory and alternative explanations for sources of nuclear posture do not include references to political pressure by other states, but he refers to such pressure repeatedly to explain posture decisions. For example, India somehow sidestepped the first node in the decision tree of the posture optimization theory because relying on a superpower patron “risked undermining India’s position in the nonaligned movement.” In turn, “[f]ear of international backlash prevented [Pakistan] from fully operationalizing an asymmetric escalation posture by testing nuclear weapons” until India “midwifed” this change with its own testing in 1998. Further qualitative research to explore the role of political constraint could help to refine Narang’s theory in testable ways.

Narang claims that Chinese and South African policy choices were influenced by consideration of political costs while this mechanism remains unacknowledged in his theory. Moreover, he seems to cast the NPT as a global background condition affecting all states equally, robbing it of potential explanatory power. Political science has not yet explained the small number of states that have acquired nuclear weapons, and in this vacuum of scholarly explanation, it is imprudent to disregard the insight of many practitioners that the NPT is an important factor in preventing proliferation.

Additional research could clarify the role of perception in Narang’s theories. He provides a useful primer on theoretical perspectives, but treats deterrence at a length too great never to mention that it takes place in the mind of the adversary. The main reason that the requirements of nuclear deterrence are unknown is that they vary with the adversary to be deterred. His theory relies on objective facts to predict posture, but some of these facts, such as resource constraint and the availability of a more powerful patron, are subject to the perceptions of decision-makers.

The book has numerous additional policy implications that should be explored. Can U.S. policy choices encourage a posture change back from asymmetric escalation to assured retaliation, catalytic, or any latent nuclear posture? How should the United States respond to the nuclear postures of additional states that newly acquire nuclear weapons? How will those states respond in turn? Could widening multilateral participation in direct communication links and nuclear risk reduction enhance crisis stability? Perhaps most importantly, would an asymmetric escalation posture deliver additional national security benefits to a state such as India against conventional or terrorist attack? If so, this finding would be very important and potentially dangerous if it supported policy arguments for more-aggressive nuclear postures. Such findings should be explored, but also combined with input from nuclear policy and military practitioners whose backgrounds may have exposed them to practical dangers of nuclear first use that are difficult to capture in a study with no data on inadvertency.

Narang adds importantly to the scholarly understanding of nuclear posture in a way that can inform policy. He studies an important topic, shatters false assumptions, provides insightful and useful new conceptual categories, offers apparently powerful theoretical explanations of important behaviors, provides a valuable set of case studies, and opens doors for additional scholarly research. At the same time, Narang’s findings should be scrutinized carefully and his policy advice assessed from additional perspectives before it is used to justify changes in nuclear posture. The many avenues for additional research it suggests and worrisome possibilities it surfaces testify to the analytic strength and policy ambition of this important book.

ENDNOTES

Pakistani President Zulfikar Ali Bhutto, shown in a 1976 photo, said in 1965 that his country would “eat grass” to match India’s nuclear capability.
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