Nonproliferation treaty talks end in acrimony

Issues of nuclear nonproliferation and disarmament take a back seat to a Middle East regional nuclear-free zone.

A month-long United Nations conference to review the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) ended in a stalemate with the failure to agree on convening a conference early next year to begin negotiations establishing a zone in the Middle East that would be free of weapons of mass destruction. The US, UK, and Canada rejected the proposal and blamed Egypt and other Arab states for their insistence that the WMD conference get under way by March 2016, a timetable that Rose Gottemoeller, US undersecretary of state for arms control and international security, called unrealistic.

"We have made clear throughout the process that we will not accept the efforts by some to cynically manipulate the [review conference] to try and leverage the negotiation to advance their narrow objectives at the expense of the treaty or of our shared long-standing principles," Gottemoeller told reporters at the conclusion of the conference.

UN Secretary-General Ban Ki-moon expressed disappointment at the conference outcome. "The Secretary-General regrets in particular that States parties were unable to narrow their differences on the future of nuclear disarmament or to arrive at a new collective vision on how to achieve a Middle East zone free of nuclear weapons and all other weapons of mass destruction," a statement issued by his office said.

Egypt confirmed that it wrote the provision calling for the WMD-free zone session to be convened within 180 days of adjournment of the review conference. Of the nuclear weapons states, Russia and China supported the proposal. The Russian Foreign Ministry issued a statement that blamed the US, the UK, and Canada for the failure of the talks and claimed that the Mideast plan was based on Russian "ideas and practical proposals."

Inaction on action plans

Disagreement on the Mideast issue precluded adoption of a densely worded 24-page draft document that also addressed broader disarmament and nonproliferation issues. Review conferences have been held every five years since the treaty took effect in 1970. A 64-point action plan adopted at the 2010 review (see PHYSICS TODAY, July 2010, page 24) has seen little progress. That action list included further arms reductions agreements between the US and Russia, negotiations on a treaty to end the production of fissile materials, and entry into force of the Comprehensive Nuclear-Test-Ban Treaty.

Gottemoeller noted that the US continues to back the concept of a Mideast WMD-free zone, first proposed in 1995, to be negotiated under NPT auspices. Asserting the US's "unwavering support" for the treaty, Gottemoeller said, "It is clear that the NPT remains the enduring cornerstone for the global nonproliferation regime and will continue to serve as the focus for our efforts to achieve a world without nuclear weapons."

Despite the lack of progress, China continues to support the NPT as "a cornerstone in the international nuclear nonproliferation regime," Foreign Ministry spokesperson Hua Chunying told reporters on 25 May. She added that "China consistently and firmly supports the establishment of a zone free of weapons of massive destruction in the Middle East."

Israel is observer

A delegation from Israel, which isn't a party to the 190-nation NPT, attended the conference for the first time as an observer. Israel has insisted that the WMD-free-zone talks be part of discussions on comprehensive regional security issues, including conventional weapons.

Israeli Prime Minister Benjamin Netanyahu personally thanked US Secretary of State John Kerry for opposing the document. "The United States kept its commitment to Israel by preventing a Middle East resolution that would single out Israel and ignore its security interests and the threats posed to it by an increasingly turbulent Middle East," Netanyahu said in a statement.

Canadian Prime Minister Stephen Harper, whom Netanyahu also called to thank, said in a statement that a WMD-free zone "can only be truly effective if all countries in the Middle East participate freely and constructively in its establishment."

Some experts fear the 45-year-old NPT is in danger of losing its relevance as an instrument for disarmament. "The conference put on display the growing frustration of the non-nuclear-weapons majority with the slow pace of action on disarmament by the nuclear-armed states, their costly and counterproductive nuclear weapons modernization programs, and dangerous nuclear doctrines," said Daryl Kimball, executive director of the Arms Control Association (ACA). Article six of the treaty requires that the five declared nuclear powers "pursue negotiations in good faith" to disarm. Meanwhile, undeclared nuclear powers India, Pakistan, Israel, and North Korea remain outside the treaty.

"The NPT is looking more like a swindle to many states," Randy Rydell, former senior political affairs officer at the UN Office of Disarmament Affairs, said at an ACA conference on 14 May. Nuclear deterrence remains embedded in the military strategies of all the nuclear weapons states, he noted. And a 2008 bilateral agreement providing India access to US civil nuclear technologies despite its status as a non-NPT member has further discredited the treaty, he added.

"We need to move away from process to substance," Alexander Kmentt, director for disarmament, arms control, and nonproliferation with Austria's Federal Ministry for Europe, Integration, and Foreign Affairs, told the ACA. "If not, the credibility of NPT as a disarmament vehicle, already under threat, will be further weakened." Austria hosted the most recent of four conferences on the humanitarian conse-

US STATE DEPARTMENT

US Secretary of State John Kerry meets Egypt's Foreign Minister Sameh Shoukry at the 2015 review conference of the Treaty on the Non-Proliferation of Nuclear Weapons on 27 April. The US blamed Egypt for the failure of the conference to reach a consensus.

quences of nuclear weapons in December 2014 (see PHYSICS TODAY, December 2014, page 27).

But other analysts said the NPT remains crucial to nonproliferation and arms reduction. Lewis Dunn, the US representative to the 1985 NPT review conference, said the 1970 treaty "remains an irreplaceable framework for a non-nuclear future." The NPT "presents a legal, moral, and political obligation on the nuclear weapons states to disarm," he said. "In today's world, it can't be re-created because none of the five [weapons states] would join any such international framework."

James Acton, codirector of the nuclear policy program at the Carnegie Endowment for International Peace, says the NPT remains "pivotally" important to inhibiting the spread of nuclear weapons. "Our ability to safeguard nuclear energy programs, to ensure they're not used for military purposes, highly hinges on the NPT," he says.

Acton downplays the review conference's importance. Just as past review sessions that went well did little to bolster the NPT's nonproliferation regime, those meetings viewed as unsuccessful didn't damage it.

Far more important to the NPT's future will be the outcome of the Iran nuclear negotiations and preventing the spread of uranium enrichment and reprocessing technologies, Acton says. As for the WMD-free zone, he says, "the NPT was always a very crude instrument for trying to make any progress on that."

The review conference was noteworthy for new information on the US nuclear arsenal; Kerry released new numbers at the outset in a show of transparency. Included in his report was the fact that as of 1 March, the number of deployed US warheads totaled 1597, just a few dozen short of the 1550 cap specified under the New START agreement with Russia for 2018. They are mounted on 785 intercontinental ballistic missiles and submarine-launched ballistic missiles and are carried aboard strategic bombers.

The total US stockpile of nuclear weapons, including inactive ones, was 4717 as of September 2014, his report revealed. That is an 85% reduction from the Cold War peak, and the smallest number since 1956. President Obama has requested a 20% increase in the pace of weapon dismantlement, according to Kerry's report. (See the 12 May story in the Politics and Policy department of PHYSICS TODAY's online Daily Edition.)

David Kramer

Neutrino detector moves from Italy to Illinois

Liquid argon is selected for next-generation experiments.

As a first stop in a journey from Italy's Gran Sasso National Laboratory to Fermilab, the ICARUS detector is at CERN for an upgrade. Once it reaches its new home, the 760-ton detector will be used to determine whether sterile neutrinos exist. The relocation will also help strengthen the international collaboration needed to realize the US's much larger neutrino ambition, a 40-kiloton detector in South Dakota's Sanford Underground Research Facility.

The move dovetails with the particle-physics strategies on both sides of the Atlantic. In June 2014 CERN announced that, in focusing on the Large Hadron Collider and high-energy physics, it would mothball its neutrino beams. And in its most recent Particle Physics Project Prioritization Panel exercise, the US community put a world-leading program in neutrinos as a top aim (see PHYSICS TODAY, July 2014, page 18). At a White House ceremony on 7 May, officials from NSF and DOE signed an agreement with CERN aligning their long-term particle-physics strategies and paving the way for closer collaborations.

Running from 2010 to 2014 at Gran Sasso with a beam from CERN, ICARUS demonstrated that a liquid-argon time-projection chamber is an effective detector of neutrinos. Nobel laureate Carlo Rubbia, who had the idea for ICARUS and led the project, said in a 22 April statement that the method is expected to "become the leading technology for large liquid-argon detectors, with its ability to record ionizing tracks with millimeter precision."

INFN

Workers check out ICARUS's cryogenics. Down the center of the 20-m-long detector is piping for the circulation and purification of 760 tons of liquid argon. The electronics racks along the sides contain nearly 53 000 readout channels.

The ICARUS upgrade includes modern electronics, more photomultiplier tubes, improved cryogenics, and a veto system to reject cosmic rays. So far, CERN and Italy's National Institute of Nuclear Physics (INFN) are putting about €10 million ($11 million) of hardware into the upgrade, but the total tab awaits the final design of the veto system—needed because, unlike at Gran Sasso, where about 1400 m of rock shielded the detector, at Fermilab ICARUS will sit just 10 m below ground. The INFN has invested roughly €40 million in ICARUS over its lifetime, not including salaries. The plan is to complete the upgrade and ship ICARUS in early 2017, with data-taking to begin in 2018.

Short-baseline trio

This month Fermilab begins excavating the dugout that will house ICARUS. Situated about 600 m from the lab's neutrino source, the detector will be part of a trio