

EDITOR'S NOTE

This issue begins with a special section focusing on the global elimination of highly enriched uranium (HEU). In his introduction, William C. Potter (James Martin Center for Nonproliferation Studies) examines the risks of nuclear terrorism posed by the estimated 50–100 metric tons (MT) of non-military HEU stockpiled around the world, describes the various uses of this material, and explores the economic, political, and strategic obstacles to international efforts to end the use of HEU for commercial and research purposes.

Anya Loukianova and Cristina Hansell (James Martin Center for Nonproliferation Studies) discuss the vital role the United States plays in encouraging the reduction and elimination of the use of HEU through the Reduced Enrichment for Research and Test Reactors initiative and other programs. Despite the technical successes of these efforts, they argue, the United States must do more to accelerate the process and create a new global norm against the use of HEU, including passing legislation to develop a consistent HEU policy and possibly reducing military HEU stockpiles to demonstrate U.S. commitment.

Cristina Hansell investigates the risks posed by the use of HEU reactor targets to produce metastable technetium-99, the world's most important radiopharmaceutical (nearly half of all civilian HEU is used for this purpose). In so doing, she also assesses the public health risks of using just four producers to manufacture the world's entire supply of this medical isotope; a prolonged outage at any one facility would create significant shortages of this perishable product. Although low-enriched uranium can be used to manufacture this material, she reports, the major producers—all of whom rely on HEU—are unlikely to convert without a dedicated political push and sufficient funding to help defray the costs.

Elena K. Sokova (James Martin Center for Nonproliferation Studies) looks at Russia, which is estimated to control more than half of all the civilian HEU used worldwide. Smuggling incidents in 2003 and 2006 involving Russian-origin HEU highlighted the proliferation risks associated with this material. Although Russia has taken steps to repatriate Soviet-origin HEU and reduce its use in Soviet-built reactors in other countries, for economic, political, bureaucratic, and other reasons it has not taken steps to convert to LEU itself. Notwithstanding these impediments, Sokova argues that innovative, non-traditional approaches may succeed in encouraging Russia to phase out the use of HEU. A failure to do so will severely undercut international efforts to end civilian use of HEU.

William C. Potter and Robert Nurick (James Martin Center for Nonproliferation Studies) identify and discuss the major obstacles to HEU removal at two key installations—the Kharkiv Institute of Physics and Technology in Ukraine, and the Sosny Science and Technology Center in Belarus—and recommend a strategy for overcoming these impediments, including adopting a greater sense of urgency, considering creative compensation packages, directly addressing institutional and political objections, and working with senior political leaders in each country. In both cases, the authors argue, a greater commitment by Russia and the United States to reduce their HEU stockpiles could, in concert with other actions, encourage Ukraine and Belarus to do the same.

Nonproliferation Review, Vol. 15, No. 2, July 2008

ISSN 1073-6700 print/ISSN 1746-1766 online/08/020119-03

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DOI: 10.1080/10736700802117213

Ole Reistad and Styrkaar Hustveit (Norwegian Radiation Protection Authority) provide a detailed accounting of civilian HEU use throughout the world, in everything from research reactors, to isotope targets, to naval propulsion. In so doing, they provide a useful baseline from which to measure the progress on minimizing and eliminating the use of HEU for non-military purposes. The authors recommend establishing a comprehensive list of all HEU-fueled facilities and fuel storage facilities. They also stress that shutting down rather than converting HEU-fueled facilities may be the easiest and most cost-effective means of reducing the global civilian use of HEU. And they warn against ignoring the sizable use of HEU for naval propulsion (particularly by the United States, which consumes 2 MT a year and will continue to do so for the foreseeable future) when promoting efforts to minimize and eliminate the use of HEU around the world.

Cristina Hansell concludes the special section with a series of recommendations to broaden and strengthen existing global efforts to ban the civilian use of HEU and reduce the risk of nuclear terrorism. These include developing new incentives for reactor shutdown and conversion; establishing research reactor coalitions; launching a global HEU database; giving the International Atomic Energy Agency a mandate to promote HEU minimization; and improving physical protection standards. Longer-term measures include the adoption of HEU management guidelines and a code of conduct. In addition, national governments should enact laws phasing out domestic use of HEU and linking future HEU exports to commitments to convert to LEU fuel.

The project that led to this special collection of articles on the threats posed by the civilian use of HEU is a natural extension of the Center for Nonproliferation Studies' work on *The Four Faces of Nuclear Terrorism* (2005) and was informed by the center's efforts in the world of diplomacy to not only comment on national and international policies but to change them as well. The authors and the center thank the Carnegie Corporation of New York, the Ploughshares Fund, the Saga Foundation, the Norwegian Ministry of Foreign Affairs, and the U.S. Institute of Peace for their generous support of research on combating nuclear terrorism and the minimization and delegitimization of civilian use of HEU.

In his article in this issue, Michael Clarke (Griffith Asia Institute, Griffith University) considers the many challenges facing Australia as it attempts to reconcile its dual commitments to nuclear nonproliferation and uranium exports even as the nonproliferation regime experiences severe strain and uranium prices increase steadily. Clarke assesses the impact of these factors, and of the new Labor government, on Australia's nuclear policy and discusses how they could lead to a reshaping of that policy.

Gregory Kulacki and Jeffrey G. Lewis (Union of Concerned Scientists and the New America Foundation, respectively) go beyond the headlines and the speculation to try to discover what prompted China to use an interceptor to destroy one of its own satellites in a January 2007 test. Traveling to China several times last year, they met repeatedly with nearly two dozen mid-level technical specialists familiar with this particular program and test. Their findings, while not conclusive, suggest that U.S. analysts and commentators have exaggerated the importance of the United States as a motivating factor in China's decision to develop the technology and conduct the test.

Senator Richard G. Lugar (Republican of Indiana) argues for an expansion of the Cooperative Threat Reduction program he helped to launch sixteen years ago. By

eliminating bureaucratic impediments and granting exemptions from certain U.S. legal requirements, he writes, the Nunn-Lugar program will gain increased flexibility and effectiveness, enabling it to fund work in other countries, such as, perhaps, North Korea, and on a wider range of projects, including training foreign governments to interdict dangerous weapons and weapons-related materials, and providing assistance in the event of an attack involving a weapon of mass destruction.

Pierre Billaud and Venance Journé (Commissariat à l'énergie atomique, retired, and Centre national de la recherche scientifique, respectively) provide a fascinating inside look at the chaotic process that led to France's successful thermonuclear weapons test in 1968. For the first time, a key participant explains why it took France more than eight years—longer than any other nuclear weapon state—to develop the hydrogen bomb, and how a timely tip from a foreign source contributed to the successful outcome.

Johan Bergenäs (James Martin Center for Nonproliferation Studies) analyzes the impediments to implementing UN Security Council Resolution 1540 through the prism of the "tragedy of the commons," showing how the rational inaction of individual states not to comply with the resolution in order to maximize individual gains eventually leads to collective irrationality and an overall weakening of common security. According to the author, a collective, coordinated response to the threat of nuclear, biological, or chemical attack is the best means of ensuring that no state succumbs to one.

Finally, we are pleased to publish three reviews of five important and timely new books on Pakistan's nuclear weapons program, the causes of nuclear proliferation, and the best means of preventing nuclear terrorism.

Mark Hibbs (Asia-Pacific editor for the nuclear publications of the Platts group, McGraw-Hill Companies) brings his considerable expertise to bear in a joint critique of three books on Pakistan's path to nuclear weapons: *America and the Islamic Bomb*, by David Armstrong and Joseph Trento, *Deception*, by Adrian Levy and Catherine Scott-Clark, and *The Nuclear Jihadist*, by Douglas Frantz and Catherine Collins. Jessica C. Varnum (James Martin Center for Nonproliferation Studies) considers a new explanation for why states develop nuclear weapons in her review of *Nuclear Logics*, by Etel Solingen. And Simen A. Ellingsen (King's College London and Norwegian University of Science and Technology) evaluates a new and reasoned approach to preventing nuclear attacks presented in *On Nuclear Terrorism*, by Michael Levi.

Stephen I. Schwartz, Editor