

## EDITOR'S NOTE

The three articles in this issue address three principal components of nuclear security: to reduce the salience of nuclear weapons through constraints on the nuclear weapon states; to safeguard civilian nuclear power to prevent nuclear proliferation by non-nuclear weapon states; and to prevent the use of nuclear weapons by sub-state groups.

The first article, by David Hafemeister, presents a detailed review of progress since the defeat in the Senate in 1999 of a Comprehensive Nuclear Test Ban Treaty in the ability of the international community to monitor such a treaty—largely through improvements in seismic capabilities. In sum, it appears that a fully implemented international monitoring system would be able to detect and to identify underground nuclear explosions with a threshold in hard rock of 0.1 kt, if conducted in most places in the world. In some locations, the threshold would be markedly lower.

The following article, by Roger Johnston, Michael Timmons, and Jon Warner, introduces and explores an approach to assure the integrity of monitoring data in the context of international nuclear safeguards, and in light of “the current unreliability of tamper-indications seals and the less than guaranteed security offered by conventional authentication methods.” The cipher approach developed by the authors is termed a “One-Time Pad of Digits Substitutions” (OPODS), with its strengths and disadvantages discussed. The analysis was done at the Los Alamos National Laboratory.

The final article, by Lawrence Wein, Yifan Liu, Zheng Cao, and Stephen Flynn, undertakes an operations analysis of ways to improve radiation monitoring (in this case, based on neutron detection) at overseas ports to prevent nuclear weapons from entering the United States in a shipping container. In this article, the authors allow multiple radiation portal monitors (RPMs) to be deployed, and investigate whether improvements can be obtained by having RPMs screen containers while the trucks carrying containers are in queue as they enter the port, and by using several RPMs to simultaneously screen a container. The authors argue tentatively that current monitoring designs could be improved significantly—enough “to offset some shielding of a plutonium weapon, but insufficient to detect a uranium weapon.” The results of any such analysis are of course dependent on the assumptions chosen, and though therefore no firm conclusions can be drawn, the analysis presents a valuable framework in which the complex tradeoffs can be studied.