

everybody is more open to discuss conversion than they were a year or two or three ago. It's not just technical issues. It's a political and financial issue. But one can be sure it would have a psychological impact, and that would be strong." Adds Alan Kuperman, a professor of public affairs at the University of Texas at Austin and a senior policy analyst for the Nuclear Control Institute, "It would finally put a stake through the heart of the myth that while you can produce isotopes from LEU, you can't do it on a large scale." If the US starts making ⁹⁹Mo, he adds, "the message [to current producers] would

be that your only shot to save your market share is to convert to LEU."

A major producer of isotopes, the high-flux reactor in Petten, the Netherlands, converted to LEU fuel a couple of years ago, and at the workshop in Australia the reactor's manager announced that a planned successor will only allow LEU targets. "I think the Dutch announcement reflects an understanding of the way the world is moving," says Kuperman. "The way to lock it in and make sure it really happens is for the US to move ahead with funding domestic production with LEU. That would get everybody to see the writing on the wall."

Toni Feder

Detectors could miss bomb-grade uranium at ports, group warns

The NRDC says next-generation radiation monitors could be thwarted by modest shielding.

A prominent environmental group is warning that radiation monitors at US ports are inadequate to detect nuclear bomb material that terrorists might attempt to smuggle inside a cargo container. The Natural Resources Defense Council (NRDC) also cautioned that fashioning an improvised nuclear explosive device from highly enriched uranium is even easier than its experts had previously thought.

In a 24 March petition, the NRDC urged the Nuclear Regulatory Commission (NRC) to accelerate the phaseout of civilian HEU applications. In that petition, the NRDC said that neither the existing radiation monitors nor a new technology that the Department of Homeland Security (DHS) expects to deploy next year can reliably detect HEU that might be secreted in any of the tens of millions of cargo containers entering US ports each year. The petition was based in part on an article by NRDC scientists Thomas Cochran and Matthew McKinzie that appeared in the April 2008 issue of *Scientific American*.

Experts at congressional hearings last month questioned the extent to which container screening, even if highly accurate and applied to every container, would foil nuclear smuggling. Vayl Oxford, director of the Domestic Nuclear Detection Office at the DHS, doubted that terrorists would ship contraband unaccompanied. Indeed, the DNDO also has been developing nuclear material detection technology to address the more likely smuggling scenarios of small aircraft, pleasure boat, or covert entry along the

mostly unguarded US frontier, he said.

In addition to portal monitoring, the DHS's Customs and Border Protection (CBP) agency prescreens containers it considers high risk at 58 ports abroad using large-scale x- and gamma-ray scanning equipment. As of late last year, 86% of maritime containerized cargo destined for US ports was subject to that prescreening, the agency said, although only a small fraction of those containers undergo actual inspection.

ABC News smuggling

The NRDC twice helped an ABC News team smuggle through customs a soda-can-sized piece of depleted uranium in cargo containers. CBP, which later confiscated the uranium and placed the NRDC's Cochran on an air travel watch list for several months, insisted that the monitors would have found the hidden uranium if it had been HEU. But the NRDC calculated that the same quantity of HEU, if shielded by a thin layer of lead and packed in the middle of a container, would present an equally faint radiation signal.

The more sophisticated portal monitors now being tested at the DNDO will have an equally difficult time finding HEU, Cochran and McKinzie said. The advanced spectroscopic portal (ASP) monitors are designed to detect both gamma rays and neutrons and discern the specific radiation signatures of nuclear materials. The new monitors are supposed to dramatically reduce the number of false alarms and delays at the ports. But tests to date have raised performance concerns, and the Government

Accountability Office has accused the DNDO of using "biased test methods that enhanced the test performance of the ASPs." (See *PHYSICS TODAY*, April 2008, page 32.) Certification of the ASP technology by DHS Secretary Michael Chertoff has been put off from last fall to this summer.

The DNDO's reaction

In a statement, the DNDO said the NRDC scientists' data "is either dated or incomplete" and that the office has "a prudent path forward" to ensure that the ASPs meet performance specifications. But in testimony before the House Committee on Homeland Security in March, DNDO director Oxford appeared to support some of the NRDC's assertions. On average, he said, the ASP did not significantly outperform the currently deployed detectors in tests and was no better at finding shielded materials. In some instances the radiation sources used in the tests had deliberately been shielded more heavily than called for in government specifications.

The DNDO is developing an active scanning system to address shielded nuclear materials in cargo. Known as the cargo advanced automated radiography system, it will be capable of probing containers for high-density materials, including lead shielding. A review of its preliminary design is scheduled for the fall of 2009.

The NRDC argued that reducing the threat posed by HEU will best be accomplished by taking the material out of circulation. The group's petition to the NRC urges an end to the licensing of all civilian HEU applications, save for temporary exceptions to allow a small number of US and Canadian reactors time to convert to low-enriched uranium. Though the NRDC admits the risk of HEU theft or diversion from North American facilities is small, the hope is that a US ban would signal to other nations, many of whose facilities are much less secure, that the problem is urgent.

Worldwide, scores of reactors and other critical facilities continue to be fueled with HEU; one expert, Matthew Bunn of Harvard University, estimated their number at 130. Although few of them have enough material on site to create an improvised nuclear bomb, some fuel fabrication facilities may have sufficient amounts. Bunn added that considerable amounts of irradiated HEU fuel aren't radioactive enough to deter theft by suicidal terrorists.

David Kramer