

Scorecard shows wide disparity in the security of world's weapons materials

No nuclear-armed states are judged to be among the best in their guarding of plutonium and highly enriched uranium from theft.

Of the 32 nations that are known or believed to have a kilogram or more of highly enriched uranium or plutonium, Australia provides the best set of procedures and policies to prevent theft, according to a recent report from the Nuclear Threat Initiative (NTI), a nonprofit nonproliferation advocacy organization. The US ties for 13th on the report's nuclear security index; Iran, Pakistan, and North Korea fall at the bottom.

The comparison of security conditions in countries possessing weapons-usable materials gives the UK, tied for 10th place, the highest marks among nations known or widely believed to possess nuclear weapons. The US is next, and France, tied at 19th, is third among the nuclear powers. Most other weapons states rank far down the list (see the table at right).

"We hope that this index will help individual countries as well as the international community to set priorities and to determine what steps must be taken to better secure the materials," said Sam Nunn, NTI cochair, CEO, and former US senator. "Nuclear terrorists will go where the material is most vulnerable. We have a global challenge, and we are in a race between cooperation and catastrophe."

Quantities skew results

The index is a weighted composite of five separate scorings: the quantity of weapons-usable material and the number of locations where it's kept; the security measures that are in place; the international commitments to materials security the state has made; the state's ability to fulfill its international commitments; and societal factors. The last item includes the extent to which corruption and governmental instability could undermine security measures. Pakistan and North Korea were judged to be particularly vulnerable to societal factors.

The US, which tied with Australia, Hungary, and the UK for first place on the stringency of measures it takes to protect its materials, would have ranked second overall were it not for the large quantities of materials it possesses and the number of locations

where they are kept. The US also lost points for its failure to ratify the Comprehensive Nuclear-Test-Ban Treaty.

Nunn said that the NTI hopes the index "will help shape the discussions" at the second Nuclear Security Summit, to be held this month in Seoul, South Korea. He noted that considerable progress has been made in securing weapons-usable materials around the world since President Obama hosted the first Nuclear Security Summit in Washington, DC, in 2010. To date, 19 countries and Taiwan have voluntarily given up all weapons-usable materials, Nunn noted. Still, he lamented the lack of a "shared consensus" among nations regarding nuclear security priorities. The NTI maintains that countries must be held accountable for their progress on security, which it says requires them to declare their inventories and subject themselves to international scrutiny from their peers.

Daryl Kimball, executive director of the Arms Control Association, says his nonprofit organization estimates that about 80% of the commitments made at the 2010 summit have been met. But, he adds, "The NTI index shows that even those that have fulfilled their Washington commitments haven't done everything necessary to secure nuclear materials."

Princeton University physicist Frank von Hippel, who cochairs the International Panel on Fissile Materials, calls the index "well done," saying that it could prompt some countries to tighten their controls. But although nongovernmental organizations may discuss the index in Seoul, von Hippel says, "My guess is that the national leaders will be too polite to do so." The panel advocates for the global minimization of weapons-usable materials.

A contradiction in terms?

The Institute for Defence Studies and Analyses, a nongovernmental Indian group funded by that nation's Ministry of Defence, was sharply critical of the index. In a commentary, institute researchers Ch. Viyyanna Sastry and Rajiv Nayan complained that the index's five categories were "a mix of the genuine and the arbitrary." The two

Countries with nuclear materials

Rank	Country	Nuclear security index
1	Australia	94
2	Hungary	89
3	Czech Republic	87
4	Switzerland	86
5	Austria	85
6	Netherlands	84
7	Sweden	83
8	Poland	82
8	Norway	82
10	Canada	79
10	Germany	79
10*	UK	79
13	Belgium	78
13*	US	78
15	Ukraine	76
16	Argentina	74
16	Belarus	74
16	Italy	74
19*	France	73
19	Mexico	73
19	South Africa	73
22	Kazakhstan	71
23	Japan	68
24*	Russia	65
25*	Israel	56
26	Uzbekistan	55
27*	China	52
28*	India	49
29	Vietnam	48
30	Iran	46
31*	Pakistan	41
32*	North Korea	37

*Known or believed to possess nuclear weapons.

questioned why countries possessing only 1 kg of fissile materials were ranked, when "in order to make a credible weapon, a minimum of 5 kg of plutonium or 25 kg of highly enriched uranium is required." None of the nations scoring among the top nine possessed more than small quantities of fissile materials, they noted. The pair also took issue with the importance the NTI index attached to public declarations and peer review; the Indian

government's position is that "transparency and nuclear security are mutually contradictory."

For his part, Nunn insisted that the NTI does not want information on security practices at individual locations to be made public. "But there is a lot of information that should be shared with the public," he said. He added that other governments will be inspired to act by such sharing.

There is no international organization responsible for monitoring the security of fissile materials, notes the NTI. The International Atomic Energy Agency's inspections can only detect whether materials are missing from civilian facilities or whether nuclear material has not been declared.

In developing the index, the NTI and its collaborator, the Economist Intelligence Unit (EIU), the business information arm of the *Economist* magazine, offered to share their findings with all 32 countries included in the report; all but North Korea, Iran, Belgium, and

Uzbekistan met with the index preparers. Belgium was briefed by phone. More than half of the 32 also validated to some extent the accuracy of the open-source data that was compiled by the EIU. The criteria for the study were chosen by the NTI, the EIU, and a panel of international experts.

The report also ranks the considerably larger cohort of nations that are believed to have less than 1 kg of fissile materials, rating them on their international and domestic nonproliferation commitments and their societal factors. More than 70% of the 144 countries in that category were judged to have high or very high levels of government corruption, which made them susceptible to use as a safe haven, staging ground, or transit point for illicit nuclear materials. The index did not assess the security of either low-enriched uranium or the highly radioactive materials that would be needed to make a radiological weapon, a so-called dirty bomb.

David Kramer

Is Japan ready to forgo nuclear reprocessing?

An international delegation of scientists visited Japan in an effort to persuade political leaders there to abandon the nation's civilian plutonium fuel-cycle program. The mid-January trip was organized by Princeton University professor Frank von Hippel, a long-time advocate of minimizing the world's inventory of nuclear weapons-usable materials. In an interview, von Hippel said that he and two colleagues met with Goshi Hosono, Japan's minister for the environment and for the restoration from and prevention of nuclear accidents, and, separately, with a dozen or so members of the Diet. Six of the lawmakers belonged to a caucus known as the DPJ Backend Study Group (DPJ stands for the governing Democratic Party of Japan). According to von Hippel and published reports, the 70-member study group has decided to oppose the further use of reprocessing in Japan.

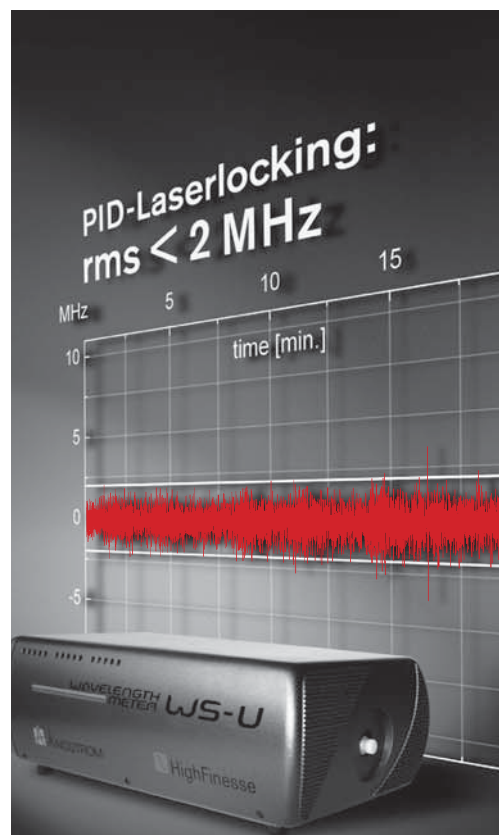
But von Hippel says it appears that the Japanese administration remains committed to the use of plutonium fuel. "The question is whether the politicians will go with the bureaucracy or with the population," which has become more antinuclear since last year's Fukushima disaster, he says. Japan is the only non-nuclear-weapons state to reprocess, although other countries, including the

Netherlands and Belgium, have their spent fuel reprocessed by France or the UK. All but a few of Japan's 50 reactors have been shut down since or prior to the Fukushima event.

The government of Aomori Prefecture, where the Rokkasho reprocessing plant is located, is eager to see revenues begin to flow from the plant, which has had its startup delayed repeatedly since 1997, von Hippel says. Several attempts to start up the plant in recent years, most recently in January, were suspended when problems were encountered in the process, known as vitrification, of converting high-level nuclear waste generated from reprocessing into a stable form for long-term storage. In the past the plant was troubled by leaks in its spent-fuel intake pools.

The Japan Atomic Energy Commission has estimated that it will cost ¥7.8 trillion (\$101.9 billion) and take from 2012 until 2051 to reprocess the 32 000 tons of spent fuel that Rokkasho was designed for. Rokkasho was built to replace a plant located at Tokai that reprocessed up to 100 tons of spent fuel per year. Tokai opened in the early 1970s and ended operations in 2006, but it is being kept in standby condition for R&D.

The International Panel on Fissile Materials, a nongovernmental organization cochaired by von Hippel,



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