

Building Momentum to Minimize HEU Use, Improve Nuclear Security and Combat Nuclear Terrorism

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Outline

- The threat posed by HEU:
 - nuclear terrorism & proliferation
- Progress towards a norm of HEU minimization to date
 - Policy measures and resulting progress at the national and international level
- The way forward: new approaches to further the norm of HEU minimization
 - HEU guidelines
 - Relevant stakeholder group resolutions
 - An HEU code of conduct

HEU & Nuclear Terrorism: Department of Homeland Security briefing

For an IND, an adversary requires three things:

1. A sufficient quantity of weapon usable nuclear material

We do not believe terrorists can enrich uranium or breed plutonium

2. A gun or implosion system design

- **The information is out there (so is misinformation)**

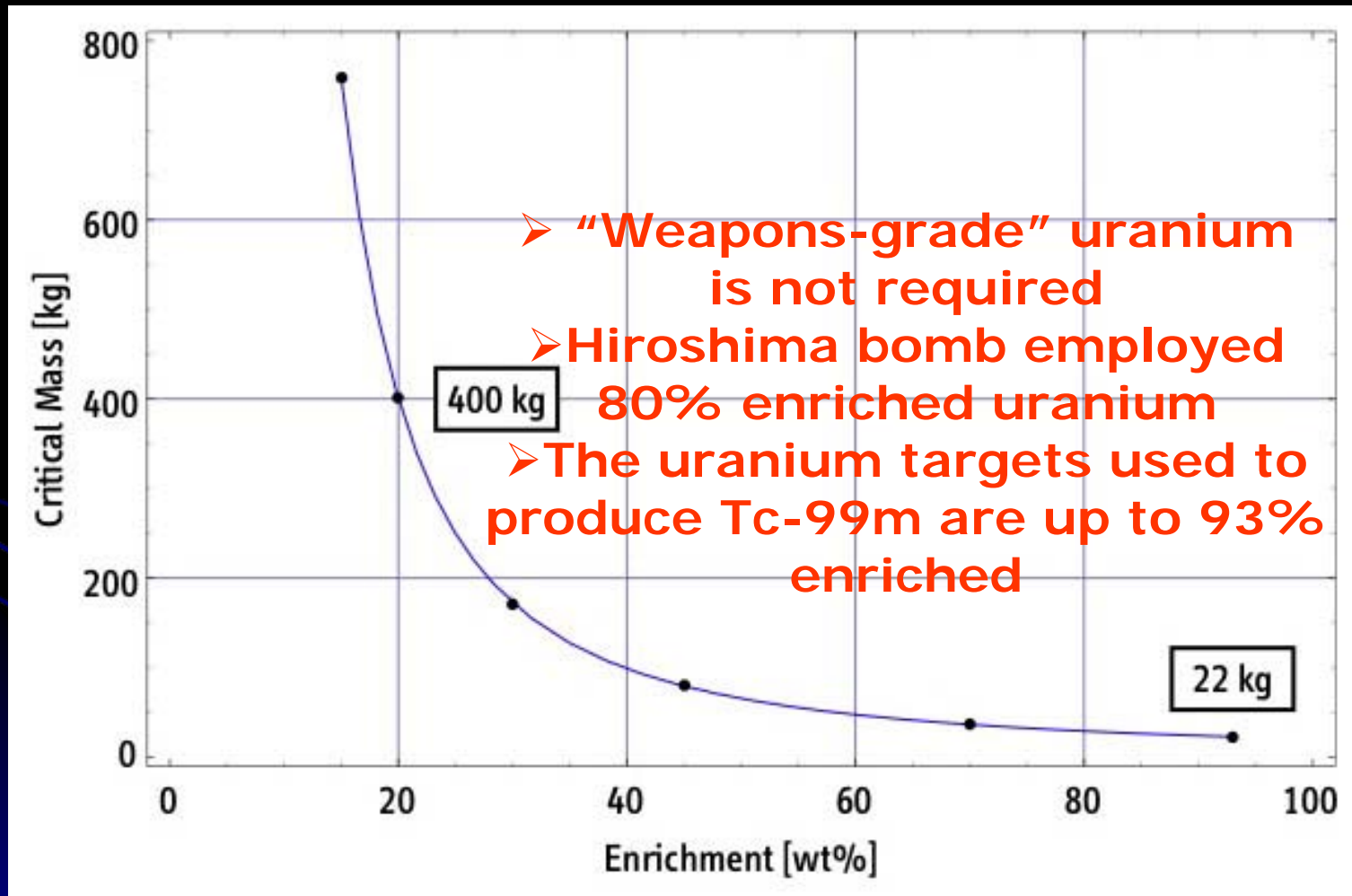
3. Construction

- **A small team of qualified individuals could probably do it, given technical expertise, operational capability**

Source: "Nuclear Smuggling," Department of Homeland Security Nuclear Assessment Program, http://www.exportcontrol.org/library/conferences/1379/005_Proliferation_Threat_Brief-Nuclear_Smuggling_-_Zachary_K.pdf

How Much HEU Is Needed?

Critical mass as function of uranium enrichment
(with a beryllium reflector)



HEU: also very useful for state nuclear weapons programs

- Does not require testing (South African and Pakistani devices)
- Civilian uses provide an excuse to have HEU
- HEU in civil use makes verification of an FM(C)T or disarmament harder

Progress towards a norm of HEU minimization to date (1)

- *Late 1970 policy shift:*
 - International Nuclear Fuel Cycle Evaluation (INFCE)
 - Reduced Enrichment for Research and Test Reactors (RERTR) Program (1978)
 - Soviet program to replace 80-90% enriched uranium fuel with 36% enriched fuel
- *1986:* U.S. NRC requires licensed (university and industry) reactors to convert (if DOE funds).
- *Technical problems:* In 1988 DOE stopped development of still higher density LEU fuels

POLICIES MATTER – AND ARE CRITICAL TO FINDING PRACTICAL SOLUTIONS

Portable Nuclear Power for Antarctica!

Designed to be shipped by air, this compact reactor will supply both heat and electricity for important scientific studies in the Antarctic. It will be built by Allis-Chalmers and installed at the Byrd Station, an inland base operated by the United States Navy.



The PM-3A reactor at McMurdo operated 1962-1972, no reactor was ever delivered to Byrd Station

Progress towards a norm of HEU minimization to date (2)

- **Political action:** In 1992 U.S. Congress passed the Schumer amendment, conditioning U.S. HEU exports on willingness to convert to LEU when fuel becomes available (1992). More funds dedicated to RERTR.
- **Technical reaction:** Development of higher-density fuels resumes (1995).
- **Politics continues:** Medical isotope producers exempted from Schumer requirement – 2005 Energy Act – BUT mandates National Academies study that finds conversion is “technically and economically feasible” (released Jan. 2009)



Unloading fuel from a research reactor, Chile.
<http://www.rertr.anl.gov>

Building an International Norm against HEU Use

The nonproliferation benefits of the conversion of civilian facilities from HEU to LEU have been recognized in a variety of international statements, including:

- International Fuel Cycle Nuclear Evaluation (INFCE) report, 1980
- 2000 NPT Review Conference Final Document
- Global Initiative to Combat Nuclear Terrorism Astana joint statement (2007)
- G-8 summits



NPT Review Conference

The need for a norm

Political decisions effect HEU use for decades into the future

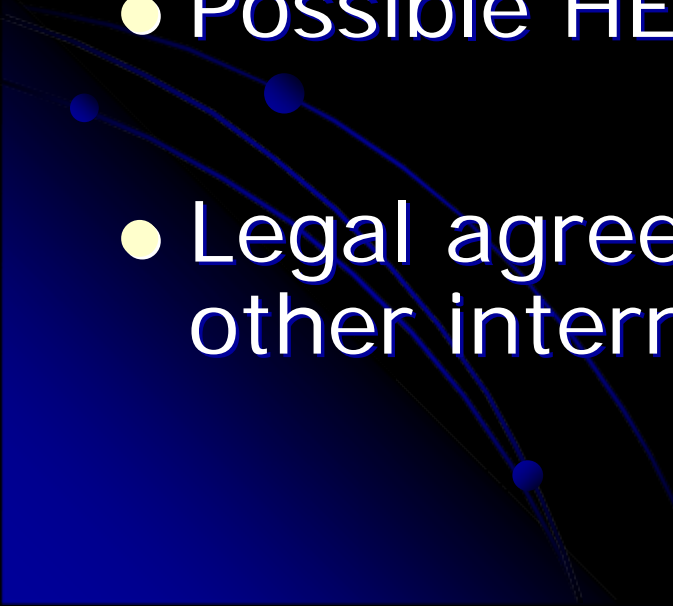
-- nothing prevents new facilities from using HEU

- Rosatom's Nikolai Arkhangelsky: If the decision on the use of LEU is taken early in the design stage, "serious problems for experimenters do not arise, and they will receive [the] facility which is required for them"
- "experience shows it is relatively easy to convince experimenters to agree to use of the LEU in the future reactor in spite of the fact that parameters of the reactor will be a little bit lower than at the use of HEU"



Germany's FRM2:
difficult to convert
after the fact

The path forward

- HEU guidelines
 - Medical resolutions
 - Possible HEU code of conduct
 - Legal agreements under the NPT or other international frameworks
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HEU Guidelines

Purpose:

- Like Pu Guidelines, a commitment to have a national strategy
- Unlike Pu Guidelines:
 - HEU minimization (where possible) & vehicle to engage new countries in minimization efforts
 - Increased attention to physical protection, risks posed by decrease in radioactivity of irradiated material (loss of "self-protection") over time
 - Less about increasing transparency

HEU Management Policies

Development of a published plan, showing how managers intend to:

- minimize proliferation risks and the risk of theft, with particular attention to fresh HEU in storage and transport, as well as any materials that are not “self-protecting”
- consolidate and minimize HEU holdings over time
- engage in international cooperation to develop alternative technologies and share research and other facilities

The Medical Community



June 2008: **Malaysian Medical Assn. resolution**

- “health professionals have a strategic opportunity and ethical obligation to close one of the most vulnerable pathways to a terrorist nuclear bomb by ending the use of HEU in the production of radiopharmaceuticals”



October 2008: **California Medical Assn. resolution**

- called for conversion to LEU as soon as possible & for radiopharmaceutical distributors and nuclear medicine departments to procure isotopes produced without HEU wherever possible.
- referred the matter for national action.



A similar resolution has been drafted for consideration at the next annual **World Health Assembly** meeting in May 2009.

An HEU Code of Conduct?

- explication of general standards, to be adopted on a voluntary basis by states, nuclear facilities, universities, companies, or other interested parties
- to spread knowledge and promote a norm, while increasing confidence that code adherents are indeed acting in accordance with top standards

Elements of an HEU code

- 1) a commitment to eliminate or to convert civilian HEU-fuelled installations to LEU fuels as soon as technically feasible and to encourage other parties to do the same;
 - 2) ending transfers of HEU except on an interim basis to facilities actively pursuing conversion to LEU;
 - 3) maintaining levels of physical protection, control and accounting concomitant with the risks (with reference to more concrete guidelines, should those be developed);
 - 4) promising to develop and maintain a strategy for the management of HEU, to ensure its safe and secure use, storage and eventual elimination.
- *Exact language should be developed by relevant experts, possibly through an IAEA technical workshop.*

Despite decades of progress, more action is needed

- Huge HEU stockpiles remain around the globe.
 - Terrorist groups may gain access to HEU.
 - States may hide military nuclear efforts under the guise of using HEU for research or other purposes.
 - *Short term actions:* increasing security. Clear standards are needed (enumerated in guidelines, a code, or by other means)
 - *Long term actions:* eliminating HEU wherever possible through conversion, development of alternative technologies, & consolidation of and remaining HEU at top-security sites.
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