U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration
Defense Nuclear Nonproliferation

Global Threat Reduction Initiative

GTRI'S Efforts to Accelerate the Establishment of a Medical Isotope Production Capability Without the Use of Highly Enriched Uranium

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Introduction

- Developing Non-HEU-Based Technologies to Enable Conversion of Global Medical Isotope Producers
- Accelerating the Establishment of U.S. Domestic Commercial Sources of Mo-99
- Update on Cooperative Agreements for Mo-99 Production
- The American Medical Isotope Production Act (H.R. 3276)

GTRI Program Goals

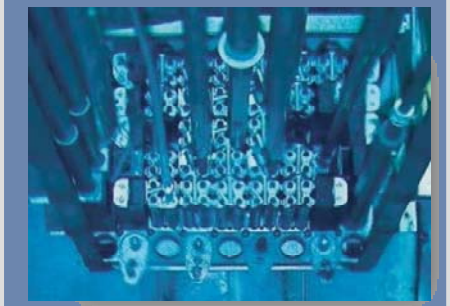
Mission

Reduce and protect vulnerable nuclear and radiological material located at civilian sites worldwide.

Goals

1. Convert
2. Remove
3. Protect

Convert



Convert research reactors and isotope production facilities from the use of highly enriched uranium (HEU) to low enriched uranium (LEU)

These efforts result in permanent threat reduction by minimizing and, to the extent possible, eliminating the need for HEU in civilian applications – each reactor converted or shut down eliminates a source of bomb material.

Remove

Remove and dispose of excess nuclear and radiological materials.

These efforts result in permanent threat reduction by eliminating bomb material at civilian sites – each kilogram or curie of this dangerous material that is removed reduces the risk of a terrorist bomb.

Protect

Protect high priority nuclear and radiological materials from theft and sabotage

These efforts result in threat reduction by improving security on the bomb material remaining at civilian sites – each vulnerable building that is protected reduces the risk until a permanent threat reduction solution can be implemented.

GTRI Supports International Commitments to Eliminate the use of HEU in Isotope Production

Nuclear Security Summit– April 13, 2010

"Participating States, as appropriate, will collaborate to research and develop new technologies that require neither highly enriched uranium fuels for reactor operation nor highly enriched uranium targets for producing medical or other isotopes, and will encourage the use of low enriched uranium and other proliferation-resistant technologies and fuels in various commercial applications such as isotope production;"

UN Security Council Resolution 1887 – September 24, 2009

"Calls upon all States to manage responsibly and minimize to the greatest extent that is technically and economically feasible the use of highly enriched uranium for civilian purposes, including by working to convert research reactors and radioisotope production processes to the use of low enriched uranium fuels and targets;"

Obama-Medvedev Moscow Joint Statement – July 6, 2009

"…we declare an intent to broaden and deepen long-term cooperation to further increase the level of security of nuclear facilities around the world, including through minimization of the use of highly-enriched uranium in civilian applications and through consolidation and conversion of nuclear materials."

President Obama's Speech in Prague – April 5, 2009

"Today, I am announcing a new international effort to secure all vulnerable nuclear material around the world within four years. We will set new standards, expand our cooperation with Russia, and pursue new partnerships to lock down these sensitive materials."

Summary

To ensure that current efforts to secure vulnerable nuclear materials around the world will not need to be repeated in the future due to the continued use of HEU to produce medical isotopes, *it is important that all new or expanded long-term Mo-99 production is undertaken without HEU*.

For our part, the U.S. provides assistance to convert global isotope producers to LEU, and is accelerating efforts to develop medical isotope production in the United States that does not require the use of HEU.

Nuclear Security Summit
Washington, 2010

United Nations
Security Council
SC/9746

GTRI Medical Isotope Production Efforts

- Molybdenum-99 (Mo-99) is a radioisotope used in 50,000 medical diagnostic tests *per day* in the U.S.
- Its shelf life is short (66 hours) and it therefore cannot be stockpiled.
- It is produced in commercial quantities by 5 reactor facilities and 4 processing facilities worldwide.
  - 2 of the 5 research reactors use HEU fuel.
  - ***3 of the 4 processing facilities use HEU targets to produce Mo-99 and the 4th (South Africa) is in the process of converting to LEU***
- The waste contains HEU and is a proliferation risk.
- U.S. demand is approximately 50% of the world market demand.
  - There are chronic shortages due to dependency on aging reactors
  - Efforts to convert Mo-99 production to LEU have been slow

GTRI Medical Isotope Production Efforts

International Efforts

- GTRI is working with international producers to provide technical assistance to convert facilities to non-HEU based production
- GTRI provided South Africa support toward the conversion of their commercial-scale Mo-99 production from HEU to LEU targets. South Africa achieved the world's first large-scale production of Mo-99 with LEU targets in July 2010, and received approval for use of the LEU-based Mo-99 in the United States in September 2010.
- GTRI sponsors projects through bilateral assistance and through the IAEA to assist countries in the conversion of Mo-99 processes to LEU targets.
- OECD-NEA-HLGMR

Domestic Efforts

- OSTP/IAWG
- GTRI is supporting the U.S. private sector to accelerate the establishment of a reliable commercial Mo-99 production capability in the United States without the use of HEU by pursing four technology pathways.
- The goal is to accelerate existing commercial projects to be successful by the end of 2013.
- This effort is in alignment with proposed legislation sponsored by Congressmen Markey and Upton.

Accelerating the Establishment of U.S. Domestic Commercial Sources of Mo-99

- GTRI has worked for years to develop LEU technologies to convert global Mo-99 producers to LEU under our HEU minimization objective.
- After the recent shutdowns of the major global producers, GTRI was tasked to accelerate the establishment of a reliable, domestic, commercial supply of this critical medical isotope without the use of HEU.
- In cooperation with U.S. commercial entities and the U.S. national laboratories, GTRI is demonstrating the viability of four non-HEU-based technology pathways for large-scale Mo-99 production:
  - LEU Target Technology
  - LEU Solution Reactor Technology
  - Accelerator Technology
  - Neutron Capture Technology
- The goal of GTRI's projects is to accelerate existing commercial projects to produce non-HEU-based Mo-99 in the United States by the end of 2013. GTRI expects the projects will produce enough Mo-99 to meet U.S. patient needs years earlier than would otherwise have been achieved without federal support.
- NNSA has awarded Cooperative Agreements, to Babcock and Wilcox for solution reactor technology, General Electric-Hitachi for neutron capture technology, and to NorthStar and Morgridge for accelerator technology, to begin the demonstration of these technologies.

The American Medical Isotopes Production Act (H.R. 3276)

- Introduced by U.S. Representative Edward J. Markey, Chairman of the House Energy and Commerce Committee Subcommittee on Energy and the Environment, and Representative Fred Upton, the Ranking Member of the Subcommittee, on July 21, 2009.
  - The full House passed its version on November 5, 2009.
  - No vote is currently scheduled in the Senate.

- Directs the DOE to establish a technology-neutral program:
  - To evaluate and support projects for the production in the United States, without the use of highly enriched uranium, of significant quantities of Mo-99, and
  - To be carried out in cooperation with non-Federal entities.

- Directs DOE to establish a program to make LEU available, through lease contracts, for Mo-99 production and retain responsibility for the final disposition of waste created by the irradiation, processing, or purification of leased uranium.

- Conditions and phases out the export of HEU in 7-13 years.

- NNSA supports H.R. 3276 because it recognizes the urgency of two important national priorities: nuclear nonproliferation and stability of the supply of medical isotopes for Americans.

Conclusion

- The current global Mo-99 supply infrastructure is fragile and aging. The United States needs a reliable domestic Mo-99 supply that is consistent with U.S. nuclear nonproliferation policy.
- NNSA is supporting the U.S. private sector to accelerate the establishment of a reliable commercial Mo-99 production capability in the United States without the use of HEU.
- These projects are expected to meet at least 100% of U.S. patient needs by the end of 2013.
- The aggressive schedule to production requires high-level political support in order to overcome barriers to meet U.S. patient needs as quickly as possible.
- H.R. 3276 would give DOE long-term authorization of funding and high-level political visibility to help the important objective to meet this critical infrastructure need.