Testimony before the Senate Committee on Energy & Natural Resources

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Tuesday, February 1, 2011

Chairman Bingaman, Ranking Member Murkowski, and Committee Members, thank you for the opportunity to testify about the National Nuclear Security Administration's (NNSA's) support for accelerating development of a domestic commercial supply of Molybdenum-99 (Mo-99) without using highly enriched uranium (HEU). This effort is part of our larger global nonproliferation program to minimize and, where possible, eliminate the use of HEU in civilian nuclear applications, including in the production of medical radioisotopes. My testimony will update you on testimony provided to this committee in December 2009 about (1) the nonproliferation and medical benefits of S.99, the *American Medical Isotopes Production Act of 2011;* (2) the NNSA's progress to accelerate the establishment of a non-HEU based domestic commercial supply of Mo-99; and (3) changing global market conditions that could undermine our efforts for a reliable domestic production of non-HEU-based Mo-99.

Mo-99 is the parent isotope of Technetium-99m, which is used in approximately 50,000 diagnostic medical procedures every day in the United States. It has a very short half life and therefore must be produced on a continuous basis to meet the needs of the medical community. Any interruptions in production can place patients at risk if diagnostic tests cannot be performed.

Currently, the United States depends entirely on foreign producers for all of its Mo-99. Of the major international suppliers of commercial Mo-99, Canada, the Netherlands, and Belgium use HEU targets to produce this vital medical isotope. Only South Africa, which partnered with NNSA to convert its HEU reactor to low enriched uranium (LEU) fuel, has begun LEU-based Mo-99 production.

Mo-99 production processes based on HEU utilize nuclear material enriched to the same degree as nuclear material used to produce nuclear weapons and improvised nuclear devices. World leaders at the 2010 Nuclear Security Summit and other fora underscored the need to minimize and, where possible, eliminate the use of HEU due to the grave threats posed by excess nuclear materials and the possible acquisition of such materials by terrorists or rogue states. New technical advances in Mo-99 production processes, many of which have been supported by the U.S. Department of Energy and NNSA working closely with industry and our national laboratories, are demonstrating that HEU is no longer required. S. 99, the *American Medical Isotopes Production Act of 2011* will encourage Mo-99 suppliers worldwide not to use HEU and to develop a reliable supply of Mo-99 for the U.S. medical community. Provisions of this legislation, in particular Section 5, are aligned with the NNSA's nonproliferation mission to assist in the conversion of research reactors and isotope production facilities worldwide from the use of HEU to LEU, and to establish a reliable supply of Mo-99 produced without the use of HEU in the United States.

Furthermore, the HEU-free, U.S.-based Mo-99 production encouraged by the *American Medical Isotopes Production Act of 2011* would serve as an example for eliminating HEU in the global medical isotope business. The proposed legislation will promote the reliable supply of Mo-99 to

hospitals throughout our country and will ultimately ensure the level of patient care that our citizens require in a way that is consistent with our nuclear nonproliferation goals.

As has been the case in 2009-2010, global Mo-99 shortages can occur with any change in the production schedules of the major producers. Unforeseen shutdowns due to technical problems or scheduled maintenance of the aging reactors currently producing Mo-99 can threaten the fragile supply chain for the much needed medical isotopes. Under the leadership of the Office of Science and Technology Policy of the Executive Office of the President, an Interagency working group, which includes NNSA and other Department of Energy offices, is pursuing the following actions: (1) investigating options to focus on near-term efforts to increase the supply to the U.S. during periods when the major suppliers will be out of operation; (2) coordinating efforts to maximize the success of the commercial sector to develop new longer-term production capabilities for the U.S. medical community; and (3) working with representatives of the medical community to ensure communication about the timing of scheduled maintenance to more efficiently manage use of available Mo-99 supplies.

NNSA frequently meets with the existing major global Mo-99 producers as part of its nuclear nonproliferation agenda to promote the development of a long-term reliable supply of Mo-99 using LEU. NNSA's programs can also assist other countries with conversion, where possible. For example, with NNSA's support, the South African Nuclear Energy Corporation (Necsa) became the first major supplier to produce large-scale quantities of LEU-based Mo-99, and completed its first shipment of FDA-approved, LEU-based Mo-99 to the United States in December 2010. Necsa's achievement to produce large-scale quantities of LEU-based Mo-99 is an important nonproliferation advance as it demonstrates the technical viability of producing

Mo-99 consistent with international commitments to minimize and eliminate the use of HEU in isotope production. With appropriate Congressional support, the long-term goal of steady state production from LEU could be achieved globally, and could thus provide a complementary, consistent supply of the medical isotope to health care providers.

The 2009 National Academies report confirmed that production of Mo-99 is both technically and economically feasible, and as a result, NNSA is demonstrating the feasibility of non-HEU based Mo-99 production by working with four commercial entities to develop technology pathways to produce adequate quantities of Mo-99 for the United States. These include: LEU solution reactor technology; neutron capture technology; and accelerator technology. The strategy is to move away from reliance on a sole technology and a limited number of facilities, as is the case with the global Mo-99 market today. The goal is for each technology to be commercially successful, and therefore NNSA's approach is technology neutral. NNSA also makes available to these commercial partners the technical expertise of the U.S. national laboratories gained from their many years of work to develop non-HEU based Mo-99 production technologies. We share the goals of this bill and look forward to working with you to ensure the accomplishment of nuclear threat reduction activities and the development of a reliable supply of medical isotopes to the public, while ensuring greater Presidential flexibility.

Despite the good progress, challenges remain that could obstruct the successful and accelerated establishment of a domestic supply of Mo-99. First, the major global producers have been and continue to be heavily subsidized by their governments. Such subsidies put at risk the economic viability of U.S. companies starting up high-tech, capital intensive businesses to produce non-HEU based Mo-99. A 2010 independent economic study by the Organization for Economic

Cooperation and Development's Nuclear Energy Agency entitled "An Economic Study of the Molybdenum-99 Supply Chain", underscores this issue by citing that long-term subsidies have damaged industry's attempts to enter the global Mo-99 market. To provide a level playing field for U.S. companies, meet nonproliferation goals, and build a non-HEU based industry for Mo-99, there must be a concerted global commitment that all new or expanded long-term Mo-99 production be undertaken without HEU. Very importantly, we must achieve full cost recovery across the entire global commercial industry. Any foreign government subsidy of HEU-based production puts the objectives of this legislation at risk.

We have significant concerns about the scope, costs, and other implications of Section 2(c), the "Uranium Lease and Take Back" provision. In addition, the proposed program could risk lengthening the timeframe to Mo-99 production if the schedule of implementing the proposed "Uranium Lease and Take Back" subprogram were to have any linkage to the expected production schedule of the commercial projects to produce Mo-99.

NNSA will use its existing, well-established program management and procurement oversight tools to ensure that the innovative non-HEU based technologies it supports are developed on schedule and that cost-shared funds are properly applied so that Mo-99 is delivered to the U.S. market on time and within anticipated costs. NNSA will also coordinate closely with the Nuclear Regulatory Commission and the Food and Drug Administration on regulatory issues associated with the commercial use of new technology.

To summarize, the Department of Energy and NNSA believe that, overall, this legislation will be helpful in providing public visibility to critical nonproliferation goals and to equally critical

medical needs. With clear commitment and sustained support, we can secure our citizens' health needs as well as their national security. I thank Senator Bingaman, Ranking Member Murkowski, and Members of the Committee for your continued leadership in supporting this legislation and we look forward to working with you to address any issues raised here today. I appreciate the opportunity to testify and am ready to answer your questions.