STATEMENT OF

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Thank you Mr. Chairman, Ranking Member Inglis, and Members of the Committee. I appreciate the opportunity to appear before you to provide testimony on the DOE Office of Science's Isotope Development and Production for Research and Applications program within the Office of Nuclear Physics. The Isotope Program was transferred from the Office of Nuclear Energy to the Office of Nuclear Physics within the Office of Science in March 2009, and, specifically, to the Nuclear Physics Facilities and Project Management Division. I have served as the Director of the Division since 2004, and I am pleased to share with you my perspectives on the DOE Isotope Program.

Overview of the Program

For over 50 years, this program and its predecessors have been at the forefront of the development and production of stable and radioactive isotope products and related services that are used worldwide. The Office of Science recognizes that isotopes are high-priority commodities of strategic importance for the Nation and essential for energy, medicine, commerce, national security, and scientific research. A goal of the program is to make critical isotopes more readily available to meet domestic needs. The program produces isotopes only where there is no U.S. private sector capability or when other production capacity is insufficient to meet U.S. needs. Isotope production for commercial distribution and application is done on a full-cost recovery basis.

The Isotope Program has unique expertise and capabilities to address technology issues associated with the production, processing, handling, and distribution of isotopes. The expertise of the nuclear science community in operating accelerator facilities and developing instrumentation and accelerator technology for a broad suite of applications complements the expertise of the isotope production community, and we expect the synergies between the communities to lead to an overall improvement in the productivity of the Isotope Program.

Isotopes are needed for a broad range of basic research, biomedical, homeland security, and industrial applications that benefit society every day. For example, americium-241

for smoke detectors; helium-3 for neutron detectors and lung imaging; nickel-63 for explosive detection; strontium-82 is used in heart imaging, tungsten-188 and rhenium-188 for cancer research; californium-252 for oil exploration; and arsenic-73 as a tracer for arsenic studies. With Federal support over the last several decades, isotopes have had a profound impact on daily life, scientific discovery and innovation, and the Nation's economy, including reduced health care costs, improved medical diagnoses, and advances in agriculture and basic physics research and in national security. The Isotope Program supports both production capabilities at a suite of facilities and research and development efforts associated with improving and developing isotope production and processing techniques.

The facilities used by the Isotope Program to produce radioisotopes include particle accelerators, hot cells, and reactors. Radioisotopes provided through the Program are produced in reactors by neutron absorption followed by radioactive decay or are produced in accelerators by bombarding materials with charged atomic particles followed by radioactive decay. Some isotopes provided by the Program are obtained by extraction from the waste byproducts of the Department's weapons programs and research activities. The Isotope Program is the steward of the Isotope Production Facility (IPF) at Los Alamos National Laboratory (LANL), the Brookhaven Linear Isotope Producer (BLIP) facility at Brookhaven National Laboratory (BNL), and isotope processing facilities at Oak Ridge National Laboratory (ORNL), BNL, and LANL. The IPF is completely dependent on the operations of the Los Alamos Neutron Science Center (LANSCE) facility.

The Isotope Program also produces isotopes at facilities where it is not the steward—in this case, the program pays for space and services at those facilities. The Isotope Program purchases irradiation services at the High Flux Isotope Reactor at ORNL, a research reactor with a neutron scattering mission operated by the Office of Science Basic Energy Sciences program, to produce selected isotopes such as Cf-252. In addition, the Isotope Program seeks cooperative isotope supply agreements with other government, private sector, and university isotope producers.

The Isotope Program is also the steward of the National Isotope Data Center (NIDC) at ORNL. The NIDC coordinates isotope production across many facilities and manages business operations for the sale and distribution of isotopes. The NIDC also supports over 50 staff members at LANL, BNL, and ORNL who provide the technical expertise for research, production, processing, and transportation of isotopes, which are then processed, sold, and distributed from ORNL.

While the research activities supported by the Isotope Program are modest, they provide important results. R&D includes target fabrication, enhanced processing techniques, radiochemistry, material conversions, and other related activities. It should be emphasized that the research activities supported by the Isotope Program are focused on isotope production and processing techniques to assure their availability for research and applications, not on their actual end-use applications, which is the mission of other programs and Federal Agencies.

Further, the Isotope Program does not produce special nuclear material or deal in highly-enriched uranium, areas which serve as sources in the production of several important isotopes. So, while the Isotope Program is not responsible for producing such isotopes, it does work cooperatively with the responsible Department offices to provide services, technical advice, or R&D on potential alternative production techniques. For example, as a service, the Isotope Program sells and distributes isotope products like helium-3 (He-3) and lithium-6, which are produced by the DOE/National Nuclear Security Administration (NNSA). But, the challenge associated with producing He-3 is that it is a byproduct of tritium decay; and the availability of tritium is determined by NNSA mission needs, not by a commercial demand for He-3.

Similarly, the DOE Office of Environmental Management is responsible for disposition of excess uranium-233 stockpiles. Though uranium-233's decay products, alpha-emitting radioisotopes are in demand by the research community. Uranium-233's proliferation and national security concerns support continued disposition, thus limiting its availability. To address this dilemma, the Isotope Program is pursuing R&D on alternative isotope production techniques for these alpha-emitters as a high priority, with the goal of decreasing dependence on uranium-233 sources.

Other needed isotopes under various DOE Program Offices include the production of Plutonium-238, for which DOE's Office of Nuclear Energy has mission responsibility to support activities such as the fabrication of radioisotope thermoelectric generators for NASA's deep space program, and the production of Molybdenum-99 (Mo-99), a mission responsibility of NNSA. Mo-99, a commercial isotope used extensively in medical diagnosis, is currently in short supply. NNSA is responsible for establishing a diverse domestic supply of Mo-99 as part of their mission to minimize the use of Highly-Enriched-Uranium to avoid proliferation concerns. Today, the Isotope Program and the Department are actively engaged in interagency and international discussions on how to address the current shortage.

Recent Activities

Operations of the current isotope production facilities are being assessed to ensure that resources are being utilized optimally. The Isotope Program is in the process of increasing the suite of production facilities that will provide isotopes, with consideration given to the capabilities of universities, commercial facilities, and other government facilities. The research component of the Isotope Program will be strengthened, and research and development efforts associated with improving the effectiveness of or creating new approaches to isotope production will be pursued. Research isotope production will be prioritized, based on community input; the overall goal will be to produce research isotopes more reliably and at more affordable prices. Additional cooperative agreements with the commercial sector will be pursued to leverage resources. Sound planning processes and merit-based peer review will guide the Program's production decisions and strategic planning.

In August 2008, the Nuclear Science Advisory Committee (NSAC), a Federally-chartered advisory committee to the DOE and the National Science Foundation, was charged to

develop a prioritized list of research topics across a wide range of scientific disciplines, including the medical field. NSAC was also asked to develop a long-range strategic plan for future production of stable and radioactive isotopes. The Isotope Program also issued a call to universities, national laboratories, and commercial facilities for proposals to produce high-priority research isotopes.

The Office of Nuclear Physics is engaged in discussions with other Federal Agencies concerning isotope needs and production. A working group with the National Institutes of Health (NIH) was established to address the recommendations of the recent National Academies report *Advancing Nuclear Medicine through Innovation*, which identified areas of isotope production warranting attention. A strategic plan was generated that identifies the isotopes and quantities needed by the medical community for the next five years, in the context of the Isotope Program capabilities. The Office of Nuclear Physics also is represented on several interagency working groups considering the production of Mo-99 in order to enhance communication within the Department and with other Federal agencies and to provide technical support in development of short-term and long-term solutions. The Office also facilitated the formation of a federal working group on the He-3 supply issue involving staff from the Office of Nuclear Physics, NNSA, the Department of Homeland Security, and the Department of Defense. This working group will help ensure that the limited supply of He-3 will be distributed to the highest-priority applications and basic research.

Recovery Act Support

Funds from the Recovery Act are supporting an R&D initiative on alternative and innovative approaches for the development and production of critical isotopes and for the improved utilization of isotope production facilities. This includes additional operations for the production of isotopes, one-time investments to improve the efficiency of or provide new capabilities for the production of isotopes at existing production facilities, and opportunities to establish production capabilities at new production sites based on peer review of the proposals received from the open call mentioned above.

Concluding Remarks

The Office of Nuclear Physics (NP) is committed to increasing availability of isotopes in short supply, providing isotopes reliably and at more affordable prices to researchers, and supporting research activities that develop more cost-effective and novel isotope production techniques. NP will utilize merit peer review and priority setting mechanisms to optimize the productivity of the Isotope Program within available resources.

Thank you, Mr. Chairman and Members of the Committee, for providing this opportunity to discuss the Isotope Development and Production for Research and Applications program. I'm happy to answer any questions you may have.