Opening Remarks by Dr. Raymond L. Orbach
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Workshop on *The Nation's Need for Isotopes: Present and Future*
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Good morning. It is a pleasure to welcome all of you to the U.S. Department of Energy's Workshop on the Nation's Need for Isotopes: Present and Future.

As many of you know, the Department of Energy's role in supplying isotopes to the Nation and to the world dates back to 1946 and the creation of the Atomic Energy Commission. Following the conclusion of the Manhattan Project in the 1940s, it was recognized that the Calutrons built to separate uranium could separate isotopes of nearly every element in the periodic table. Over the next several decades, until the early 1990s, these devices separated hundreds of kilograms of stable elements for a diverse array of applications. The stockpile of separated stable isotopes we have and utilize today is due to that effort. In an article in Physics Today in May 2005, William E. Parkins wrote "The development and use of the Calutron to produce enriched uranium for the first atomic bomb that was exploded in warfare, and then to produce the full spectrum of separated isotopes for uses in peacetime, is the greatest example of beating swords into plowshares in the history of human kind. For its contribution in both wartime and peacetime, the physics profession can be proud."

The radioisotope technicium-99, used in approximately 85 percent of diagnostic imaging procedures in nuclear medicine, had its beginnings with the discovery by Walter Tucker and Margaret Greene at Brookhaven National Laboratory in the 1950s that it was produced in the decay of its parent, molybdenum-99. The first molybdenum-99/technetium-99 generator was developed by Tucker and Greene a short time later. In 1960, Powell Richards, then in charge of radioisotope production at Brookhaven, suggested the use of technetium as a medical tracer at a physics symposium in Rome. The very next year the first generator produced at Brookhaven was used to make blood flow measurements in patients.

Over the past 50 years DOE has played a central role in linking government investments in isotope production capabilities and development of new stable and radioactive isotopes. This has led to advances in medicine, basic research in the physical and life sciences, industrial, agriculture, and environmental applications, defense technologies, and national security.

This workshop is an occasion to bring together a diverse group of stakeholders, users and producers of isotopes, to participate in a process that will inform the Department's future directions to meet the Nation's isotope needs as called for by Rivard et. al. in their 2005 article in *Applied Radiation and Isotopes*. Over 18 Federal departments and agencies, 17 academic institutions, 8 national laboratories and 14 private industries and companies are represented here today.

With the FY 2009 President's Budget Request to Congress, the Department of Energy proposed to move the DOE Isotope Program currently in the Office of Nuclear Energy to the Office of Nuclear Physics within the Department's Office of Science. Under the Office of Nuclear Physics the isotope program will be entitled "Isotope Production and Applications." And along with the transfer of the program, the Department has requested an additional $3.2 million specifically for development and production of research isotopes. The response we have received from Congress is encouraging.

You may have asked yourselves, "Why make this transfer?" One reason is that the Department recognizes one of the primary responsibilities of the isotope program is the production of stable and radioactive isotopes for the research and development of new applications. Support in this area has been neglected in recent years. Transferring the program to the Office of Science, Office of Nuclear Physics will better position the program to address the isotope needs of the research community, while continuing to provide isotopes for commercial applications.

The Office of Nuclear Physics has expertise and a strong history in operating facilities and developing technologies that are relevant to the production of stable and radioactive isotopes. It also has a strong track record for successfully managing research programs, and working with the research community and other Federal agencies.

The Program fully intends to honor current contracts with its customers for commercial isotopes during the transition. Moving forward, the production of isotopes for commercial applications will continue to be conducted with full cost recovery by the consumer. This part of the program will remain self-supporting. The Office of Science intends to take advantage of the Department's current authorities to make available isotopes that will encourage and stimulate promising areas of research at a price that provides a reasonable compensation to the government.

The budget and production capabilities of the DOE Isotope Program are modest compared to the Nation's needs and interests for isotopes. And those interests have grown in recent years for both commercial and research isotopes. This presents great challenges to our current capabilities. For example, there are over 20 million procedures performed in the U.S. annually that use radiopharmaceuticals and radiotracers. Not only is the nation challenged to meet the isotope needs for these procedures, we have not been able to meet the demand for newly produced isotopes for innovative research in nuclear medicine imaging and diagnosis and targeted therapies. Actinium-225 and Copper-67 are examples of some of the radioistopes that have shown promise for cancer therapies.

Industrial applications for isotopes have also grown in areas such as instruments for analysis and characterization of materials and environments, sealed samples for irradiation applications including sterilization of medical supplies and pharmaceutical and food packaging, and for processes like cross-linking in the development of materials. Cobalt-60 is widely used for these purposes. Application for technologies needed to meet national security requirements has also increased the demand for a number of isotopes, such as Nickel-63.

The demand for Californium-252 for applications such as online analyzers for optimizing coal-fired power plants and other production facilities, treatments for certain cancers that are not responsive to other radiation therapies, oil exploration, and radiography of aircraft to detect metal fatigue, is yet another example.

This increased interest and demand for a broad spectrum of isotopes has come at a time when traditional sources and foreign sources are decreasing or becoming less reliable. Cobalt-60 and Moly-99 are examples. Proliferation and other national security concerns associated with some isotopes have also restricted their availability for applications that would have broad benefits to society. The reactor-produced isotopes that require a year or more of irradiation to produce adds an additional challenge to making those isotopes available to meet demand in a timely manner.

We are also challenged by our country's current infrastructure and the cost of producing isotopes, particularly isotopes in small quantities for research purposes. There is no dedicated domestic facility for the production of research isotopes at affordable prices to researchers. There are currently no dedicated commercial isotope-producing reactors in the United States. And no isotope-producing reactors owned and operated by private industry. The reactors at the Department of Energy's facilities and at one university, the University of Missouri, are the main sources of reactor-produced isotopes in the U.S. Because of the Nation's limited capabilities we rely heavily on foreign sources of isotopes: Moly-99 for Technetium is a good example. In some cases relying on foreign sources may put us in a very vulnerable position. The un-planned outage at Canada's Chalk River reactor last fall showed us just how vulnerable we can be. The Chalk River reactor provides the majority of the Moly-99 for medical applications in the U.S. In November the aging reactor was closed for maintenance but remained closed beyond its scheduled downtime. This prolonged closure led to shortages for the isotope across the United States and Canada. To replace its aging reactor Canada built two new reactors, but serious design flaws and cost increases led to a decision in May of this year to end the development of the reactors.

The coordination between DOE and other federal agencies, universities, and private industry needs to be strengthened if we are going to tackle these challenges in a meaningful way. That is why all of you are here today. Each of you has your own interests or represents the interests of your communities. It's important that we understand your interests. And it is equally important that everyone appreciates the needs and interests of the other users and producers.

As the isotope program moves forward under the Office of Nuclear Physics, it will need to develop priorities for research isotopes and isotopes for commercial applications, along with priorities for existing and future capabilities. Your input, and guidance from the federal Nuclear Science Advisory Committee, will help inform these priorities. We are looking forward to the results of your working groups that will meet over the next three days.

I thank Dr. Jehanne Simon-Gillo, Acting Associate Director of the Office of Science for Nuclear Physics for her leadership in preparing to assume responsibility for the DOE Isotope Program and to reposition the program to better meet the needs of the community. I also want to thank John Pantaleo, who has been the program manager for the DOE Isotope Program for 17 years, for his dedication to managing the program and for his willingness to join the Office of Nuclear Physics when the program is transferred.

And I want to thank each of you for taking the time to be here today, and for providing your valuable input on current and future isotope needs, and the capabilities and options for meeting these needs. I hope this workshop marks the beginning of an ongoing dialogue, a strategy for future success, and a stronger collaboration between DOE, other federal agencies, academia, and private industry. Thank you.