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Dr. Patricia M. Dehmer
Acting Director
Office of Science
U. S. Department of Energy
1000 Independence Avenue
Washington, D.C. 20583

Dr. F. Fleming Crim
Assistant Director
Directorate of Mathematical and Physical Sciences
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Dear Drs. Dehmer and Crim:

In a letter from your offices dated March 10, 2015, the Nuclear Science Advisory Committee (NSAC) was asked to conduct its annual assessment of the National Nuclear Security Administration's Office of Material Management and Minimization (NNSA-M^3) Domestic Molybdenum-99 (Mo-99) Program.

The charge was taken up by the NSAC standing Subcommittee on Mo-99 Production chaired by Dr. Susan Seestrom of Los Alamos National Laboratory. This subcommittee presented its report to NSAC at a meeting on July 16, 2015. Following comments from NSAC, a revised report was distributed to NSAC on July 27, 2015 and NSAC accepted it unanimously. A copy of the report is enclosed with this letter.

Mo-99 is used to produce the Technetium-99 isomer (Tc-99m), which is the most widely used isotope in diagnostic nuclear imaging procedures. As such, its availability is of great concern to the medical community and the general public. Present technology relies heavily on recovering Mo-99 from the irradiation of highly enriched uranium (HEU) targets at facilities outside the United States. The NNSA-M^3 program works with the international producers to convert isotope production from the use of HEU targets to low enriched uranium targets without negatively impacting the Mo-99 supply. The National Defense Authorization Act for FY2013 also directs the program to " ... support projects for the production in the United States, without the use of highly enriched uranium, of significant quantities of molybdenum-99 for medical users."

As defined by the charge, the Subcommittee once again focused on reviewing the goals and processes of the M^3 program for establishing domestic production of Mo-99 and their approach to managing risk. However since the anticipated need and viability of domestic production capability depends on the worldwide competition and production capacity, particularly in the context of the efforts to reduce both the use of highly enriched uranium and the effects of subsidization of facility construction and operation on the Mo-99 market, we also considered broader issues to place domestic production in proper context. The individual plans and progress of the cooperative agreement partners were not examined in detail. The Subcommittee does not see any fundamental technical barriers to the projects. The issues are primarily regulatory and economic. However, the decision by the Canadian government to end production in October 2016

at their reactor that has been producing 15-40% of the global supply establishes an urgency to the resolution of the issues.

The basic conclusion of the report remains that establishing a reliable domestic supply of Mo-99 without the use of HEU is an extremely complex issue with many factors outside the direct control of the NNSA M^3 program. The program has worked diligently and proactively to deal with these issues. However the time scale for initiating domestic production by any of the cooperative agreement partners has slipped by at least one year in the past year. Also, the international progress towards full cost recovery has been slower than desired. The Subcommittee concludes the likelihood of a shortage of Mo-99 in the period 2016-2018 has increased substantially since the last review and there remain significant risks to the success of domestic commercial production efforts as discussed in the report. Recommendations are made to improve the outlook relative to this risk. That said, these mitigation measures may reduce but do not remove the risk.

A report from this subcommittee is called for once a year. We will continue to welcome community input to this process.

Sincerely yours,

Donald F. Geesaman
Chair, NSAC