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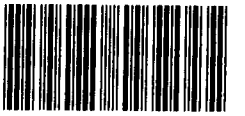

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NUCLEAR MATERIALS

GAO's Views on Decreasing Tritium Requirements and Their Effect on DOE Programs

Statement of
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Before the
Department of Energy Defense Nuclear Facilities Panel
Committee on Armed Services
House of Representatives

Mr. Chairman and Members of the Panel:

We are pleased to be here today to provide our views on the adequacy of the Department of Energy's (DOE) tritium supplies. As you know, tritium is a radioactive material used in nuclear weapons that decays at a rate of 5.5 percent per year and must be periodically replenished in the weapons. DOE has not produced tritium since 1988 because its nuclear production reactors at Savannah River, South Carolina, are shut down. My testimony today focuses on DOE's projections of tritium supplies in relation to tritium requirements for servicing existing and planned nuclear weapons and the impact of future tritium supplies on DOE's programs, including proposed new facilities to produce tritium.

Projected U.S. defense tritium requirements to service existing and planned nuclear weapons have decreased dramatically from 1988 through 1990 and may decrease further in future years. This is primarily the result of actual and planned nuclear weapons retirements. DOE's analyses of tritium supplies and requirements indicate that sufficient tritium supplies will exist to meet the anticipated needs of the nuclear weapons stockpile for the next several years. This situation has important implications for DOE's Savannah River reactor restart and new production reactor programs. The decreased requirements provide additional time, if needed, to (1) evaluate and deal with outstanding safety and environmental issues before restarting the Savannah River reactors

and (2) reconsider the capacity and choice of technology for new tritium production.

TRITIUM SUPPLIES AND REQUIREMENTS

Since 1988, the actual number of nuclear weapons in the stockpile and the weapons which are planned to be in the stockpile have decreased significantly. Retirement of weapons that the Department of Defense is not planning to replace and retirements resulting from the Intermediate-Range Nuclear Forces treaty contributed to this decrease. These retirements included intermediate-range nuclear weapons from Germany after the country's reunification.

Since 1988, the actual and projected future retirement of nuclear weapons have dramatically affected the need for tritium. This is because tritium in retired weapons is returned to DOE and added to the tritium inventory. In addition, because the retired weapons no longer have to be periodically replenished with tritium, future tritium requirements are being reduced. According to a DOE analysis, sufficient tritium supplies will exist to meet the anticipated needs of our nuclear weapons stockpile for the next several years.

Retirement of weapons, in addition to those already planned, and negotiations aimed at arms reduction treaties may reduce

tritium requirements further over the next few years. According to DOE officials, ongoing negotiations with the Soviet Union for a second START treaty may result in removing more weapons from the stockpile. Finally, the Short-Range Nuclear Forces treaty, now in the early stages of negotiation, may cause a reduction in the tactical nuclear weapons stockpile in 2 or more years.

It is important to note that our assessment of anticipated tritium demand does not take into consideration the recent decision to develop a tritium reserve as a contingency against unforeseen events. No reserve requirement existed prior to 1990, when initial decisions regarding the Savannah River reactors and new sources of tritium production were made. Because the reserve (1) represents a substantial addition to today's anticipated tritium requirements and (2) has implications for funding and decisions on the reconfiguration of the nuclear weapons complex, its need must be carefully evaluated in light of changing tritium requirements and other contingency options.

In this regard, maintaining a tritium reserve of the size specified in the 1990 requirements has several disadvantages, including tritium's rapid decay rate and the resulting need to constantly replenish it. DOE officials told us that they are developing a detailed justification establishing the need for the reserve. We are currently reviewing DOE's tritium contingency planning efforts and the extent that alternatives for dealing with

unforeseen events have been considered. We plan to issue a report on the subject in the spring of 1991.

IMPLICATIONS OF DECREASING TRITIUM REQUIREMENTS FOR DOE PROGRAMS AND PROJECTS

DOE has recently changed its plans to restart the Savannah River reactors and add new tritium production capacity. However, the decreased tritium requirements provide (1) additional time, if needed, for DOE to evaluate and deal with outstanding safety and environmental issues before restarting the Savannah River reactors and (2) an opportunity to reconsider whether plans for future tritium production capacity are still appropriate.

Three Savannah River production reactors are currently the nation's only production source of tritium. These reactors have been shut down since 1988 to make hardware improvements, upgrade operator qualifications, expand staffing and training, increase management involvement, and improve oversight. In previous years, restarting these reactors was a top priority with DOE because of the perceived urgency associated with tritium requirements.[1]

On the basis of our review of DOE's data, which is supported by DOE's recently issued reconfiguration study of the nuclear weapons complex,[2] we believe the decrease in the current and

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[1]The first Savannah River reactor was scheduled to be restarted in September 1990, but restart was subsequently delayed and is now scheduled for the summer of 1991.

[2]Nuclear Weapons Complex Reconfiguration Study, Jan. 1991.

projected DOE tritium demand suggests that the urgency associated with restarting the reactors to meet requirements projected in 1988 has diminished. Current DOE projections indicate that if none of the Savannah River reactors are restarted, current tritium supplies will meet defense requirements for the next several years. If one reactor is restarted, DOE will be able to meet tritium requirements over the reactor's useful life. Finally, if two reactors are restarted, tritium supplies could significantly exceed projected tritium requirements.

Because the urgency in restarting the reactors to meet requirements has diminished, DOE now has additional time, if needed, to evaluate and deal with outstanding problems associated with the reactors. We are about to issue a report that addresses these problems, including slippage in the restart schedule, factors causing the latest delays, and safety oversight changes and safety culture concerns. DOE officials responsible for the Savannah River reactors informed us that they are aware of the tritium supply situation. They have announced that they now plan to operate only two reactors. The first reactor is expected to be restarted in the third quarter of 1991 and operation of the second reactor is being deferred until early in 1992. Operation of the third reactor will be deferred indefinitely. DOE officials told us that it is important to demonstrate that the Savannah River reactors can be safely restarted in a timely manner, and that it is urgent that DOE restore tritium production capability. As a

result, DOE does not plan to further delay restarting the first reactor because of decreases in tritium requirements.

In 1988, DOE developed a strategy to build two new tritium production reactors. Specifically, DOE selected two reactors as its preferred choices--a heavy-water reactor located at Savannah River, South Carolina, and a high-temperature, gas-cooled reactor located near Idaho Falls, Idaho. The estimated cost of the two reactors is $6.8 billion. In addition, to provide for contingencies, DOE began working to solve the institutional and potential legal issues associated with acquiring the Washington Nuclear Plant, Unit 1 (WNP-1), a 63-percent complete light-water reactor located on DOE's Hanford Reservation near Richland, Washington. Since fiscal year 1990, approximately $674 million has been budgeted for the new production reactor program, and DOE has requested an additional $500 million in the proposed 1992 budget.

This production strategy was developed when tritium requirements were much higher than they are now. Production capacity, efficiency, and safety features of the reactors that DOE prefers to use can change with lower tritium requirements. Other production alternatives that DOE dismissed in 1988 may be worthy of further consideration. For example, in a February 1990 report,[3] we

[3]Nuclear Science: The Feasibility of Using a Particle Accelerator to Produce Tritium (GAO/RCED-90-73BR, Feb. 2, 1990).

found that a particle accelerator,[4] which DOE rejected partly on the grounds that it would require excessive power to produce necessary amounts of tritium, has certain safety and environmental advantages over nuclear reactors. The particle accelerator needed to meet the lower tritium requirements would be smaller and would use less power than the type previously reviewed by DOE. This feature could make its safety and environmental advantages more attractive. The particle accelerator may also be more flexible in terms of capacity because of its modular nature. We are currently preparing a report that discusses the cost estimate and criteria used in DOE's evaluation of the accelerator for tritium production.

In the fiscal year 1992 budget, DOE announced that because of the high cost of building two reactors, the Department would build only one reactor now while leaving the option of constructing the second reactor open. DOE officials told us that they were not reconsidering the capacity of the reactors or changing the technologies under consideration for the first reactor because of the need to (1) quickly build a replacement for the Savannah River reactors and (2) provide additional reactor capacity in case tritium requirements dramatically increase.

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[4]A particle accelerator is a device that uses basic laws of electromagnetism to increase the motion energy of charged particles.

SUMMARY

The dramatic decrease in tritium requirements and the prospect of further decreases provide additional time to evaluate outstanding issues before restarting the Savannah River reactors. In addition, decreasing tritium requirements raise issues about the best approach to building adequate new capacity to produce tritium. DOE has recently made changes to its Savannah River reactor restart and new production reactor programs. However, even with these programmatic changes, we believe it is clear that additional time is available, if needed, to evaluate (1) outstanding safety and environmental issues before restarting the Savannah River reactor and (2) when the reactors should be restarted. DOE also has additional time to reconsider the capacity and choice of technology of new tritium production.

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Thank you, that concludes my testimony. We would be happy to answer any questions that the Panel might have.