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ACQUISITION,
TECHNOLOGY,
AND LOGISTICS

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MEMORANDUM FOR CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Terms of Reference – Defense Science Board Summer Study on Nuclear Deterrence in the 21st Century's Multi-Polar, Multi-Threat Strategic Environment

The Defense Department is confronting the problem of the need to recapitalize the strategic deterrent. This financial burden is on the order of $10 to 15 billion per year starting in about 2022. At the same time, the Nation is facing a more complex strategic security environment than it has seen in many decades. Of special concern is that established nuclear powers have been modernizing and expanding their capabilities in both traditional and non-traditional ways. China and Russia began modernizing their strategic forces well ahead of our commitment to do the same while also integrating additional elements, such as intermediate range missiles, into their force structure. Russia has also pursued the development and deployment of theater nuclear weapons that have a range of tailored effects as a foil to U.S. conventional superiority. In addition other states, such as Korea and Iran, are fielding or have the potential to field strategic nuclear weapons.

Although the threat of nuclear Armageddon has subsided since the end of the Cold War, the Nation must still deter the existential possibility of a major nuclear attack on the United States. In addition, the issues posed by regional proliferation, the emerging possibility of limited use in regional conflicts, and the corollary potential for rapid escalation coupled with the expressed concerns by many of our allies about our extended deterrence guarantee, all introduce complexities and challenges not seen since the early days of the Cold War.

U.S. nuclear modernization plans to date have focused on replacing or extending systems whose end-of-life is near. This is highly expensive and it assumes that the deterrent force mix of the 1980's is still appropriate for the strategic environment and challenges that are and will face us for the next 40-50 years.

The Defense Science Board (DSB) is requested to address the topic of nuclear force modernization and recapitalization, focusing on ways to reduce the affordability problem and on ways to respond to the changing strategic environment through technical, programmatic, and operational innovation. The DSB will consider the critical issues associated with the following:

- Status and trends in major power threats and proliferators that could threaten the United States or its allies, to include their nuclear, advanced conventional, and cyber capabilities that might:
  - threaten the operational viability of our nuclear deterrent
  - make our ability to control escalation through non-nuclear means problematic
  - impact the assurance of U.S. extended deterrence in the eyes of our allies

- Based on all of the above, revisiting the principles of nuclear deterrence and stability in the context of the current and projected multi-actor threat space;

- Translation of those principles into the high-level technical requirements placed on our nuclear forces, enabling capabilities (e.g., warning, command and control) and operations, and non-nuclear capabilities (to include both conventional offensive as well as defensive systems) we might want to employ either as a strategic deterrent in themselves or as a vehicle in stemming escalation to strategic nuclear use;

- Assessment of relevant nuclear and non-nuclear force element capabilities, both against the requirements derived above, as well as from an assurance standpoint in light of adversary advanced capabilities, such as cyber and air defenses. The assessment should address the adequacy of current capabilities and plans for acquisition, modernization, or replacement, especially in the context of where other major powers are today and where we expect them to be in the next 20 years;

- Assessment of platform and weapon architectures and production approaches that would allow greater speed in adapting the nuclear force, to include the impact of modern manufacturing technologies. In addition, assess the threat potential if such approaches and capabilities are adopted by others, and how we might respond to such activities;

- From the results of the above steps, providing recommendations with respect to our nuclear deterrent programs regarding:
  - The nature of, or degree to which, a different technical and/or operational approach to nuclear delivery or weapon options (e.g., hypersonics for delivery or special effects weapons) might be desired from a responsiveness, deterrence, and stability standpoint, including dual-use delivery systems;
  - New technical features in our nuclear weapon systems that could strengthen deterrence; and
  - The use of technology to improve cross-domain, or integrated, deterrence for raising the nuclear threshold and assuring our allies of our extended deterrence.

I will sponsor the study. Dr. Miriam John and Mr. Bob Stein will serve as Co-chairmen of the study. Mr. Hank O'Brien will serve as the Executive Secretary, however an additional Executive Secretary from Under Secretary for Policy's office in the new administration may be added at the Under Secretary's request. Ms. Karen Saunders will serve as the DSB Secretariat Representative.

The task force members are granted access to those Department of Defense officials and data necessary for the appropriate conduct of their study. The Under Secretary of Defense for Acquisition, Technology, and Logistics will serve as the DoD principle staff contact for the matter under consideration and will coordinate decision-making as appropriate with other stakeholders identified by the study's findings and recommendations. The nominal start date of the study period will be within 3 months of signing this Terms of Reference, and the study period

will be between 9 to 12 months. The final report will be completed within six months from the end of the study period. Extensions for unforeseen circumstances will be handled accordingly. It is anticipated that the new administration will conduct a nuclear posture review after taking office and that as a result the TOR may be modified to reflect the focus and timing of that review after the administration takes office. The study chairs will also meet at least quarterly with the USD(AT&L) and the USD(P) to ensure that the timing and focus support the new administration's decision process.

The study will operate in accordance with the provisions of Public Law 92-463, "Federal Advisory Committee Act," and DoD Directive 5105.04, "DoD Federal Advisory Committee Management Program." It is not anticipated that this study will need to go into any "particular matters" within the meaning of title 18, United States Code, section 208, nor will it cause any member to be placed in the position of action as a procurement official.

Frank Kendall