U.S. Air Force Strategic Deterrence Analytic Capabilities

An Assessment of Tools, Methods, and Approaches for the 21st Century Security Environment

Committee on U.S. Air Force Strategic Deterrence Military Capabilities in the 21st Century Security Environment

Air Force Studies Board

Division on Engineering and Physical Sciences

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Preface

In 2012, the Assistant Chief of Staff for Strategic Deterrence and Nuclear Integration requested that the U.S. Air Force Scientific Advisory Board (SAB) and the Force Global Strike Command, and the National Research Council (NRC) of the Force Studies Board (AFSB) to conduct a workshop on what Air Force Strategic Deterrence Analytic Capabilities would be needed in the 21st century security environment. The AFSB agreed and organized a workshop to frame the issues and construct the terms of reference (TOR, see Appendix A) for a study. The SAB and the AFSB jointly sponsored the workshop and the NRC and submitted to the Force a sponsor's study TOR.[1]

TERMS OF REFERENCE

At the Air Force's subsequent request, the NRC approved the terms of reference (TOR) for a study. The TOR called for a committee of independent experts to form Ad Hoc Committee (AHC) and the National Research Council's (NRC's) Air Force Studies Board (AFSB) to conduct a workshop on what Air Force Strategic Deterrence Analytic Capabilities would be needed in the 21st century security environment. The AFSB agreed and organized a workshop to frame the issues and construct the terms of reference (TOR, see Appendix A) for a study. The SAB and the AFSB jointly sponsored the workshop and the NRC and submitted to the Force a sponsor's study TOR.[2]

> 1 Appendix A provides biographies of the committee members. The committee members were selected for their expertise in the subject matter and were chosen to be blind with many years in the Force nuclear weapons capabilities, strategies, and operations, and with expertise in the Force's nuclear weapons planning, risk management operations research and modeling and simulation.

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[11] The committee devoted much of its fact-finding to the regional dimension, reviewing literature, and receiving briefings from experts. It did not, however, have an opportunity to visit the regional combatant commands (as it did STRATCOM) to gain their perspectives on deterrence in regional settings.

[12] The current U.S. nuclear stockpile includes the W76 and W88 warheads for SLBMs, theW78 and W87 warheads for ICBMs, the B61 and B83 bombs, and the W80 warhead for air-launched cruise missiles.

legs of the triad and two air delivered warheads, (1) a gravity bomb deployable on both bombers and tactical aircraft[13] and (2) a warhead for a long-range stand-off (LRSO) capability ultimately to replace the air-launched cruise missiles (ALCMs).[14] Whether this strategy can be sustained with adequate funding over the long term remains to be seen.

Fourth, while this committee addressed tools, methods, and approaches appropriate to sizing the delivery systems, it did not extend its discussions to whether the same tools, methods, and approaches provide an analytically sound basis for determining the appropriate stockpile size and mix. Fifth and last, the committee understands that over the planned lifetime of U.S. Air Force and Navy nuclear delivery platforms and weapons, both continuity and change will be significant. Planning for continuity must also provide flexibility and options to respond to change, both geostrategic and technological, which could be very sudden and dramatic in the years ahead.

It was our great pleasure to work with the extremely dedicated and professional members of the committee during this study. We would like to single out committee members Michael Wheeler, Paul Davis, Stephen Walker, W. Peter Cherry, and Jerrold Post for their outstanding contributions as chapter leads. It is our hope that this report provides a useful service to DoD and the nation.

Gerald F. Perryman, Jr., *Co-Chair*
Allison Astorino-Courtois, *Co-Chair*
Committee on U.S. Air Force Strategic Deterrence Military Capabilities in the 21st Century Security Environment

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[13] See B61 Life Extension Program and Future Stockpile Strategy, House Armed Services Committee Subcommittee on Armed Services, testimony of Donald L. Cook, Deputy Administrator for Defense Programs, NNSA, October 30, and 2013. Those hearings addressed the increasingly costly B61 life extension program and its place in the future stockpile strategy.

Acknowledgment of Reviewers

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report:

Kevin P. Chilton, U.S. Air Force (retired),
Raymond Jeanloz, University of California, Berkeley,
Michael E. Kassner, University of Southern California,
Brad Roberts, Stanford University,
C. Paul Robinson, Sandia National Laboratories (emeritus),
James Scouras, Johns Hopkins University Applied Physics Laboratory,
Alan Washburn, Naval Postgraduate School, and
Larry D. Welch, Institute for Defense Analyses (emeritus).

Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations, nor did they see the final draft of the report before its release. The review of this report was overseen by Stephen M. Robinson, University of Wisconsin,

Madison. Appointed by the National Research Council, he was responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

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Acronyms

AFB	Air Force Base
AFGSC	Air Force Global Strike Command
AFSB	Air Force Studies Board
ALCM	air-launched cruise missile
BMD	ballistic missile defense
CAS	complex adaptive systems
COCOM	combatant command
CTBT	Comprehensive Nuclear Test Ban Treaty
DAAP	deterrence and assurance analysis program
DARPA	Defense Advanced Research Projects Agency
DoD	Department of Defense
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities
DSB	Defense Science Board
FYDP	Future Years Defense Program
IAEA	International Atomic Energy Agency
ICBM	intercontinental ballistic missile
IT	information technology

JCIDS	Joint Capabilities Integration Development System
JCS	Joint Chiefs of Staff
JROC	Joint Requirements Oversight Council
LEP	Life Extension Program
LRSO	Long-Range Standoff (Missile)
MIRV	multiple independently retargetable reentry vehicle
MM	Minuteman missile
NATO	North American Treaty Organization
NNSA	National Nuclear Security Administration
NPR	Nuclear Posture Review
NPT	Nuclear Nonproliferation Treaty
NRC	National Research Council
NSA	National Security Agency
NSC	National Security Council
NWC	Nuclear Weapons Council
OSD	Office of the Secretary of Defense
PPBE	planning, programming, budgeting, and execution
RSAS	RAND Strategy Assessment System
SAC	Strategic Air Command
SALT	Strategic Arms Limitation Treaty
SLBM	submarine-launched ballistic missile
SNA	social network analysis
START	Strategic Arms Reduction Treaty
STRATCOM	Strategic Command
TOR	terms of reference
UN	United Nations
USD/AT&L	Under Secretary of Defense (Acquisition, Technology, and Logistics)
WMD	weapons of mass destruction

Next: Summary »

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