



September 2016

# NUCLEAR WEAPONS

## DOD Assessed the Need for Each Leg of the Strategic Triad and Considered Other Reductions to Nuclear Forces

## Why GAO Did This Study

Since the 1960s, the United States has deployed nuclear weapons on three types of strategic delivery vehicles collectively known as the strategic triad. The triad comprises the sea-based leg (submarine-launched ballistic missiles), ground-based leg (intercontinental ballistic missiles), and airborne leg (nuclear-capable heavy bombers). As a result of arms control agreements and strategic policies, the number of U.S. nuclear weapons and strategic delivery vehicles has been reduced substantially; however, the strategic triad has remained intact. DOD and the Department of Energy are planning to invest significant resources to recapitalize and modernize the strategic triad in the coming decades. The departments projected in 2015 that the costs of maintaining U.S. nuclear forces for fiscal years 2016 through 2025 would total \$319.8 billion, and DOD expects recapitalization and modernization efforts to extend into the 2030s.

GAO was asked to review DOD's analysis of the decision to retain all three legs of the strategic triad. This report describes the processes DOD used in supporting that decision. GAO reviewed documentation and interviewed officials from DOD and the military services on the key reviews DOD carried out from 2009 to 2014—including the 2010 Nuclear Posture Review—in analyzing its strategic force structure.

## What GAO Recommends

GAO is not making any recommendations in this report. DOD provided technical comments, which were incorporated as appropriate.

View [GAO-16-740](#). For more information, contact Joseph W. Kirschbaum at (202) 512-9971 or [kirschbaumj@gao.gov](mailto:kirschbaumj@gao.gov).

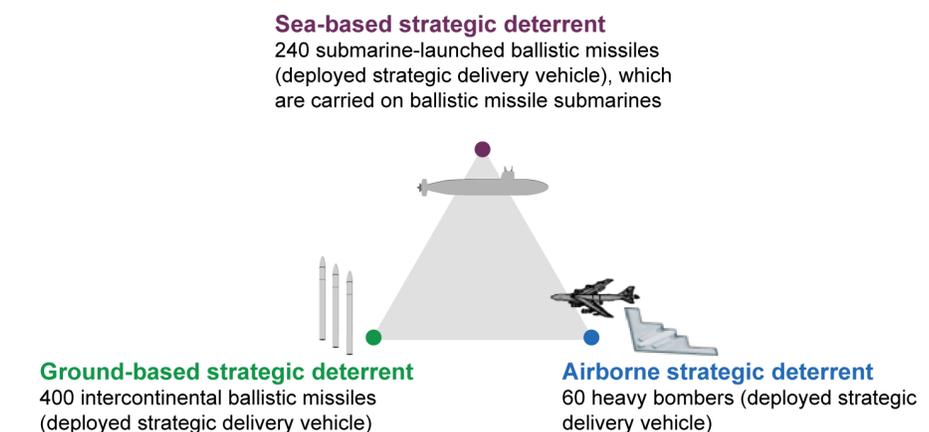
## NUCLEAR WEAPONS

# DOD Assessed the Need for Each Leg of the Strategic Triad and Considered Other Reductions to Nuclear Forces

## What GAO Found

The Department of Defense (DOD) assessed the need for each leg of the strategic triad in support of the 2010 Nuclear Posture Review and considered other reductions to nuclear forces in subsequent reviews. The department identified advantages of each leg of the triad and concluded that retaining all three would help maintain strategic deterrence and stability. The advantages DOD identified include the survivability of the sea-based leg, the intercontinental ballistic missiles' contribution to stability, and the ability of the nuclear-capable bombers to visibly forward deploy. The 2010 *Nuclear Posture Review Report* states—and DOD officials also told GAO—that the administration has considered various options for the U.S. nuclear force structure, including options in which DOD would eliminate one leg of the triad. For example, Strategic Command, Air Force, and Navy officials told GAO that they had analyzed alternative strategic force structures in preparation for the 2010 Nuclear Posture Review. DOD officials also told GAO that the department had assessed nuclear force reductions as part of reviews conducted after the Nuclear Posture Review, including during the development of the President's 2013 nuclear employment guidance, the 2013 Strategic Choices Management Review, and DOD's 2014 plan to implement the New Strategic Arms Reduction Treaty (New START) with Russia. The figure shows DOD's current planned strategic force structure for implementing New START, including the number of delivery vehicles that would be retained for each leg of the triad.

**DOD's Current Planned Strategic Force Structure for Implementing the New Strategic Arms Reduction Treaty, Grouped by the Three Legs of the Strategic Triad**



Source: GAO analysis of Department of Defense documents. | GAO-16-740

This is a public version of a classified report GAO issued in May 2016. It excludes classified information on warhead levels, the specific advantages of each leg of the triad, and some of the analyses of alternatives that were considered.

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## Abbreviations

DOD	Department of Defense
New START	New Strategic Arms Reduction Treaty
NPR	Nuclear Posture Review

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September 22, 2016

The Honorable Adam Smith  
Ranking Member  
Committee on Armed Services  
House of Representatives

The Honorable Jim Cooper  
Ranking Member  
Subcommittee on Strategic Forces  
Committee on Armed Services  
House of Representatives

The Honorable John Garamendi  
House of Representatives

Nuclear weapons have long been a cornerstone of the nation's defense strategy. Since the 1960s, the United States has deployed nuclear weapons on three types of strategic delivery vehicles. These three types of vehicles—together with the warheads they carry—are collectively referred to as the strategic triad. The triad comprises the sea-based strategic deterrent (submarine-launched ballistic missiles carried on ballistic missile submarines), the ground-based strategic deterrent (intercontinental ballistic missiles), and the airborne strategic deterrent (nuclear-capable heavy bombers). The strategic triad has played an essential role in U.S. policy for deterring potential adversaries and assuring U.S. allies and other security partners that they can count on U.S. security commitments. The United States has maintained its nuclear deterrent capability while decreasing numbers of weapons in response to arms control agreements and strategic policies. In 1991, the U.S. nuclear weapon stockpile totaled approximately 13,000 weapons; as of February 2011, it had been reduced to fewer than 4,500, according to the Department of Defense (DOD).<sup>1</sup> In his April 2009 speech in Prague, the President spoke of the U.S. commitment to seeking a world without

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<sup>1</sup>Department of Defense, *Report on Plan to Implement the Nuclear Force Reductions, Limitations, and Verification and Transparency Measures Contained in the New START Treaty Specified in Section 1042 of the National Defense Authorization Act for Fiscal Year 2012* (April 2014).

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nuclear weapons. The 2010 *Nuclear Posture Review Report* (NPR report) outlined the administration's approach to maintaining the nuclear deterrent capability while pursuing further reductions in nuclear weapons.<sup>2</sup> The number of U.S. nuclear weapons and strategic delivery vehicles has fallen substantially, but the core model for U.S. strategic force structure—the strategic triad—has remained intact. The 2010 NPR report stated that DOD had considered a wide range of force structure options before concluding that it would retain the strategic triad.

The strategic delivery vehicles and nuclear weapons that comprise the strategic triad are aging and being deployed beyond their intended service lives. DOD and the Department of Energy are planning to invest significant resources to recapitalize and modernize the strategic triad in the coming decades, including developing a new long-range strike bomber with nuclear capabilities, a replacement or upgrade for the current fleet of intercontinental ballistic missiles, a new class of ballistic missile submarines, and an upgrade to some of the missiles and warheads that will be carried on these delivery vehicles. This is part of an extensive, multifaceted effort by DOD and the Department of Energy to sustain and modernize U.S. nuclear weapons capabilities, including the nuclear weapons stockpile; the research and production infrastructure; and the nuclear command, control, and communications system. DOD and Department of Energy estimates show that nuclear sustainment and modernization efforts are expected to cost billions of dollars over the next decade. As we have previously reported, DOD and the Department of Energy projected in 2015 that the costs of maintaining U.S. nuclear forces for fiscal years 2016 through 2025 would total \$319.8 billion, and DOD

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<sup>2</sup>Section 1070 of the National Defense Authorization Act for Fiscal Year 2008, Pub. L. No. 110-181 (2008), required the Secretary of Defense, in consultation with the Secretary of Energy and the Secretary of State, to conduct a comprehensive review of the nuclear posture of the United States covering the next 5 to 10 years. DOD published the conclusions and recommendations from that review in the April 2010 NPR report.

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expects recapitalization and modernization efforts to extend into the 2030s.<sup>3</sup>

You asked us to review DOD's analysis of the decision to retain all three legs of the strategic triad. This report describes the processes DOD used in supporting that decision. This report is a public version of a classified report that we issued in May 2016 and omits information that DOD deemed classified on warhead levels, specific advantages of each leg of the triad, and some of the analyses of alternatives that were considered.<sup>4</sup> Although the information in this report is more limited, it addresses the same objective as the classified report. The overall methodology for both reports is also the same.

To describe DOD's process for assessing the strategic triad, we reviewed relevant documentation and interviewed officials from the military services and DOD offices that participated in the key reviews the department carried out in analyzing its strategic force structure from 2009 to 2014, including the 2010 NPR. We used this documentation and testimonial evidence to understand DOD's process for determining a need to maintain the triad and DOD's consideration of alternatives to the triad. We compared this information to direction referenced in the 2010 NPR and subsequent strategic force reviews. We interviewed officials from the following offices:

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<sup>3</sup>GAO, *Nuclear Weapons Sustainment: Improvements Made to Budget Estimates Report, but Opportunities Remain to Further Enhance Transparency*, [GAO-16-23](#) (Washington, D.C.: Dec. 10, 2015). DOD and the Department of Energy provided a joint report to Congress in April 2015 on the projected costs of maintaining U.S. nuclear forces for fiscal years 2016 through 2025. In the joint report, DOD inadvertently reported an incorrect figure for the long-range strike bomber; the budget estimates shown above reflect the corrected data. DOD provided an addendum to the 2016 joint report with corrected budget estimates for the long-range strike bomber and an explanation for the error on November 18, 2015. DOD and Department of Energy, *Fiscal Year 2016 Report on the Plan for the Nuclear Weapons Stockpile, Nuclear Weapons Complex, Nuclear Weapons Delivery Systems, and Nuclear Weapons Command and Control System Specified in Section 1043 of the National Defense Authorization Act for Fiscal Year 2012* (Washington, D.C.: Apr. 2, 2015) and DOD, *Air Force Addendum to the Fiscal Year 2015 and Fiscal Year 2016 Reports on the Plan for the Nuclear Weapons Stockpile, Nuclear Weapons Complex, Nuclear Weapons Delivery Systems, and Nuclear Weapons Command and Control System Specified in Section 1043 of the National Defense Authorization Act for Fiscal Year 2012* (Washington, D.C.: Nov. 18, 2015).

<sup>4</sup>GAO, *Nuclear Weapons: DOD Assessed the Need for Each Leg of the Strategic Triad and Considered Other Reductions to Nuclear Forces*, [GAO-16-372C](#) (Washington, D.C.: May 18, 2016).

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- Office of the Under Secretary of Defense for Acquisition, Technology and Logistics
  - Office of the Secretary of Defense, Office of Cost Assessment and Program Evaluation
  - Office of the Under Secretary of Defense for Policy, Office of Deputy Assistant Secretary of Defense for Nuclear and Missile Defense Policy
  - U.S. Strategic Command (Strategic Command)
  - Joint Staff J5 (Strategic Plans and Policy)
  - Joint Staff J8 (Force Structure, Resources and Assessment)
  - Air Force offices, including A10 (Strategic Deterrence and Nuclear Integration), Air Force Global Strike Command, and Air Force Nuclear Weapons Center
  - Army offices, including the Army Nuclear and Countering Weapons of Mass Destruction Agency
  - Navy offices, including the Strategic Systems Programs and the Ballistic Missile Submarine Security Technology Program.

We conducted this performance audit from March 2014 to September 2016 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## Background

The 2010 NPR report described the administration's approach to maintaining the U.S. nuclear deterrent capability while pursuing further reductions in nuclear weapons. The 2010 NPR was the third comprehensive assessment of U.S. nuclear policy and strategy conducted by the United States since the end of the Cold War; previous reviews were completed in 1994 and 2001. The Office of the Secretary of Defense and the Joint Staff led the effort in consultation with the Departments of State and Energy. Other organizations participated, including the military departments, the combatant commands, the Departments of Homeland Security and Treasury, the Office of the Director of National Intelligence, and the National Security Council and its

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supporting interagency bodies. The 2010 NPR report focused on five objectives:

1. preventing nuclear proliferation and nuclear terrorism;
2. reducing the role of U.S. nuclear weapons in the U.S. national security strategy;
3. maintaining strategic deterrence and stability at lower nuclear force levels;
4. strengthening regional deterrence and reassuring U.S. allies and partners; and
5. sustaining a safe, secure, and effective nuclear arsenal.

The third of these objectives—maintaining strategic deterrence and stability at reduced nuclear force levels—emphasizes the importance of bilateral and verifiable reductions in strategic nuclear weapons in coordination with Russia. In support of this objective, the United States signed a new Strategic Arms Reduction Treaty with Russia—known as New START—on April 8, 2010, which entered into force on February 5, 2011.<sup>5</sup>

New START gives Russia and the United States 7 years to reduce their strategic delivery vehicles and strategic nuclear warheads—under the counting rules outlined in the treaty—and will remain in force for 10 years.<sup>6</sup> According to DOD’s April 2014 report on its plan to implement New START, DOD plans to maintain 400 deployed intercontinental ballistic missiles; 240 deployed submarine-launched ballistic missiles; and 60 deployed heavy bombers.<sup>7</sup> The 60 heavy bombers consist of B-52s and B-2s. Taken together, these add up to 700 deployed delivery vehicles and fall within the New START limits that go into force in 2018. DOD and military service officials told us these numbers reflect DOD’s current

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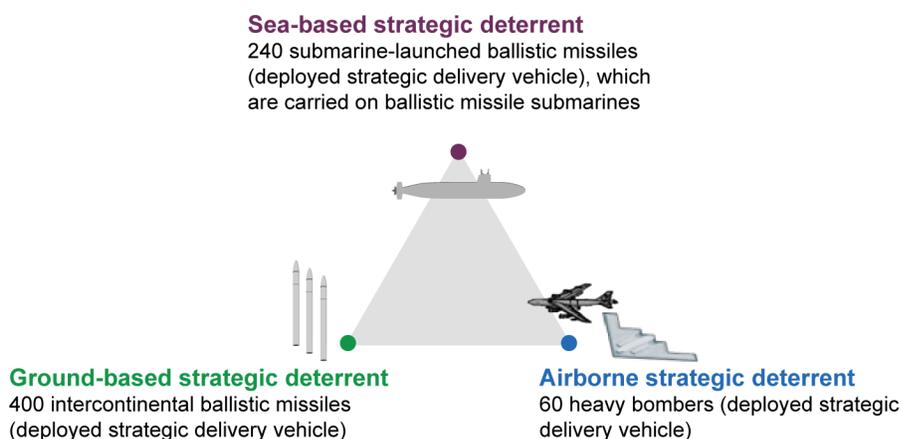
<sup>5</sup>*Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms*, U.S.-Russ., Apr. 8, 2010, T.I.A.S. No. 11-205.

<sup>6</sup>Under the terms of New START, the United States and Russia may extend the treaty for an additional period of up to 5 years.

<sup>7</sup>Department of Defense, *Report on Plan to Implement the Nuclear Force Reductions, Limitations, and Verification and Transparency Measures Contained in the New START Treaty Specified in Section 1042 of the National Defense Authorization Act for Fiscal Year 2012*.

planned strategic force structure for implementing New START. Figure 1 shows DOD's planned deployed strategic force structure for implementing New START, including the number of delivery vehicles for each leg of the triad.

**Figure 1: DOD's Current Planned Strategic Force Structure for Implementing the New Strategic Arms Reduction Treaty, Grouped by the Three Legs of the Strategic Triad**



Source: GAO analysis of Department of Defense documents. | GAO-16-740

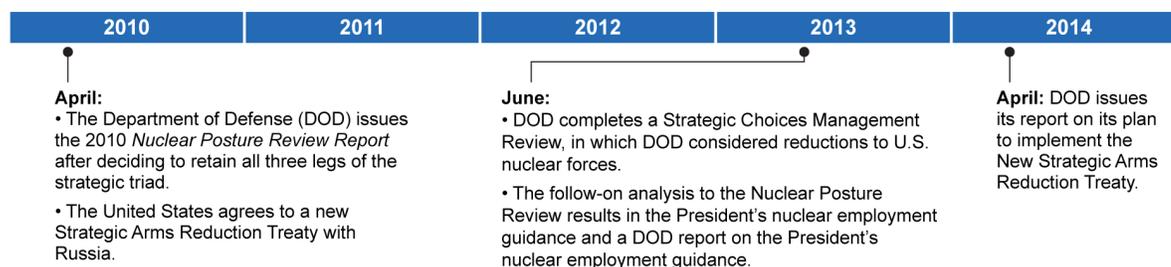
In 2011, the President directed DOD to conduct a follow-on analysis to the NPR, which reviewed U.S. nuclear deterrence requirements. The review resulted in the development of the President's nuclear employment guidance and a DOD report on this nuclear employment guidance, which was completed in June 2013.<sup>8</sup> The review was led by DOD and included senior-level participation by the Office of the Secretary of Defense, the Joint Chiefs of Staff, Strategic Command, the Department of State, the Department of Energy, the Office of the Director of National Intelligence, and the National Security Staff (now known as the National Security Council). As indicated in DOD's 2013 report on the President's nuclear employment guidance, the review assessed what changes to nuclear employment strategy could best support the five key objectives of

<sup>8</sup>Department of Defense, *Report on Nuclear Employment Strategy of the United States Specified in Section 491 of 10 U.S.C.* (June 12, 2013). Section 491 of Title 10, U.S. Code, requires the President to submit to Congress a report on matters related to nuclear weapons employment strategy if the President implements a strategy change. See 10 U.S.C. § 491(a).

the 2010 NPR and a sixth objective: achieve U.S. and allied objectives if deterrence fails.

In June 2013, DOD completed a Strategic Choices Management Review, which, according to DOD officials, considered reductions in nuclear forces, among other things. According to the Secretary of Defense, the purpose of the Strategic Choices Management Review was to understand the effect that further budget reductions would have on the department and to develop options to deal with these reductions. Figure 2 shows a timeline of events and reviews related to DOD's assessment of U.S. nuclear forces from 2010 through 2014.

**Figure 2: Timeline of Events and Reviews Related to DOD's Assessment of U.S. Nuclear Forces**



Source: GAO analysis of Department of Defense documents. | GAO-16-740

## DOD Assessed the Need for Each Leg of the Strategic Triad in the 2010 NPR and Considered Other Reductions to Nuclear Forces in Subsequent Reviews

DOD assessed the need for each leg of the strategic triad in support of the 2010 NPR and considered other reductions to nuclear forces in subsequent reviews. The department identified advantages of each leg of the triad and concluded that retaining all three would help maintain strategic deterrence and stability. The 2010 NPR report states that the administration considered various options for U.S. nuclear force structure, including options in which the United States would eliminate one leg of the triad. DOD officials also told us that the department had assessed nuclear force reductions as part of subsequent reviews, including during the development of the President's nuclear employment guidance, the 2013 Strategic Choices Management Review, and the development of DOD's plan to implement New START.

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The 2010 NPR Report Identified Advantages of Each Leg of the Triad that Are Also Discussed in Navy and Air Force Acquisition Documents

The 2010 NPR report identified advantages of each leg of the triad that DOD decided warrant retaining all three, even in light of the planned reductions under New START. These advantages—including the survivability of the sea-based leg; the intercontinental ballistic missiles' contribution to stability; and the ability of the nuclear-capable bombers to visibly forward deploy—are further described in Navy and Air Force acquisition documents completed both before and after the 2010 NPR, from 2008 through 2014. These acquisition documents do not include an assessment of the strategic triad as a whole but help define and clarify the advantages that are identified in the 2010 NPR report. In addition to identifying the advantages of each leg, the 2010 NPR report indicates that retaining all three legs best maintains strategic stability at reasonable cost while reducing risk against potential technical problems or vulnerabilities.

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DOD and Key Stakeholders Considered Alternatives to a Triad for the 2010 NPR

The 2010 NPR report states that for the planned reductions under New START, DOD considered force structure options in which the department would eliminate a leg of the triad. DOD officials told us that in senior-level force structure meetings in support of the NPR, DOD and key stakeholders discussed and considered alternatives to a triad for U.S. strategic force structure. DOD officials were unable to provide us documentation of the NPR's analysis of the strategic force structure options that were considered; officials from the Office of the Secretary of Defense, Joint Staff, and Strategic Command told us that much of the NPR analysis on the consideration of different strategic force structure options was discussed in senior-level meetings and was not documented. In addition to the discussions and analysis of options for alternative strategic force structures that occurred during the development of the 2010 NPR, Strategic Command, Air Force, and Navy officials told us that they had also analyzed alternative strategic force structures in advance of the NPR discussions. We reviewed examples of Air Force and Strategic Command analyses and reported on these in our classified report.

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DOD Also Considered Reductions in Nuclear Forces in Other Reviews

DOD's 2013 unclassified report on the President's nuclear employment guidance states that DOD also assessed potential reductions in U.S. nuclear forces in the follow-on review to the NPR that led to the development of the 2013 Presidential nuclear employment guidance. The report says that, in that review, the President determined that the United States can safely pursue up to a one-third reduction in deployed nuclear weapons from the level established in New START, while still ensuring the security of the United States and U.S. allies and partners and maintaining a strong and credible strategic deterrent. DOD officials told us

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that to avoid large disparities in nuclear capabilities, the report also stated the administration's intent to seek negotiated cuts with Russia. However, such negotiations have not yet begun as of August 2016.

DOD officials told us that, in the June 2013 Strategic Choices Management Review—which supported the department's budget review—the department considered cutting nuclear forces and capabilities. The purpose of the Strategic Choices Management Review was to examine the potential effect of additional anticipated budget reductions on the department and generally review how DOD would allocate resources when executing its fiscal year 2014 budget and preparing its fiscal years 2014 through 2019 budget plans. According to DOD officials, the administration and the department ultimately decided against the options to reduce nuclear forces that were considered in the 2013 Strategic Choices Management Review.

As we have previously reported, DOD considered alternatives to its strategic force structure in senior-level meetings for implementing New START.<sup>9</sup> According to DOD officials, in these senior-level meetings—which were organized by the Joint Staff and led by the Office of the Under Secretary of Defense for Policy—DOD finalized its recommendations to the National Security Council for the strategic force structure to implement the treaty. DOD officials told us that, during these meetings, DOD participants considered options to comply with the treaty.<sup>10</sup> They also told

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<sup>9</sup>GAO, *Nuclear Weapons: DOD's Plan for Implementing Nuclear Reductions Generally Addresses Statutory Requirements but Lacks Some Detail*, GAO-15-90C (Washington, D.C.: Dec. 11, 2014).

<sup>10</sup>Under New START, Russia and the United States must not exceed 800 deployed and nondeployed intercontinental ballistic missile launchers, submarine-launched ballistic missile launchers, and nuclear-capable heavy bombers. A protocol to New START defines key terms, including nondeployed intercontinental ballistic missile launchers, nondeployed submarine-launched ballistic missile launchers, and nondeployed heavy bombers. A nondeployed intercontinental ballistic missile launcher (e.g., a silo) is an intercontinental ballistic missile test launcher, an intercontinental ballistic missile training launcher, an intercontinental ballistic missile launcher located at a space launch facility, or an intercontinental ballistic missile launcher, other than a soft-site launcher, that does not contain a deployed intercontinental ballistic missile. A nondeployed submarine-launched ballistic missile launcher (launch tube) is a submarine-launched ballistic missile launcher—other than a soft-site launcher—that is intended for testing or training, or a submarine-launched ballistic missile launcher that does not contain a deployed submarine-launched ballistic missile. A nondeployed heavy bomber is a test heavy bomber or a heavy bomber equipped for nuclear armaments that is located at a repair facility or at a production facility. See GAO-15-90C for more complete descriptions of these and other terms.

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us that DOD ultimately recommended maintaining 400 deployed intercontinental ballistic missiles, 240 deployed submarine-launched ballistic missiles, 60 deployed heavy bombers, 54 nondeployed intercontinental ballistic missile silos, 40 nondeployed submarine-launched ballistic missile launch tubes, and 6 nondeployed nuclear-capable heavy bombers. According to officials, the National Security Council approved this recommendation, which is reflected in DOD's April 2014 report on its plan to implement New START.

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## Agency Comments

We provided a draft of the classified version of this report to DOD for review and comment. In response to that draft report, DOD provided technical comments that we have incorporated as appropriate.

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We are providing copies of this report to the appropriate congressional committees, the Secretary of Defense, the Secretary of the Air Force, the Secretary of the Navy, the Secretary of the Army, the Joint Staff, and the Under Secretary of Defense for Policy. In addition, this report is available at no charge on the GAO website at <http://www.gao.gov>. If you or your staff have any questions about this report, please contact me at (202) 512-9971 or [kirschbaumj@gao.gov](mailto:kirschbaumj@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in the appendix.



Joseph W. Kirschbaum  
Director  
Defense Capabilities and Management

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# Appendix: GAO Contact and Staff Acknowledgments

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## GAO Contact

Joseph W. Kirschbaum, (202) 512-9971 or [kirschbaumj@gao.gov](mailto:kirschbaumj@gao.gov).

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## Staff Acknowledgments

In addition to the contact named above, Penney Harwell Caramia (Assistant Director), Scott Fletcher, Jonathan Gill, Joanne Landesman, Amie Lesser, Brian Mazanec, Timothy Persons, Steven Putansu, Michael Shaughnessy, and Sam Wilson made key contributions to this report.

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## Strategic Planning and External Liaison

James-Christian Blockwood, Managing Director, [spel@gao.gov](mailto:spel@gao.gov), (202) 512-4707, U.S. Government Accountability Office, 441 G Street NW, Room 7814, Washington, DC 20548



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