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A Low-Yield, Submarine-Launched Nuclear Warhead: Overview of the Expert Debate

The Low-Yield D-5 Warhead

The Trump Administration developed a new low-yield version of the W-76 warhead for existing submarine-launched Trident II (D-5) missiles. Unclassified sources state that the existing W76-1 warhead has an explosive yield of around 100 kilotons. The National Nuclear Security Administration (NNSA) has said the low-yield version, the W76-2, would be configured “for primary-only detonation.” This could mean a yield of less than 10 kilotons.

Congress appropriated \$65 million for the W76-2 warhead in FY2019 and \$10 million to complete work in FY2020. It also authorized \$19.6 million in FY2020 for the Navy to integrate the warhead into the submarine force. NNSA completed the first modified warhead in February 2019, began delivering warheads to the Navy by late 2019, and completed the deliveries during FY2020. The Pentagon reported in February 2020 that the Navy had begun deploying the warheads by that time. NNSA did not disclose the total number produced, although it is likely just a very small portion of the W76 stockpile (estimated, in unclassified sources, to be around 1,300 total warheads).

The Trump Administration introduced the low-yield version of the W76 warhead in the 2018 Nuclear Posture Review (NPR). It cited the need for additional “tailored” and “flexible” capabilities to address the danger of coercive nuclear use, a concept described below, by Russia and North Korea. The NPR stated that this warhead would supplement existing U.S. strategic nuclear capabilities to “enhance deterrence by denying potential adversaries any mistaken confidence that limited nuclear employment can provide a useful advantage over the United States and its allies,” and that low-yield warheads would not add to the number of deployed SLBM warheads, but would replace some “higher-yield [SLBM warheads] currently deployed.”

The NPR report, and its argument in favor of a low-yield SLBM warhead, launched a debate among U.S. experts about the rationale for the development of such a warhead and the benefits and risks that might accrue from its deployment. While some argue that this warhead is a response to Russia’s so-called “escalate to de-escalate” strategy that will strengthen deterrence and raise the nuclear threshold, others contend that it will lower the threshold for U.S. use and increase the risk of nuclear war.

Deterrence vs. Warfighting

The core of the debate over the low-yield D-5 warhead focuses on the question of whether the United States has a gap in its current nuclear deterrent capabilities that can be filled by the deployment of a new low-yield warhead. The 2018 NPR and experts who support the report’s assessment

argue that adversaries might mistakenly believe the United States would be self-deterred from responding with nuclear weapons after an adversary’s nuclear use in a regional conflict, and therefore could be coerced into withdrawing from the fight if an adversary threatened nuclear use. They contend that Russia in particular might threaten to escalate to nuclear weapons if it were losing a conventional conflict, and note that Russia has exercised the use of low-yield nuclear weapons for this type of contingency. They argue that if Russia pursued this approach, the United States would only be able to respond with the higher-yield weapons like those currently deployed on submarine-launched missiles. The deployment of a low-yield D-5 warhead would therefore bolster deterrence by convincing Russia that the United States could respond with a proportional, limited attack.

Critics of the NPR’s analysis question whether the United States needs a new weapon to address Russia’s mistaken belief that it could threaten escalation without fearing U.S. retaliation. If the belief is mistaken, they argue, then the United States could respond by reasserting and reaffirming its commitment to its allies in Europe, so that Russia would know that this type of threat would not be met with a U.S. or NATO retreat. They also contend that the deployment of new low-yield options could increase the risk of nuclear war because their existence would make it easier for U.S. officials to consider the use of nuclear weapons in a conflict. Some have also argued that there is no “gap” in capabilities because the United States already has low-yield warhead options for gravity bombs and cruise missiles deployed on U.S. and NATO aircraft.

On these latter points, those who support the NPR’s analysis have pointed out that the low-yield SLBM could improve survivability and penetration as weapons delivered by aircraft would be vulnerable to an adversary’s air defenses. Some also cite the U.S. experience of deploying lower-yield nuclear weapons during the Cold War to posit that there is no evidence that the United States is more likely to use these weapons just because it has them.

The Potential for Limited Nuclear War

The debate has also included discussions about whether a war in which nations used small numbers of low-yield nuclear weapons could remain “limited,” or whether it would inevitably escalate to a more extensive nuclear exchange. The NPR’s analysis rests on the view that Russian might use a limited number of nuclear weapons if it is losing a conventional war, and that the United States should be able to threaten a limited response to deter Russia. Critics have countered that there is no such thing as “limited” nuclear war because any use of a nuclear weapon

would make a conflict something more than limited. Even if the numbers are small and the yields are low, they argue, the damage would be extensive. They have also argued that nuclear war could not be controlled, so even the limited use of nuclear weapons would risk a global catastrophe.

Some analysts dispute the idea that nuclear war cannot remain limited. Others, however, agree that the use of nuclear weapons would increase the risk of broader escalation and see this as a point in favor of the U.S. deployment of low-yield nuclear weapons. They argue that Russia seems to believe that it could use nuclear weapons in a limited way and deter the United States from responding with its larger warheads. By deploying a low-yield SLBM warhead, the United States would not only aim to convince Russia that the United States would respond after a limited attack, but would also bolster deterrence precisely because Russia's limited use of nuclear weapons could lead to an escalation to a broader nuclear exchange.

In disputing this analysis, some have questioned the NPR's assessment of Russian nuclear doctrine and have countered that the NPR's assertion that Russia has lowered its nuclear threshold is not based on sufficient evidence. They argue that the possible first use of nuclear weapons by Russia and North Korea would likely have less to do with a coercive nuclear strategy intended to deter the United States than with these countries' concerns about U.S. conventional superiority—that they would resort to nuclear weapons because they could not fight and win a conventional war.

The Discrimination Problem

Some experts have posited that the deployment of a low-yield SLBM warhead could create a new “discrimination problem,” in which an adversary like Russia would be unable to distinguish during a conflict if an SLBM launched by the United States carried just one low-yield warhead and was not part of a large attack. In this view, a U.S. launch intended to control the escalation of a regional conflict could contribute to Russia's decision to escalate to the strategic level due to misinterpretation and doubts about its early warning systems' accuracy.

Others have disputed this assessment, arguing that the U.S. policy of “limited nuclear options” has historically been, and continues to be, based on assessments that Russia's early warning systems could tell the difference between a single launch and large attack. They contend that Russia would likely delay its response until it had made that assessment. They also claim that the novelty of this “discrimination problem” is overstated because the United Kingdom already deploys low-yield warheads on its SLBMs, and the United States and United Kingdom rely on a “common pool” of Trident II D5 missiles—yet no one has ever claimed that this arrangement might lead to confusion about the size or scale of a U.S. retaliatory attack.

Submarine Vulnerability

Some have advanced the argument that U.S. ballistic missile submarines could be vulnerable to detection after the launch of a single or small number of missiles carrying low-yield warheads because the launch would reveal the boat's location. Others have countered that the boat would be able to move quickly enough to create a large, possibly

daunting search area, making it very difficult for Russia to pinpoint the boat's location with enough confidence to launch a successful attack.

Collateral Damage

Considerations about a potential reduction in collateral damage have also entered into the debate about the development of low-yield SLBM warheads. The U.S. military has generally favored, based on the Law of Armed Conflict, providing the President with nuclear options that have “less collateral effect.” By extension, some experts have posited the need for a “nuclear necessity principle,” where U.S. nuclear planners would “use the lowest-yield nuclear weapon possible,” and only in cases where hardened and buried targets could not be destroyed by conventional weapons. A low-yield D-5 warhead, they argue, would support this goal.

Others counter that the lower-yield warhead and less-stringent use parameters would actually increase the risk of nuclear use in a conflict. This, they argue, would actually increase the risk of nuclear war, and therefore increase the risk of devastating nuclear destruction, possibly in violation of the Law of Armed Conflict.

Anya Fink provided valued assistance in preparing this report.

CRS Products

CRS Report RL33640, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, by Amy F. Woolf

Other Resources

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John R. Harvey, Franklin C. Miller, Keith B. Payne, and Bradley H. Roberts, “Continuity and Change in U.S. Nuclear Policy,” *RealClear Defense*, February 7, 2018.

Jon Wolfsthal, “Say No to New, Smaller Nuclear Weapons,” *War on the Rocks*, November 22, 2017.

Francis J. Gavin, chair, “Policy Roundtable: The Trump Administration's Nuclear Posture Review,” *Texas National Security Review*, February 13, 2018.

Daryl Kimball and Kingston Reif, “The New U.S. Nuclear Strategy is Flawed and Dangerous. Here's Why,” *Arms Control Association*, February 15, 2018.

Austin Long, “Discrimination Details Matter,” *War on the Rocks*, February 16, 2018, also Austin Long, “Location, Location, Location,” *Lawfare*, March 11, 2018.

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