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.

Any 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
U.S. Department of Defense, Nuclear Posture Review,
John R. Harvey, Franklin C. Miller, Keith B. Payne, and Bradley
H. Roberts, “Continuity and Change in U.S. Nuclear Policy,”
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
Daryl Kimball and Kingston Reif, “The New U.S. Nuclear
Strategy is Flawed and Dangerous. Here’s Why,” Arms
Austin Long, “Discrimination Details Matter,” War on the
Rocks, February 16, 2018, also Austin Long, “Location,
Location, Location,” Lawfare, March 11, 2018.
Scott Sagan, “Armed and Dangerous,” Foreign Affairs,
November 2018.
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