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THE FUTURE OF THE OHIO CLASS SUBMARINE

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ABSTRACT

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The *Ohio* class submarine and its *Trident* weapons system is an engineering marvel designed to deter the aggression of the former Soviet Union by providing a credible retaliatory strike capability in the event of a nuclear attack. The deterrent effect of *Ohio* class submarine was exceptionally successful. Following the collapse of the Soviet Union, the role of the submarine and its weapons system in national strategy is less well enunciated. The current National Security Policy and National Defense Policy do not clearly identify a role for strategic nuclear deterrent forces. The National Military Strategy provides that nuclear capabilities will continue to act as a deterrent by providing military options to deter a wide range of threats including the use of weapons of mass destruction and large-scale conventional forces. However, deterrence is less effective against non-state actors or terrorists that would threaten to use weapons of mass destruction. With the threat of nuclear war reduced, the size of the nuclear capable force should also be reduced. This project will provide an opinion on the number of *Ohio* class submarines necessary to provide an adequate nuclear deterrent and make recommendations for the employment of those submarines removed from strategic missions.

THE FUTURE OF THE OHIO CLASS SUBMARINE

The *Ohio* class Fleet Ballistic Missile Submarine (SSBN) armed with the *Trident* weapons system is the single most powerful weapon in the United States arsenal ever conceived. The current fleet of fourteen ships, each carrying twenty-four *Trident II* D-5 missiles and the lion's share of the nation's operational nuclear warheads, is the very heart of the nation's deterrence against a nuclear attack. On patrol in the vast Atlantic and Pacific Oceans, the *Ohio* Class SSBN cannot be located assuring a massive retaliatory nuclear strike should an adversary attack the United States or its allies with nuclear weapons. Following the collapse of the Soviet Union, there has been much debate about this unique submarine and its mission with little effect. With the exception of removing four submarines of the class from strategic service, these submarines still conduct strategic deterrent patrols much as they and earlier classes of fleet ballistic missile submarines did twenty five years ago at the height of the Cold War. The United States faces new threats identified in the National Military Strategy that understandably place the U.S. nuclear deterrent capability behind that of the more pressing requirements of the war on terror. However, nuclear deterrence was the core of U.S. military strategy for four decades which produced a prodigious nuclear retaliatory capability. Today, the threat of a nuclear strike against the United States is less and does not warrant the size of our nuclear deterrent force including the *Trident* weapons system.

Since 1990, the number of U.S. attack submarines (SSNs) has been reduced from 96 ships to 56 yet the SSN force is being asked to accomplish more missions and tasks. For example, the requirements for one critical submarine mission, that of Intelligence, Surveillance, and Reconnaissance (ISR) have doubled in the last 15 years.[1] Exacerbating the decline, submarine construction has not kept pace with the shrinking fleet as older submarines are retired and are not replaced.

With the threat of nuclear war reduced and other threats identified, the number of *Trident* submarines conducting strategic deterrent patrols should be reduced. However, the Navy and Congress do not want to lose the capability of this unique ship. This paper proposes a reduction in the number of *Ohio* class submarines engaged in strategic operations and offers a plan for those that are removed from strategic service to meet new mission requirements, provide additional submarine capabilities normally associated with SSNs, and provide resources for the training of new nuclear trained officers and crew members.

History of the Trident Submarine

During the Cold War the nuclear triad consisting of strategic bombers, land-based intercontinental ballistic missiles (ICBMs), and the sea based Submarine Launched Ballistic Missiles (SLBMs), provided a very flexible and survivable deterrent force. The SLBM was and still is the most survivable leg of that triad and was purposefully designed that way from the very start. Careful to differentiate the role of the SLBM from the capabilities that the Air Force designed in its strategic bomber force, the Navy sacrificed missile accuracy for range and invulnerability in the first designs of the Fleet Ballistic Missile (FBM) program.[2] A long range missile would allow a submarine to take advantage of a larger expanse of ocean within which to hide. This revolutionary weapons system followed closely on the heels of the development of submarine nuclear propulsion affording nearly complete invulnerability as no external source of air is required to support a combustion engine. In the past, diesel powered submarines had to operate either on the surface of the ocean or near the surface with a snorkel above the surface of the ocean. In sharp contrast, a nuclear powered submarine, with no requirement for a combustion engine to provide propulsion, can remain submerged for as long as the crew can endure.

The first submarine launched ballistic missile, the *Polaris* A-1, went to sea on the *USS George Washington (SSBN 598)* in July 1963. Technological refinements enhancing primarily range as well as accuracy where achieved with the deployment of the Polaris A-3 missile four years later. The *Polaris* A-1 had a range of 1200 nautical miles; the A-3 extended the range to 2500 nautical miles. Continuing to improve the reach of SLBMs, the development of the *Poseidon* C-3 missile, the second design iteration of the FBM program, culminated in its deployment in 1971. This missile had a range greater than 2500 nautical miles that further expanded SSBN patrol areas. While range was increased in each new missile, accuracy was also improved; Circular Error Probable (CEP), the theoretical circle within which the warhead was expected to strike, was reduced from 1800 meters to less than 450 meters.[3]

As Soviet-American relations worsened and as missile accuracy and destructiveness improved during the mid- and late 1970s, both nations sought to protect their respective nuclear arsenals by greatly hardening their forces on land. Consequently, strategic doctrine shifted from that of Mutually Assured Destruction – emphasizing the destruction of cities and populations – to destruction of hardened targets, or counterforce targets, particularly following an initial strike. This task was expected to be accomplished by the FBM force as it was the most survivable. This mission demanded greater accuracy, payload, and range in order to destroy hardened targets. The result of nearly a decade of development, the *Trident I* C-4 missile was deployed in

1979 on the *USS Ohio (SSBN 729)* and had a range in excess of 4000 nautical miles and, in an attempt to hold hardened targets at risk, had a CEP of less than 300 feet while carrying significantly larger warheads. However, the *Trident I* C-4 capabilities were deemed insufficient to destroy counterforce targets that American planners theorized were necessary to deter Soviet aggression. Hence began the push to a truly massive, survivable, accurate weapon capable of striking anywhere in the Soviet Union at counterforce targets from virtually anywhere in any ocean.[4] The result, the *Trident II* D-5 missile, is nearly twice the size of the *Trident I* C-4 and is capable of delivering as many as eight 450-kiloton W-88 warheads 6000 nautical miles [5] with a 50 % improvement in accuracy. More than a decade in development, the D-5 missile was initially deployed in 1990 on the *USS Tennessee (SSBN 734)*, the ninth *Ohio* class hull. During this same period, continued improvement in submarine propulsion and acoustic silencing was added to the design of the *Ohio* class submarine. The design was eminently successful.

Large enough to carry the 24 huge D-5 missiles and quiet enough to hide from the most aggressive Soviet SSNs, the United States fielded a formidable weapon system that could hold all of the Soviet Union's hardened targets at risk. During this same period, the American SSNs achieved undersea dominance throughout the world's oceans and although the Soviets deployed their own SSBNs, they were always vulnerable to U.S. SSNs. This fact curtailed or arguably eliminated the Soviet retaliatory strike capability. During this same period, U.S. strategic planners shifted nuclear targeting to counterforce or hardened targets and no longer targeted large population centers as a nuclear deterrent both in response to political pressure and because they had the technology to do so. In fact, the Navy, with its highly capable SSN force holding Soviet SSBNs at risk and the *Trident* weapons system threatening the land-based, counter-strike capability of the Soviet Union, gave strategic planners options in nuclear strategy that went far beyond the hostage situation of MAD.[6] This situation gave the United States a significant advantage and pushed the Soviet Union to the bargaining table precipitating the first Strategic Arms Reduction Treaty.

The Strategic Arms Reduction Treaty (START I) entered force in December 1994 after being ratified by the United States Senate and the Russian Parliament in October and November 1992 respectively, greatly limiting the number of warheads and launcher systems that each nation could field.[7] The initial impact of the treaty – or more specifically, the progress of treaty negotiations – on the *Ohio* class submarine force, coupled with budgetary constraints, was the reduction of the original building plan of twenty submarines to eighteen.[8] The last *Ohio* class hull, the *USS Louisiana (SSBN 743)*, was commissioned in September 1997.[9] The ultimate impact of the treaty was the removal of the first four *Ohio* class submarines from the

strategic arsenal. Subsequently, prior to the deadlines for warhead reduction imposed by START I, considerable discussion occurred between Navy planners and the Congress about the future of these four submarines beyond simply breaking up the hulls. During the same period, the number of SSNs that the U.S. operated declined precipitously. This loss of force was exacerbated by the cancellation of the *Seawolf* submarine construction program due to the excessive cost. Consequently, both the Navy and the Congress recognized that retaining the four *Ohio* class hulls in non-strategic roles would ameliorate the loss of submarine capabilities particularly in Carrier Battle Group support and Special Forces applications.[10] The first four submarines of the *Ohio* class commenced SSGN conversion and refueling overhauls in 2004.[11] The next four ships of the class, beginning with the *USS Henry M. Jackson (SSBN 730)* in 2001, have completed maintenance replacing the smaller *Trident I* C-4 missile with the larger *Trident II* D-5 missile.

The *Ohio* Class Submarine Force Today

Current operational status and basing of the eighteen *Ohio* class submarines are detailed in Table 1, below.[12]

Ship (hull number) [mo./year commissioned]	Homeport	Role
USS Ohio (SSGN 726) [11/1979]	Bangor, WA[13]	SSGN
USS Michigan (SSGN 727) [11/1982]	Bangor, WA[14]	SSGN
USS Florida (SSGN 728) [6/1983]	Bangor, WA[15]	SSGN
USS Georgia (SSGN 729) [2/1984]	Kings Bay, GA[16]	SSGN
USS Henry M. Jackson (SSBN 730) [10/1984][17]	Bangor, WA	Strategic Patrol
USS Alabama (SSBN 731) [5/1985][18]	Bangor, WA	Strategic Patrol
USS Alaska (SSBN 732) [1/1986][19]	Bangor, WA	Strategic Patrol
USS Nevada (SSBN 733) [8/1986][20]	Bangor, WA	Strategic Patrol
USS Tennessee (SSBN 734) [12/1988]	Kings Bay, GA	Strategic Patrol
USS Pennsylvania (SSBN 735) [9/1988]	Bangor, WA	Strategic Patrol
USS West Virginia (SSBN 736) [10/1990]	Kings Bay, GA	Strategic Patrol
USS Kentucky (SSBN 737) [7/1991]	Bangor, WA	Strategic Patrol
USS Maryland (SSBN 738) [6/1992]	Kings Bay, GA	Strategic Patrol
USS Nebraska (SSBN 739) [7/1993]	Kings Bay, GA	Strategic Patrol
USS Rhode Island (SSBN 740) [7/1994]	Kings Bay, GA	Strategic Patrol
USS Maine (SSBN 741) [7/1995]	Bangor, WA	Strategic Patrol
USS Wyoming (SSBN 742) [7/1996]	Kings Bay, GA	Strategic Patrol
USS Louisiana (SSBN 743) [9/1997]	Kings Bay, GA	Strategic Patrol

TABLE 1

The *Ohio* class submarines remain the most survivable part of the nuclear triad of strategic bombers, land-based ICBMs, and submarines. Since the collapse of the Soviet Union and in compliance with arms reduction treaties, U.S. bomber and ICBM forces have undergone significant reductions in size and operational tempo. However, the fourteen *Ohio* class ships that are strategically loaded continue strategic deterrent patrols. Although the Soviet Union collapsed in the early 1990's and former Soviet SSBNs largely returned to their bases, the U.S. SSBN force, including *Ohio* class submarines, actually increased its operational tempo during the first half of the 1990's.[21] In recent years, these submarines have taken on more tasks that are typically shouldered by SSNs. In an effort to allow the shrinking SSN force to continue to meet requirements set by Combatant Commanders and others, SSBNs have taken on training and testing roles that previously were almost exclusively handled by SSNs. But there is a limit to what missions an *Ohio* class submarine may undertake. In many respects the submarine's nuclear deterrent mission makes it incompatible with most SSN missions.

Naval ships, including submarines, are generally designed to accomplish many tasks. However, the *Ohio* class submarine is the exception to this rule. It was designed for one task – nuclear deterrence. Everything about the submarine is centered on the *Trident* weapons system or the support of that weapons system. With the goal of maximizing the time that each ship can remain at sea when it is essentially invulnerable, the *Trident* weapons system as a concept extends beyond the ship itself to the maintenance and support structures ashore. Two new submarine ports were built from the ground up to accommodate the unique operational tempo of the *Ohio* class submarines so that all required maintenance, including drydock periods, could be completed in the 30-day refit periods that bookend each patrol. Training facilities and corresponding personnel programs were built exclusively around the two-crew concept that is the foundation of the high operational tempo of the *Ohio* class submarine. Equipment was designed to be easily removed from the ship and replaced within hours. Supplies were containerized to speed the process of replenishing a ship for patrol. Communications systems were designed to allow operation at deeper depths and with more redundancy. Even the Navy's supply system was modified to accommodate the unique operations of the *Ohio* class submarine. The *Ohio* class submarine, and its *Trident* weapons system, in its role as a nuclear deterrent weapon is inseparable from its support and maintenance infrastructure ashore.

The *Ohio* class submarine, although designed around an exceptional weapons system, is still a submarine at its very core. It is powered by the most powerful submarine power plant

ever put to sea – the S-8G nuclear reactor. It must still submerge and surface, navigate the oceans of the world, and defend itself. It is outfitted with a very capable sonar and defensive system that put it on par with the *Los Angeles* class submarines that were being produced at the same time that the *Ohio* class submarines were being built. And like all submarines, all this technology and engineering brought together in a single ship is expensive. The Federal Government estimated in 1996 that the construction of eighteen *Ohio* class submarines and outfitting them with the *Trident* weaponry cost $34.8 billion. Further, it was estimated that the cost of operating a single SSBN for a year including two crews was approximately $4.3 million per year[22] which has undoubtedly increased in the last ten years. Also of note, the conversion of the first four *Ohio* class submarines has been budgeted at $500 million per submarine.[23]

In 2000, the Navy had not acquired a new submarine in nearly three years although some new construction was in progress on the new *Virginia* class submarines, the replacement for the cancelled *Seawolf* program. The oldest of the current strategically loaded *Ohio* class submarines, the *Henry M. Jackson,* would have been decommissioned in 2014 after a nominal 30 year hull life. With no replacement SSBN designs in progress and facing a future where submarine procurement would be particularly difficult, the Navy delayed the inevitable decision to pursue a new SSBN submarine design by extending the hull life of the *Ohio* class submarines by 15 years. This decision exacerbated a problem identified seven years before – the aging *Trident II* D-5 missile inventory. Following the arms reduction initiatives of the 1990's, acquisition of the missile airframe was slowed. The D-5 missile has a life expectancy of 20 years and there are insufficient numbers of missiles in inventory to outfit a fleet of fourteen submarines, each with a life span of 45 years. The Navy is now purchasing new D-5 missiles to fill the shortfall at nearly $30 million per missile. The Navy estimates that it will need to purchase 233 missiles.[24]

Nuclear Deterrence and the *Ohio* Class Submarine

Facing ever increasing costs, an aging fleet and weapons stockpile, and a world that is fundamentally different than the one for which the *Trident* weapons system was designed, pressures to reduce, restructure, or even eliminate the *Ohio* class submarine force and its weapons system have increased. The first and most obvious question that must be asked before considering a reduction in the size of the *Trident* force is whether or not the mission for which they were originally designed – that of nuclear deterrence – is still a credible mission. The threat posed by Russia and its nuclear arsenal is significantly less that what it was thought to be over a decade ago. This fact, coupled with the sudden emergence of a worldwide terrorist

threat, has pushed the study of nuclear strategy to the margins, if not completely off the table.[25] This same fact certainly contributed to the quickness of President Bush's treaty negotiations that produced the Moscow Treaty of 2001.[26] By comparison, the START I treaty took over a decade to negotiate and ratify. However, scholars all uniformly agree that the nuclear threat is still there and cannot be ignored. The current situation with Iran is proof that nuclear weapons are increasingly being sought by smaller nations. Scholars also agree that a nuclear retaliatory capability is effective in deterring small nations from using their newly acquired capabilities but certainly is not effective in preventing proliferation of nuclear weapons. If anything, a nuclear retaliatory capability seems to encourage proliferation.[27] With the proliferation of nuclear weapons comes the possibility that terrorists or terrorist organizations will obtain nuclear weapons. Nuclear strategists argue that a terrorist cannot be deterred from using a nuclear weapon through retaliatory threat and that pre-empting an attack is a more appropriate approach.[28] However, a nuclear pre-emptive strike is considered implausible; instead, precision weapons with conventional ordnance and extensive command and control networks combined with greater intelligence capabilities are now the preferred means to eliminate or deter the terrorist threat. One author cautiously opined we are "transition[ing] to a world in which conventional weapons are the queens of the chessboard and nuclear weapons have a backstopping role."[29] In a nutshell, nuclear deterrence is still necessary to deter the aggressive tendencies of nations. However, the terrorist remains the "wild card" and must be countered differently. The question then becomes how much nuclear capability is enough.

Determining the Force Size

The size of the nuclear arsenal is influenced by three factors -- national strategy, arms reduction treaties and, ultimately, resources. The capacity to retaliate in kind following a nuclear strike was a hallmark of the national strategies of the United States for years until the release of the *National Security Strategy* (NSS) in September 2002. Section V of the document states that the United States will "prevent our enemies from threatening us, our allies, and our friends with weapons of mass destruction." That statement infers a nuclear deterrent role; however, the next paragraph identifies "an historic reduction in… …nuclear arsenals"[30] and focuses on the threat of weapons of mass destruction in general and details a strategy to combat those weapons. A strategic nuclear deterrence policy is hard to recognize or even extrapolate and, further pushing aside a nuclear deterrence policy, the NSS specifically states that "[t]raditional concepts of deterrence will not work against a terrorist enemy…"[31] The *National Defense Strategy of the United States of America* (NDS) clouds the role of nuclear forces even more by

stating the NSS will be accomplished by "deterring aggression… …by maintaining capable and rapidly deployable military forces… "[32] which implies a conventional, expeditionary force. Again, as with the NSS, it's difficult to discern a nuclear deterrence policy in this document. Finally, the National Military Strategy (NMS) provides some direction with regard to nuclear capabilities when it states that nuclear deterrence will continue to play a role by providing military options to deter a wide range of threats.[33]

In November 2001, President Bush agreed with Russian President Vladimir Putin that by December 2012, both nations would reduce the number of deployed nuclear warheads from the levels established by the START I treaty to between 1700 and 2200 warheads.[34] This treaty, the SORTS or "Moscow" Treaty, continues the arms reduction initiatives that began with the Strategic Arms Limitation Treaties (SALT I and II) which are no longer in force. The START treaties, as mentioned earlier, significantly affected the *Trident* weapons program in that the reduction in warheads and launchers required by the treaty caused the removal of four *Ohio* class submarines from their strategic role.

There is one more document that affects the current nuclear deterrent capabilities of the United States and that is the Nuclear Posture Review (NPR) of 2001 which, among other things, directed that the nuclear arsenal be reduced to 1700 – 2200 warheads by 2012 matching the Moscow treaty initiatives. Unfortunately the document did not provide a detailed plan for accomplishing the task. This document redefined the decades-old nuclear deterrent Triad but kept the *Ohio* class submarine force intact. It also identifies an aging nuclear weapons infrastructure that is in need of recapitalization as well as the need to develop new warheads.[35] In one of its more controversial parts, the NPR advocates the development of conventional warheads as well as a class of new nuclear weapons for destroying deeply buried targets that can be deployed on the D-5 missile.[36] However, by most accounts, the NPR perpetuates a nuclear capability that was framed by the Cold War.[37]

Finally, the process of financing the military in concert with the Quadrennial Defense Review (QDR) also affects the nuclear capability of the United States and, by extension, the size of the *Ohio* class submarine force. The 2005 QDR echoes the national strategy documents by advocating a more rapidly deployable force – a force that can counter the proliferation of weapons of mass destruction (WMD) and influence the world with maneuver capabilities. The QDR, like the NPR, proposes development of conventional weaponry to be deployed on the *Trident* missile within two years and continues to support the conversion of the first four *Ohio* class ships to the SSGN role.[38] While the QDR doesn't delineate specific numbers of *Ohio* class submarines for specific roles, the Congress of the United States in conjunction with the

Navy has been exploring the savings associated with reducing the number of SSBNs in the strategic inventory to 12 or 10.[39] The explorations of Congress in reducing the size of the *Trident* weapons program as a nuclear deterrent mirrors the NSS, NDS and NMS in that conventional weapons capabilities are now regarded as more important than nuclear capabilities. This is illustrative that politicians and military leaders alike think that the current SSBNs force is larger than necessary considering the threats identified in the NSS and other documents and the arms reductions directed by the Moscow Treaty and the NPR.

New Roles for the Trident Submarine

The Trident weapons program can be described as "middle-aged" yet is expected to provide U.S. nuclear retaliatory capability for the next twenty years. The NPR addresses the issues of inadequate numbers of missile airframes as well as the fact that the two warheads carried by the missile must be upgraded.[40] To this end the U.S. has significantly invested in recapitalizing the nuclear weapons infrastructure to ensure the viability of the *Trident* weapons system for the next quarter century. However, the 2005 QDR complicated the future of the *Trident* weapons program in advocating placing conventional warheads on the *Trident II* D-5 missiles, adding a mission that the weapons system will have to accommodate without compromising its ability to execute the nuclear deterrent role. This new mission may prove to be very difficult to accomplish given the extreme differences between a well developed strategy of nuclear deterrence through an assured response following a nuclear strike and newer, forward-looking, aggressive, preventative strategies. In many respects the *Trident* weapons system and *Ohio* class submarine are victims of their own success. Fleet Commander Evaluation Tests or FCETs have repeatedly demonstrated that the *Trident II* D-5 missile is extremely reliable and accurate. The submarines themselves are regarded as masterpieces of submarine design and are highly regarded by the officers and crew that man them. It is not surprising that the United States government and the Navy are loath to give the submarines to the ship breakers before their time irrespective of the cooling nuclear climate. The 2005 QDR, in advocating a new mission for the *Trident* weapons system, is an attempt to capitalize on the unique capabilities of the weapons system and the submarine to fit the national strategy. The proof is the retention of the first four submarines following conversion to SSGNs.

Scholars have debated the merits of putting conventional warheads on ICBMs and SLBMs that normally carry nuclear weapons. The argument is that, in modern nuclear deterrence, the ability to destroy an adversary's nuclear capability without having to use nuclear weapons would be the primary deterrent but the role of deterring another state's first use of WMD would rest

with the nuclear arsenal. Scholars also point out that the SLBM, because of an inherently longer response time when called upon to launch, is actually a stabilizing factor in a nuclear exchange and is appropriate for a nuclear policy of assured retaliation. Scholars argue that the better option would be to convert all ICBMs from a nuclear capacity to a conventional role. The land-based ICBM can be employed much more quickly and is considered a first-strike weapon. Removing the nuclear warheads from all these missiles would be seen as stabilizing in that a "use before lose" mentality would be eliminated.[41]

Russia, China, the United States, and other nations field early warning radar systems that can quickly detect and pinpoint a ballistic missile launch. These systems can quickly determine the trajectory of the weapon and its intended target but are incapable of determining if the warhead is conventional or nuclear. The act of launching a ballistic missile from a submarine, regardless of its payload, could trigger a nuclear response. Russia for years has indicated that their nuclear command and control systems are designed to promote faster launch decisions than in the United States. A sudden SLBM launch may trigger the Russian government's traditional command and control system, leaving very little opportunity for digesting information and opting to delay a nuclear launch.[42] Additionally, the trajectory of a ballistic missile launched from the Pacific Ocean or Atlantic Ocean, the normal patrol areas of the *Ohio* class submarine, would most likely cross China or Russia assuming the target to be somewhere in the Middle East or Asia in general. This has two significant implications. First, the U.S. would have to inform Russia or China of its intentions prior to initiating a strike from a submarine if either of those two nations was not the intended target which blunts the effectiveness of the strike. Second, the launch acts as a datum for the submarine itself. If the launch platform is also carrying nuclear weapons, the effect of launching a missile makes the entire submarine and its nuclear payload more vulnerable. Assuming that other nations have been informed of an intention to launch a strike from a ballistic missile submarine, this may afford a nation an opportunity to actually destroy the submarine. For these two reasons, it is unlikely that any U.S. President will execute a non-nuclear strike from an *Ohio* class submarine on strategic deterrent patrol.

Recommendations

Unquestionably, the *Trident* weapons system is highly effective in assuring a significant retaliatory capacity in the event of a nuclear strike against the United States. However, the United States can no longer afford, either politically or economically, a force of fourteen SSBNs. At the same time the Navy wants to retain the unique capabilities of the *Ohio* class submarine

as well as bolster the capabilities of the SSN force. While the SSBN will never be able to do all that an SSN can accomplish even after conversion to the SSGN role, the effect of adding additional submarines to the inventory can serve to distribute submarine mission requirements over a larger submarine force. Clearly, the retention of the *Ohio* class submarine hull is important.

When the United States reduces its nuclear warhead inventory to the limits imposed by the Moscow Treaty and the NPR, a maximum of 2200 weapons will have to be distributed amongst the nuclear triad of submarines, bombers, and land-based ICBMs. If 2200 nuclear weapons is the target in 2012 and assuming a distribution that is similar to current distribution, 500 would be carried by ICBMs and 260 would be assigned to bomber forces, leaving approximately 1440 for SLBMs.[43] These warheads would be distributed among 14 *Ohio* class submarines resulting in approximately 4 warheads per missile. This distributes the available warheads across a large force which maximizes survivability but affords little savings in that additional missile airframes must be purchased to outfit a submarine force with a 45-year lifespan. The Navy should reduce the SSBN force to 10 submarines, which would increase the number of warheads per missile to six. Reducing the size of the SSBN force would save money in two ways. First, fewer D-5 missile airframes need be purchased. Second, depending upon the future missions assigned, the cost of continuing to operate four SSBNs in strategic service is eliminated. This second cost savings is reduced as the four submarines removed from the strategic mission would still be put to sea but not with the expense of maintaining a nuclear arsenal.

The Navy should not invest in conventionally armed *Trident II* D-5 missiles. As described above, it is doubtful that the capability would ever be used. This would save the money necessary to redesign the missile to accommodate new weaponry and an accompanying new command and control network. As discussed above, the *Trident* weapons system is a comprehensive system that includes not only the ship and missile, but the command and control system as well as the shore based maintenance and training systems. With a significantly different mission, these maintenance and training systems would have to be modified. And finally, with a smaller SSBN force, the deterrent value of each missile becomes that much higher. Displacing limited nuclear warheads for conventional capabilities disproportionately reduces the retaliatory capability of the force.

The four *Ohio* class submarines removed from strategic nuclear deterrent role should be converted to one of two roles. First, two of the platforms should be converted to the SSGN role at a total cost of approximately $1.0 billion. This would provide additional Special Forces and

Tomahawk Land Attack Missile (TLAM) strike capabilities increasing the availability of these mission capabilities within the submarine force. Recently announced proposals for arming Trident submarines with a conventionally armed Intermediate Range Ballistic Missile (IRBM), or the joint high speed weapon offer non-strategic *Ohio* class submarines an even broader array of mission capabilities.[44] These tantalizing new capabilities are yet another compelling reason to move a portion of the *Ohio* class submarine fleet from strategic to conventional roles.

Second, the remaining two SSBNs freed from their nuclear deterrent role should be moved to Charleston, SC to be used as nuclear power training facilities. Currently, the Navy operates two retired *Lafayette* class SSBNs to train nuclear reactor operators and mechanics prior to being sent to the fleet. These two older class SSBNs are outfitted with nuclear reactors that are nearing the end of their useful lives and do not match the technology that is in the fleet today. By comparison, the *Ohio* class submarine has a power plant that is identical to a training facility in upstate New York and more closely resembles what is in the fleet today. Retiring two *Ohio* class submarines and retaining them as nuclear training facilities eliminates the cost of operating each submarine with two crews[45] saving approximately $8.6 million per year. The Navy would inherit a training reactor that will operate for the next 25 to 35 years[46] and not have to replace the existing training reactors with new nuclear reactors or simulators. Estimates of building a replacement training reactor approach $1.5 billion and might require 20 to 24 years to construct assuming a construction program similar to that of a commercial power plant.[47]

Conclusion

The *Ohio* class submarine is a marvel of engineering and its *Trident* weapons system is a remarkably capable weapons system. It is no wonder that both the Navy and the civilians that direct the Navy want more out of this extraordinary machine. However, we cannot forget that the *Ohio* class submarine with its weapons system is the distillation of thirty years of nuclear deterrence and quintessentially outfitted for that one role. It is a role that cannot be diluted by other missions if the submarine is to be successful at nuclear deterrence. Isolated from the nuclear deterrent role, the *Ohio* class submarine can offer the nation years of operation that will support the National strategy and provide a realistic training facility for future submariners.

Endnotes

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[13] The USS OHIO (SSGN 726) completed conversion to SSGN status in February 2006. She completed her last strategic deterrent patrol in August 2003.

[14] The USS MICHIGAN (SSGN 727) commenced a refueling overhaul and conversion from SSBN to SSGN at Puget Sound Naval Shipyard in October 2004. She is expected to be homeported in Bangor, WA when the overhaul and conversion are completed in late 2006.

[15] The USS FLORIDA (SSGN 728) commenced a refueling overhaul and conversion from SSBN to SSGN at Norfolk Naval Shipyard in April 2004. In January 2003, FLORIDA was the first OHIO class submarine to successfully launch a Tomahawk cruise missile from a specially modified ballistic missile tube. She is expected to be homeported in Bangor, WA when the overhaul and conversion are completed in early 2006.

[16] The USS GEORGIA (SSGN 729) commenced a refueling overhaul and conversion from SSBN to SSGN at Norfolk Naval Shipyard in October 2005. She is expected to be homeported in Kings Bay, GA when the overhaul and conversion are completed in mid-2007.

[17] The USS HENRY M. JACKSON (SSBN 730) completed a back-fit from the Trident I C-4 missile to the Trident II D-5 missile in late 2002.

[18] The USS ALABAMA (SSBN 731) completed back-fit from the Trident I C-4 missile to the Trident II D-5 missile in late 2002.

[19] The USS ALASKA (SSBN 732) completed back-fit from the Trident I C-4 missile to the Trident II D-5 missile in late 2005.

[20] The USS NEVADA (SSBN 733) will complete back-fit from the Trident I C-4 missile to the Trident II D-5 missile in late 2006.

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[37] Freedman, 433.

[38] Donald H. Rumsfeld, *The Quadrennial Defense Review Report* (Washington, D.C.: The Pentagon, February 2006), 50.

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[40] Rumsfeld, *Nuclear Posture Review,* 16.

[41] Cimbala, 47.

[42] Ibid, 50.

[43] Thomas Cochran, "Too Many, Too Slow: The Bush Administration's Stockpile Reduction Plan," 7June 2004; available from http://www.nrdc.org/nuclear/fstockpile.asp; Internet; accessed 10 March 2006.

[44] Merrick Carey, "Multi-Tasking Subs," *Proceedings*, Vol. 132/3/1237 (March 2006): 2.

[45] The Navy concept of Operations for the new SSGN includes a dual crew to maximize the period that each SSGN can operate at sea.

[46] The Navy based the hull life extension of the OHIO class submarine on both metallurgical analysis of existing submarines and an understanding that the unique nature of SSBN operations tended to place less stress on the hull than a comparable SSN. Provided a submarine hull isn't subjected to the stresses associated with submerged operation it is plausible that the hull would last much longer.

[47] Ron Hagen, "Charts On Plant Ownership, Costs, License Extensions, And Future Trends," 17 July 2003; available from http://www.eia.doe.gov/cneaf/nuclear/page/analysis/nuclearpower.html; Internet; accessed 10 March 2006.