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MASTER OF MILITARY STUDIES

**Raising the *Iowa*: Reactivating the *Iowa* Class Battleships to Fill the
Current Naval Surface Fire Support Vacancy**

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

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Executive Summary

Title: Raising the *Iowa*: Reactivate the *Iowa* Class Battleships to Fill the Naval Gunfire Support Vacancy.

Author: Major Rene Torres, United States Marine Corps

Thesis: While US troops (both Marines and Army) transition from ship to shore, the Navy should re-commission the mothballed *Iowa* class battleship in order to fill the present fire support gap and incorporate the larger caliber (16 inch) gun systems in the development of future Naval Surface Fire Support (NSFS) platforms.

Discussion: The nation ceased to obtain a viable Naval Gunfire Support (NGFS) capability since the decommissioned the *Iowa* class battleships in the early 1990s. With the loss of this valuable asset and the absence of a near-peer competitor in the Soviet Union, both the Navy and Department of Defense (DOD) have strayed from the value and necessity of the large caliber (16-inch) naval gun and the platform in which it is mounted. Over the years the Navy has developed an over reliance on precision guided missile munitions. The Navy's leadership has convinced both congress and the Marine Corps that the combination of the smaller caliber, single gun mounted NGFS shooters and precision missiles could support the needs of the littoral ground forces. A driving desire for a modernized fleet coupled with a belief that the amphibious assault mission has been filed away to history, the Navy has spent years of development and funding on smaller caliber platforms that lack the lethality and volume of fire to support the land component. As a result of the advancements in anti-ship missiles amongst the world's belligerents, the combination of the Navy's doctrine and current NGFS ranges, today's NSFS providers have been rendered useless to the ground commander. With little effort and funding compared to the money that the Navy has invested since 1991, the reactivation of the nine by 16-inch caliber *Iowa* class battleship, can not only fill the NGFS vacancy, but bolster the current battle groups with their multi-mission abilities and relieve some of the pressure from the nation's aircraft carriers. Existing technologies will allow the Navy to provide effective and lethal naval gunfire for a greater duration while reducing the ship's threat to anti-ship missiles.

Conclusion: With China advancing as a near-peer competitor, and the instability of rogue governments like North Korea and Iran, the time to return the *Iowa* to service is now. Through modernization and modifications, the *Iowa* can not only meet the NSFS requirements of the nation, but also serve as a test bed for the development of the next generation large caliber war ship.

Preface

The inspiration for this paper stems from the desperate gap in effective Naval Surface Fire Support (NSFS) during my time in the Marine Corps. As a field artilleryman, I understand both the necessity and importance of responsive, large caliber fire support and the value it brings to the combined arms fight. However, while the landing force transition from ship to objective within a hostile littoral, field artillery will not be immediately available. Historically, NGFS has provided this vital requirement in fire support. The value of a larger caliber naval gun has proven its worth from World War II to Operation Desert Storm. However, since the decommissioning of the 16-inch caliber *Iowa* class Battleships in the 1990s, America's forcible entry from the sea capability has been diminished if not lost. Replaced with a much smaller caliber (5-inch) weapons system, current NSFS does not meet either the Marine Corps or the Joint Force's requirements to support a forcible entry capability.

The capability of the larger caliber naval gun and the United States Navy's ability to provide effective fire support for an amphibious assault has been missing for close to twenty years. Testing and funding spent on numerous concepts and replacements have filled this time, however yielding no results. The Navy's desire for increased technology and new ships has blinded them from recognizing the *Iowa* class battleship as the answer to the NSFS GAP. The modernization, service life extension programs (SLEP) and more importantly funding, that could have been implemented into the *Iowa* class over the past twenty years could have reduced if not eliminated this vital fire support gap we have today.

The focus and direction of this paper was influenced by a number of key contributors and/or advisors. First I would like to thank my wife Rebecca for facilitating the time I needed to research and create this work. To my son Samuel and daughter Sophia for understanding that I needed to do "Computer work" and would not be able to play. Finally, I would like to thank Dr. B. A. Wineman for providing suggestions and helping to guide the format of the paper and whose patience and mentorship allowed this paper to be completed.

On 28 February 1991, the United States Military executed its last combat fire mission from an *Iowa* class battleship in support of Operation Desert Storm. That same moment also marked the last time that the US Navy/Marine Corps possessed an effective and robust Naval Gunfire Support (NGFS) platform. Serving in their third major conflict since their respective 1942-1944 commissioning, the battleships of the *Iowa* Class would end their combat service by firing 52 Tomahawk missiles and 1,078 16-inch projectiles in support Operation Desert Storm. Since the Battleships' post-Desert Storm deactivation in 1991, the US Navy has been unable to provide a NGFS platform that can provide the necessary results to adequately support a forcible entry capability for the Marine Corps or Joint Force.

While US troops (both Marines and Army) transition from ship to shore, the Navy should re-commission the mothballed *Iowa* class battleship in order to fill the present fire support gap and incorporate the larger caliber (16 inch) gun systems in the development of future NGFS platforms. Long gone are the days of the 16-inch guns of the *Iowa* class battleships and the effective NGFS to match. From World War II through the early 1990s, the *Iowa* class battleships loomed off enemy shorelines with the primary role of providing effective and deadly fire support.¹ The US Navy's current NGFS capable ships fall dangerously short of the needs of the Marine Corps to maintain a forcible entry from the sea capability. As has been stated by two former Commandants of the Marine Corps, Generals James L. Jones, USMC (Ret) and General Michael W. Hagee, USMC (Ret), the virtual absence of NGFS within the littoral battle space, places Marines at considerable risk.² The Navy's current arsenal of NGFS platforms do not maintain the requisite lethality to destroy hardened enemy targets during shaping or preparation phases of an amphibious assault. The Navy's current platforms also fail to provide adequate ranges to facilitate continuous, responsive fire support for maneuver elements operating within

the littoral regions. Additionally, current NGFS platforms fail to provide the psychological effect and force projection that came hand in hand with the blazing, off shore presence of an *Iowa* class battleship. Former Executive Secretary of the National Security Council William L. Stearman stated, "I am absolutely convinced that a battleship stationed off Kuwait in July 1990, and our declared readiness to use it, could well have discouraged Iraq from attacking, sparing us the enormously costly Persian Gulf war."³

However, perhaps the greatest issues regarding the lack of effective NGFS lies within a strategic divide between the Navy and Marine Corps' vision for future warfare. Despite the Marine Corps' leadership's continued statements, identifying the requirement for an improved NGFS capability, the Navy has seemingly ignored the Marine Corps' requests. As stated in a 13 December 2005 Government Accountability Office (GAO) report, "Primarily, aviation can essentially meet Marines' fire support requirements with acceptable risk."⁴ The Navy is convinced that aviation can support the amphibious landing force's fire support needs.

Many experts have identified that the preponderance of the world's population resides within 50 to 60 miles of its littoral regions. They also predict that 75 % of the world's population within the littorals will reach up to 9 billion by the year 2050.⁵ Soon after the conclusion of Operation Desert Storm, Major General J. M. Myatt, USMC (Ret), provided a concept in which he forecasted that with the growing littoral populations, the world's future troubles and instabilities would develop within urban areas in and around the littorals. Both the Navy and Marine Corps embraced General Myatt's predictions and have based their respective future war-fighting theories on concepts such as Ship to Objective Maneuver (STOM), Sea Basing and Operational Maneuver From the Sea (OMFTS). Innovative platforms such as the MV-22 Osprey and the expeditionary fighting vehicle (EFV) will enable the Marine Corps to

push farther and faster into the littorals. However, with the absence of an all-weather, responsive and effective fire support platform to support these maneuver elements, these aforementioned systems cannot fully exploit the concepts in which they were created to execute.

Requirements: The Marine Corps has long ago identified the requirement to improve NGFS by way of official requests from the Corps' high-level leadership. In 2000, in an open press forum, then Commandant of the Marine Corps (CMC), General James Jones addressed his concern for the lack of a viable NSFS platform. "I have a lot of concerns about naval surface fire...the Marine Corps should be concerned about fire support from the sea...what has taken up the slack for us is Aviation...but we still haven't solved the problem of how to see through the clouds in the close air support business or to deliver ordnance in all kinds of weather. Naval Gunfire...help(s) you get through that."⁶ NGFS is an all weather platform that is not as easily restricted by poor weather conditions and is severely less effected by poor sea state conditions, as opposed to aviation.

In 2002, the Commanding General of the Marine Corps Combat Development Command (MCCDC), Lieutenant General Edward Hanlon Jr. wrote a letter to the then Chief of Naval Officer (CNO) of the US Navy, identifying the required ranges that NGFS platforms must effectively meet in order to support the Marine Air Ground Task Force (MAGTF) and its ever changing challenges of amphibious operations. The requirements were divided into three phases: a near-term, calling for a maximum range of 41 nautical miles (nm) within the 2004-05 timeframe, a mid-term goal of 63 nm projected for 2006-09, and a 97 nm far-term goal projected for 2010-2019.⁷ These requirements reflected the need to support the United States Marine Corps' capstone concept of expeditionary maneuver warfare. Again, in February of 2004, CMC General Michael W. Hagee drafted a report to the Secretary of the Navy identifying the lack of

NGFS support as it pertained to amphibious operations. General Hagee stated that “Critical deficiencies currently existed in the capability of the Navy to provide all-weather, accurate, lethal and responsive fire support throughout the depth of the littoral in support of expeditionary operations. In the critical period of the early phases of the forcible entry operations when organic Marine Corps ground indirect fires are not yet or just beginning to be established, the landing force will be even more dependent on the complementary capability required of naval surface fire support assets.”⁸ Additionally, on 13 January 2010, in response to what the future of NGFS looked like, CMC, General James Conway offered that NGFS was still an issue for concern and that the current program (The Advanced Gun System) would not rectify the NGFS gap, specifically in terms of magazine storage and volume of fire.⁹

In 2004 the Chairman of the Joint Chiefs of Staff stated in the National Military Strategy (NMS), the desire to “Secure strategic access and retain global freedom of action” for US forces.¹⁰ Within the NMS, four Joint Operating Concepts were provided as a means of guidance toward meeting the Joint objectives of the NMS. The Major Combat Operations (MCO) concept, which was re-written in 2006, specifically identified the ability to conduct forcible entry operations, as a requirement the U.S. military must contain. Offshore naval fires were identified as a capability that would be required to support forcible entry. In the 2006 version of the MCO, naval fires are referred to as “Littoral Fires” and states the following; “Joint fires assets are an integral part of Sea basing, and include Offensive Air Support from sea-based and theater/global aviation assets, and NGFS from ships. Future joint fires must provide the reach, precision, volume, and responsiveness required to support maneuver forces ashore.”¹¹

In the face of numerous testimonies by the Marine Corps’ ranking leadership to the Senate Arms Service Committee, as well as through official correspondence between the Navy and

Marine Corps leadership, the Navy has failed to respond to the issue of ineffective NGFS. Additionally, the Navy has failed to meet the requirements established by the Joint Chiefs of Staff and is currently incapable of supporting a Joint Force Commander's land based maneuver units ashore with NGFS.

Current Status of NGFS: Presently, the Navy's only NGFS platform is the Mark 45, 5-inch gun system. Consisting of two versions, the existing 54-caliber mount and the modified 62-caliber mount, these weapons have the capability to fire twenty rounds per minute with maximum ranges of 13 nm and 20 nm respectively.¹² Both ranges fall well below the Marine Corps' near-term requirements identified by Lieutenant General Hanlon. With the current limited ranges, NGFS warships would be required to occupy Fire Support Areas no less than 5 kilometers from an enemy shoreline, placing the vessels at great risk to anti-shipping mines and well within the ranges of hostile anti-ship surface missiles. With the ever-increasing capabilities and effectiveness of enemy anti-ship missiles, the risk does not outweigh the gain in placing such an asset within range of the enemy defensive weapon systems. Thus, this restriction ultimately nullifies the Navy's ability to provide relevant NGFS within a hostile littoral. However, even if operating within a permissive environment, free from the mine or missile threat, the problem of sustainment and lethality still exists. As determined as early as 1994 in a Center for Naval Analysis (CNA), *NSFS Cost and Operational Effectiveness Analysis*, "None of the 5-inch Gun concepts can destroy hard point targets far enough inland."¹³ Additionally, smaller caliber (5-inch) guns cannot accurately suppress targets, and ships with 5-inch guns have a limited supply of ammunition that can be quickly depleted in a few dozen fire missions, drastically limiting the NGFS asset's on-station time.¹⁴ Moreover, when 5-inch rounds impact directly on their target, they cannot provide the lethality to intimidate the enemy and eliminate large bunkers or armored

vehicles. The author of this work can personally attest to a trend of unreliability of both the 5/54 and 5/62 gun systems. As the qualifying agent for all 2nd Fleet NGFS platforms from 2001 to 2003, he identified reoccurring weapon system failures and mechanical casualties associated with the Mark 45 platform.¹⁵ In the combat environment, these system failures and casualties would unquestionably cost the lives of many American service men relying on NGFS to support their maneuver throughout each phase of an amphibious assault. The Mark 45 weapon system and its small caliber gun has failed to meet the both the Marine Corps' "Near and Mid term goals" as identified by Lieutenant General Hanlon (Ret) earlier in this writing and unless the *Iowa* class battleship is re-commissioned, will be incapable of supporting the Marine Corps' "Far term goal" as well.¹⁶ Current NGFS small caliber gun systems must be replaced with a viable asset that can not only meet range and lethality requirements, but also the volume of fire issue that requires ample magazine storage and would extend the shooter's on-station time within the littoral battle space.

Attempted replacements/Future systems: In response to the Marine Corps' need for a NGFS overhaul, the Navy has offered several solutions that ranged from alternate weapons systems, enhanced munitions capabilities, to the creation of a new warship.

The Advanced Gun System (AGS): The Navy's current solution to filling the NGFS gap is the AGS. It consists of a 155mm howitzer weapon system with the capacity to fire 12 rounds per minute at a range of 115 nm.¹⁷ Unlike the single gun ships of the Arleigh Burke class ships, the AGS will be employed in pairs and will have an accompanying magazine storage with the capacity to store up to 750 rounds per weapon system. Although the AGS will be employed in pairs with a greater magazine capacity, the two 155mm guns of the AGS cannot produce the massing volume of fire that came with the nine 16-inch guns of a single *Iowa* class battleship. In

theory, the AGS may possibly meet the requirements of the Marine Corps. However, the AGS was scheduled to be incorporated within the Navy's newest innovation of Land Attack Destroyers, the DDX, since re-designated as the DDG-1000. Unfortunately, the DDG-1000 was not scheduled to be active until 2015. The Marine Corps initially agreed to the development of both the DDG-1000 and its accompanying AGSs, despite the institution's request to reinstate the *Iowa* class battleships in 2001 to support the current NSFS gap in the interim. The Marine Corps' acceptance of the AGS and DDG-1000 program was based on the planned fielding of 32 DDX ships by 2019. The large number of available DDG-1000s would provide a greater lethality, and when massed, would also solve the volume of fire concerns, as well as longer on-station duration to support continuous operations throughout the littorals. However, the DDG-1000 program has since been restructured. The DDG-1000 program continues to degrade as the projected numbers have diminished. In 2007, the Department of the Navy (DON) reported that the originally promised 32 vessels would be cut down to 24. Again, in 2008 DON announced that the revamped number of 24 ships would be reduced to only 8 DDG-1000s. In October of 2008, the DON revealed that the DDG-1000 program would be limited to the creation of a mere two or three DDG-1000s.¹⁸

In perhaps the most discouraging set back for filling this vital requirement, on 4 February 2010, Defense Secretary Robert Gates informed the House Armed Services Committee (HASC) that "The Navy's DDG-1000 destroyer program is poised to breach cost-controls set by Congress requiring it to be canceled or recertified. The cost of the future ships has grown since the Navy decided two years ago to reduce the planned buy of the warships from eight down to just three."¹⁹ The cost of the DDG-1000 has risen to the extent that the Department of Defense (DOD) will be required to justify the continuance of the program to Congress. In accordance

with the Nunn-McCurdy statute and the Weapon Systems Acquisition Reform Act of 2009, which President Obama signed, programs that breach Nunn-McCurdy cost-growth limits are more likely to be canceled rather than recertified.²⁰ “Chairman of the Joint Chiefs of Staff Adm. Michael Mullen added that Pentagon officials are looking at the DDG-1000 program and at termination costs tied to ending the program.”²¹ With the DDG-1000 now struggling for continued existence, the Marine Corps’s hopes for an acceptable NGFS platform are directly tied to the fate of the diminishing possibilities of the Navy’s DDG-1000. Once again, the future of NSFS is bleak.

The Extended Range Guided Munitions (ERGM): ERGM incorporated the technology of Global Positioning Systems (GPS) and would not require the need to procure a new weapon system. It would be fired from the updated Mark 45 5-inch/62-caliber gun system that has been phased into all NSFS vessels within the Navy. The ERGM advertised accuracy within twenty meters of its target, and a maximum effective range of 63 nm. There are several reasons why ERGM is not and never will be the answer to NGFS. ERGM’s trajectory would take it to altitudes upward to 80,000 feet before acquiring its target through the use of GPS technology. With all the friendly carrier air assets within its Area of Operation (AO), air space coordination would become extremely difficult. Perhaps ERGM’s greatest shortfall was the time it took to reach its target (time of flight). Responsive fire support with any indirect fire support platform rarely exceeds two minutes; ERGM would have held time of flights in relation to a 63 nm maximum range of upwards to eight minutes. The indirect fire support concept relies on the massing of its munitions at the same time and place. By the time an adequate number of ERGMs were to be airborne and prepared to engage, more than eight minutes would have surpassed from request to delivery of NGFS. A commander would be required to blindly fire ERGMs, with the

hopes that a target would appear eight minutes later. This would also require enemy targets to remain stationary for eight minutes in order to comply with the ERGM's time of flight.²² As a result of ERGM's reliance on GPS technology to acquire a more precise target engagement, by its very nature it was vulnerable to GPS jamming. Once its signal has been scrambled, the munition would be rendered useless or even worse, unsafe to friendly or innocent personnel.

Finally, the ERGM round remains to be a 5-inch caliber munition, which continues to lack the lethality required to eliminate armored vehicles or hardened structures. The ERGM was scheduled for fielding within the existing NSFS platforms of the current Navy's Destroyer's group by the year 2005. However, after exhausting over 600 million dollars into the ERGM, and because of its lack of lethality and volume of fire, the program was cancelled in 2008. Once again, precious time and funding spent with no resolution in sight to fill the void that is NGFS.

The Rail Gun Concept: The basic concept of the rail gun is based on the use of electromagnetic pulse that will serve as the propelling charge (gun powder) to fire its projectiles. This electromagnetic rail gun concept is currently under development and seeks to provide the option to field a major caliber gun with significant capability at some point in the distant future. The rail gun concept may provide a future NGFS platform with the range requirements to facilitate the use of a major caliber weapon. Additionally, the use of electromagnetic pulse technology would eliminate the requirement to store traditional propellant charges. This excess space would be utilized to increase the platform's projectile magazine storage. In theory, this technology would double the available number of projectiles aboard ship to support the maneuver elements of the amphibious task force. However, in an interview conducted with "Fires" representative for MCCDC, Major James Hoover informed this author that the rail gun was in its infant stages of development and continues to undergo testing. If all goes well, the rail

gun would not be available for testing aboard ship until 2020, adding 10 more years to the existing 19 years of inadequate NGFS. Coupled with the uncertainty of the DDG-1000 and the remainder of the Navy's 30-year ship building plan, the Marine Corps, as well as the Joint community must continue to wait an additional ten to fifteen years for a conceptually viable NSFS platform.²⁴

Capital Surface Warships: The Capital Surface Warships (CSW) concept meets the needs of not only the Marine Corps', but to the Joint community as well. Still in its conceptual phase, the CSW draws its capabilities from the traditional *Iowa* class battleship, with an upgrade of both existing and future technologies. The proposed concept would utilize a mixture of larger caliber (16-inch) and intermediate sized (155mm) caliber weapons, as well as smaller caliber weapons that would be supported by a large magazine capacity. Existing GPS and Search and Destroy Anti-armor (SADARM) munitions would support the 16-inch weapon system. SADARM is an existing munition that will not only allow the CSW to range targets at 38 kilometers (standard SADARM) and 400 kilometers (with Scram Jet technology), but would provide the CSW and the amphibious taskforce with a robust anti-armor lethality. The combination of the traditional 16-inch projectile and its mix of fuse combinations coupled with existing Rocket Assist Projectile (RAP) technology would also allow the CSW to destroy hardened structures or engage traditional enemy targets. The CSW concept appears to offer an even greater potential than the *Iowa* class battleship, and is essentially the battleship of the future. However, the CSW is a concept that has yet to be accepted by the DON, and for the meantime, and unless the Navy agrees, time to develop, build and test the CSW will not solve the current NSFS gap.

Aviation: The Navy's view was candidly stated in a 13 December 2005 Government Accountability Office (GAO) report, "Primarily aviation can essentially meet the Marine Corps'

fire support requirements with "acceptable risk."²⁵ This analysis of aircraft responsiveness completely dismisses the fact that aviation can be easily restricted by weather, time on station (fuel/distance to target area) and the anti-air threat. Many factors strictly pertaining to weather can prevent or limit aviation's ability to support the targeting process. As identified in a Kosovo lessons learned study conducted by the Center for Strategic and International Studies in 17 September 2003, during air support operations in Kosovo (1999), "weather affected approximately 50% of the strikes by preventing below-the-clouds close air support." Additionally, weather negatively affected airfield and tanker operations, degrading overall aviation operations by 30% to 50%.²⁶ As recent as Operation Iraqi Freedom, weather reduced the availability and effectiveness of close air support to troops-in-contact, increasing the requirement for artillery support and coalition NGFS. Specifically on 21-22 March 2003, during the British Royal Marine (RM) assault on the Al Faw Peninsula (Iraq), weather and competing tasks restricted the use of tactical air support during the RM assault. Fortunately for Allied Forces, the Royal Australian and British Royal Navy provided the only effective and available NGFS support during OIF in support of the RM assault.²⁷

Disparity on the use of NGFS: The Navy and Marine Corps do not share the same concerns with regard to how and when NGFS should be employed. The Marine Corps, as well as the Joint community, is seeking to reincorporate a necessary fire support platform that can support U.S. troops throughout each stage of an amphibious assault, and can reinforce the vital concept of combined arms in an all-weather environment. NGFS has proven its worth from Normandy, throughout the island hopping campaign of World War II against Japan, as well as during the Korean War. As late as Operation Desert Storm, the value of the larger caliber 16-inch naval gunfire was evident during the amphibious demonstration (feint) in Operation Desert

Storm, where 16-inch gunfire provided both the lethality and volume of fire to convince Iraqi forces of the feint's credibility.²⁸ As the Marine Corps prepares to return to its roots in amphibious warfare, it continues to identify the glaring need for an all weather, far reaching NGFS platform that contains the lethality required to properly shape the littoral battlefield for a successful forcible entry. NGFS must be able to continuously support operations throughout all phases of the amphibious assault. In order to do so, the NGFS platform must have the capability to range all targets within the ground force's battle space.

The "mid and far-term goals" identified by MCCDC include a standoff distance of 25 nautical mile (nm) from the shoreline within their respective 63 nm and 97 nm range requirements. This standoff is essential for both the protection of the amphibious shipping and the exploitation of OFMTS.²⁹ With the current capabilities that exist with anti-ship missiles and the range of coastal artillery, the Navy is restricted to a 25 nm buffer zone, when operating within a hostile littoral region. However, current 5-inch NGFS platforms maintain a maximum range of 15 to 20 miles. The math is simple, current NGFS does not meet the requirements to support concepts such as OFMTS and has become irrelevant for use during an amphibious assault. Lacking the range to engage targets ashore without violating the 25 nm standoff, NGFS has been rendered useless to the ground component of an amphibious task force, and has limited the 5-inch weapon to the role of an anti-ship defense mechanism. Additionally, present day NGFS cannot provide shaping or preparatory fires for troops on the ground within the littorals, and certainly cannot provide support further inland. The Navy is certainly aware of its inability to support the landing force within the littorals. However, it has done very little to rectify the issue since deactivating the *Iowa* Class battleships in the early 1990s. The Navy's desire for missile and rocket type precision munitions, and the smaller ships that support these capabilities

has created a prejudice against a large caliber gun system and the larger platform ships that would truly support a viable NSFS capability. Instead, the Navy turned to the development of their smaller, multi-mission platforms. These ships hold the capability to fire several types of rockets and missiles, with the most notable being the highly touted Tomahawk Cruise missile. Although these weapons certainly have their place within the Joint arsenal and have proven their worth, they concentrate on precision strikes and cannot provide a responsive volume of fire that a large caliber gun produces in support of maneuver forces ashore. In terms of cost alone, the ballistic projectile from a large caliber naval gun is far less expensive than the precision guided missile. As a result of the 1994 CNA, NSFS Cost and Operational Effectiveness Analysis (COEA), it was determined that of all the possible advanced gun systems (5-inch, 155mm and 8-inch), the 16-inch gun was rated the least risky and cost effective for future long range development. In addition, the estimated procurement cost per round, for future GPS and extended range munition development for the 16-inch projectile was lower than both the 5-inch and 155mm projections.

Projectile	Warhead	Unit Cost
16-inch	DPICM	\$39k
5-inch	DPICM	\$47k
155mm	DPICM	\$51k
5-inch	SADARM	NA
16-inch	SADARM	\$112k
155mm	SADARM	\$124k

Table A: Projectile Procurement Costs (abbreviated) in order least to highest cost.³⁰

“Missile development and procurement cost estimates were considerably higher than any of the gun projectiles. Procurement costs alone spanned between \$800 million to \$1.5 billion for one thousand missiles. Annual O&S costs for missiles were seven to ten times those of guided gun launched projectiles.”³¹ At such high costs, “no one really believes that Navy will use a

multimillion dollar cruise missile to take out a machine gun nest or antitank position.”³² In turn, missiles cannot replace NGFS. Despite data collected from their own 1994 NSFS COEA that stated, “As the gun bore size and barrel length increases, the percentage of targets hit increases and the cost per target decreases,” the Navy has not once considered the development of an NGFS platform containing a large caliber (12-inch or greater) gun since the deactivation of the battleship.³³

With the Navy now being tasked by President Barack Obama’s administration to maintain a sea-based theater Ballistic Missile Defense (BMD) capability, a heavy emphasis has been placed on bolstering existing BMD capable ships, and not on either the amphibious shipping or improving the NGFS capability.³⁴ As stated by General Conway, “amphibious programs were ranked below other shipbuilding priorities in the Navy’s procurement plan.”³⁵ As discussed earlier in this work, the Navy feels that Naval Aviation and missiles can compensate for the lack of adequate NGFS. According to the Deputy Director of the US Naval Fire Support Association, Major Tracy A. Ralphs USA (Ret), “Regardless of aircraft availability, the ability of aircraft to equal or sustain the explosive payloads that can be delivered by 16-inch Naval Guns is lacking.”³⁶ A bombardment rate comparison conducted by retired flag-level U.S. Foreign Service Officer and current Director of the U.S. Naval Fire Support Association, Dr. William Stearman determined “within range of its guns, the battleship can in one hour lay down 56 times the tons delivered from a carrier.”³⁷ The fact that the effective use of NGFS would decrease the number of aircraft placed in harms way, coupled with the reality that aircraft are not an all weather weapon system, puts rest to the idea that air support is a viable replacement for NGFS.

As the Navy continues to ignore the advantages of a large caliber naval gun, current NGFS platforms serve only as another weapon system that ships can use to defend themselves from

enemy vessels. Since the decommissioning of the battleships, the sense of urgency placed upon the training and enhancement of NGFS to meet the Marine Corps' needs has been nonexistent. For example in 2003, aware of the dire conditions of a non-effective NGFS capability, American aircraft engine manufacturer Pratt and Whitney, approached the Navy with a concept that could produce a Scramjet propelled 16-inch projectile that could range close to 400 nautical miles. However, the Navy simply informed Pratt and Whitney that they had no interested sponsor for this capability.³⁸

Until 2003, the Navy's primary east coast training facility for NGFS existed on the Puerto Rican island of Vieques. East coast NSFS shooters deployed to the Puerto Rican Operating Area (PROA) once a year to conduct NGFS training. Individual ship's company NGFS teams would participate in a one-week classroom NGFS training course two weeks prior to transiting to the PROA for NGFS qualifications. In theory, NGFS shooters spent two weeks out of the year focusing on NGFS. This author found that 75% of all ships on the east coast were insufficiently proficient in their mastery of NSFS. In fact, only a handful of NGFS capable warships scored a 95% or higher on their qualifying evaluation. Ships consistently missed timelines and held initial salvo errors greater than 300 meters. Constant delays as a result of a poor knowledge base as well as navigational issues added up to hundreds of hours of wasted range time per year. With the already inadequate training time spent on NGFS skills, if the Navy were serious about improving the quality of NSFS support, one would think it would allot increased range time for its NGFS warships. In contrast, the Navy has since altogether ceased use of the Vieques training range, without planning an adequate replacement for future NGFS training.³⁹ The combination of an inadequate NGFS platform, a poor knowledge base, and overall disregard for the needs of both the Marine and Joint Commander, are basic but major

contributors to the unacceptable lack of littoral fire support.

A solution at hand; *Iowa Class Battleship*: Sitting mothballed in California, Virginia, New Jersey and Hawaii, are the answers to the NGFS platform vacancy. The system that can meet the Marine Corps' near and mid term goals, and with existing extended range research to meet the far term goal. The *Iowa* Class Battleship should be reinstated to active duty as the primary NSFS platform until an acceptable future system replacement is available. Its 16-inch guns are capable of destroying any sized bunker facility as well as any armored threat that exists in the world today. "A battleship's guns can, in one half hour, accurately lay down tonnage of high explosives equal to that delivered by 15 x B-2 sorties."⁴⁰ With regards to compatibility with its smaller multi mission replacement destroyers and cruisers, the *Iowa* class battleship can also tie into the Navy's integrated weapons system (Aegis) network which would only bolster a battle group's dynamic capabilities and still provide the necessary NSFS to support the Marine or Joint Force Commander. As once stated by former Chief of Naval Operations Admiral Albert Herman Trost, "Put a Battleship with an Aegis cruiser and you've got something that can go anywhere in the world. Put a battleship battle group within a couple of hundred miles of a carrier battle group and you've got something no one in the world can beat!"⁴¹ The battleship is a floating arsenal. The strength and defensive capabilities are unmatched by any Naval vessel today with the exception of the aircraft carrier. Further, the "single mission" assumption for the battleship platform is not supported by the past employment of the *Iowa* class. "These ships (*Iowa class*) executed a multitude of missions including logistics functions such as refueling escorts, metal work, electric component repairs, as well as command and control, intelligence collection and anti-ship operations with either guns or missiles."⁴²

Its speed ranks up with the fastest warships currently in the naval fleet, and when engaged

in battle can produce a significant demoralizing effect on its enemies. As North Korean Prisoners of War (POW) attested to, incoming U.S. 16-inch shells gave cause for many North Korean surrenders. North Korean political officers told their men that the United Nations forces were firing atomic shells at the North Koreans, as result of the size of the craters that 16-inch shells caused. One North Korean POW told an interrogator that he surrendered when many of his fellow soldiers were killed during a Navy (NGFS) bombardment, and one 16-inch shell landed near his position and failed to explode. The shell's size alone convinced him it was time to surrender.⁴³ The battleship's mere presence alone can exude enormous political strength, shaping the operational environment and singularly capable of fulfilling the requirements of an Information Operations (IO) campaign. During a 1981 Congressional debate, former Secretary of the Navy, John Warner revealed that he was directed to decommission the *USS New Jersey* (Iowa Class) during the 1973 Paris Peace Accords because "its belligerency and its antagonism was impeding the progress of the peace talks" (Vietnam War).⁴⁴

The Navy's bases their justifications for not reactivating the battleships on cost, manpower and a relentless tie to new and advanced technologies.⁴⁵ Although each of the first two justifications can be easily debunked, unfortunately it is the Navy's seemingly relentless desire for a modernized fleet that has caused this critical vulnerability to the nation's forcible entry capability.

Cost: The cost to reactivate and maintain an *Iowa* class battleship is estimated at just over \$1 billion dollars. "However, this would include standing up a new powder (propellant) production line, training, and other support expenses."⁴⁶ Taking into account the modernization projects that the Navy implemented into the battleships in the mid 1980's, bringing the *Iowa* class up to speed with current modifications could facilitate the Navy's ability to field at least

two *Iowa* class battleships within two to three years of approval. Weighted against the \$10 to \$15 billion allocated to the fragile DDG-1000 program, which still falls short of NGFS requirements, returning the *Iowa* class to active service is a bargain. When one tabulates the billions of dollars and years spent dedicated to failed projects, such as the \$600 million poured into ERGM or the tenuous development of the DDG-1000, it is obvious that with a fraction of this funding, the Navy could restore the dynamic capabilities of the *Iowa Class* battleship. Reactivating the *Iowa* is not an issue of cost, but an issue of priorities and focus toward the needs of the U.S. military arm. As former Chairman of the House Armed Services Committee, the late Bob Stump (Republican, AZ), once quite accurately stated, "Measured against their capabilities, they [battleships] are the most cost effective and least manpower intensive ships we have."⁴⁷

Manpower: As the Navy submitted its 2007 version of its 30-year shipbuilding plan, it did so with the plan to build 32 DDG-1000s. In 2008, the plan called for a decrease of 8 DDG-1000s. In 2009, they drastically reduced the numbers of the NSFS capable DDG-1000s to just three.⁴⁸ The point is not to demonstrate a disregard for filling the NGFS vacancy, but to illustrate the fact that in 2007, there were no discussions on how the Navy would man its projected 32 ships, nor was the topic raised again in 2008 when the number dropped to 24. However, time and time again, when confronted with the issue of manning two to four *Iowa Class* ships, the Navy retorts with the manning issue. With the now drastic reduction of DDG-1000s from 32 to three, the Navy could redirect the manpower to man a platform that can meet the Joint Commander's NSFS requirements within two to three years.

Technology: Embracing technology for the betterment of the nation's defense is not only prudent, but also a requirement. However, with the inability and unwillingness to meet the nation's NSFS requirements since the deactivation of the *Iowa* class battleship, the Navy does

not need to rely so heavily on new technology to rectify this issue. The Navy's desire for a modernized fleet has blinded the military from a proven platform and the larger caliber naval gun that requires limited hours of sea trials and modernization. The *Iowa*'s hull, speed, defensive measures and weapons are comparable to the Navy's current fleet. As determined in 2007, in the most comprehensive study on NSFS in the past 20 years, U.S. Army Colonel S. A. Welch with the assistance of the Fires Battle Lab at the Army Fires Center of Excellence (Fort Sill, Oklahoma), the *Iowa* class remains the nation's optimal choice for NSFS. The Navy should focus their efforts on advance technologies in the direction of the *Iowa* class. With current advances in precision guided and extended range ballistic projectiles, the Navy can develop and field advanced 16-inch projectiles. The 1980s modernization of the *Iowa* class also facilitates the implementation of current and future cruise missiles that the fleet can use in support of theater operations. In terms of steaming years, both the *USS Iowa* and the *USS Wisconsin* (mothballed *Iowa* class ships) have low mileage, with the *Iowa* having 18 years and the *Wisconsin* with 15 years of operational mileage. Less robust carriers have steamed 50 years continuously. Modernizing the battleships would be similar to the program that successfully upgraded the highly effective 1950s vintage B-52s, whose service life has been extended to 2050.⁴⁹ The Navy's desire for a modernized fleet makes the *Iowa* class the perfect test-bed for the development of a future platform such as the CSW mentioned earlier in this work. Applying lessons learned to both the design and construction of the ship, as well as the large caliber weapon systems makes the *Iowa* class as relevant today as it was in the past.

Conclusion: It is apparent to both the Marine Corps and the Joint Force community that during a time of increased readiness and instability around the world, coupled with the military advancements of China as a near-peer competitor within the next five to ten years, the capability

of forcible entry from the sea is an essential mission that the U.S. must not only maintain, but improve on as well. However, there remains to be, and for the foreseeable future, a crucial gap in Naval Gunfire Support. As the Navy continues to ignore the capabilities of a platform that once reigned supreme within its fleet, as well as both the cost effectiveness and lethality of the larger caliber 16-inch gun systems, both the Marine Corps and its Joint counterparts continue to wait for an adequate answer to its NSFS vacancy. A fascination with aviation, missiles and a modern fleet cannot permit the Department of Defense to continuously ignore this near negligent shortfall. For those that view forcible entry from the sea as an archaic maneuver never to be utilized again, let history's record remind them of the military's scramble to execute the bold landing at Inchon during the Korean War. The amphibious landings were considered obsolete in 1950, as MacArthur's amphibious assault saved a United Nations' force from being driven to the sea. One can venture back a mere twenty years to see the relevance of the threat of an amphibious assault in Desert Storm made on Saddam Hussein's Iraqi Army when the blazing fires of 16-inch guns convinced the Iraqi Army that the amphibious force was the main effort.

With a focus on land-locked Middle Eastern countries in support of overseas contingency operations, the Department of Defense and the Navy cannot afford to allow this delinquent vacancy in fire support. As the world projects China to grow closer to being a near-peer competitor to the United States, possibly capable of deterring an American amphibious assault, and as Iran and North Korea continue to develop their respective nuclear missile programs, the time to restore the optimal NSFS platform to support a viable forcible entry is now. The *Iowa* class battleships can fill this requirement within two to three years, and their service will not only produce military might, but also serve as a test bed for a future system. The price is right and existing technologies can propel its 16-inch projectiles 24 to 400 km in support of littoral

maneuver forces. Continued failure to rectify this issue may lead to the complete loss of the nation's forcible entry capability, leaving our military leaders with limited operational options and possibly irrelevant within the littorals.

Bibliography

Advanced Gun System: United Defense, Products.

http://www.baesystems.com/ProductsServices/1_and_a_as_advanced_gun_system.html, January 16 2004.

Anderson, Gary W., *Taking the High Road to Hell: The Current State of the Navy-Marine Team*. Marine Corps Gazette, November 2008.

Baker, A.D., III. *The Naval Institute Guide Combat Fleets of the World*, 1998-1999, Annapolis, MD: Naval Institute Press, 1998.

Center for Naval Analysis, NSFS Cost and Operational Effectiveness Analysis final report CNR 210, Washington DC, October 1994.

Chairman, Joint Chiefs of Staff, *The National Military Strategy of the United States of America* (Washington, DC: Department of Defense, 2004).

Christopher P. Cavas, *DDG-1000 Program Will End at Two Ships*, Defense News, July 22, 2008. <http://www.defensenews.com/story.php?i=3639737>

Commanding General, Marine Corps Combat Development Command. Letter to Chief of Naval Operations (N86 and 85). 3900/C44. Subject: "Naval Surface Fire Support for Operational Maneuver from the Sea." 3 December 1996.

Conway, James, General, Commandant USMC, in response to a question from this author on the way ahead for NSFS, United States Marine Corps' Command and Staff College, Quantico VA, 13 January 2010.

Cordesman, Anthony H., *The Lessons and Non-Lessons of the Air and Missile Campaign in Kosovo* (Washington, DC: Center for Strategic and International Studies, 17 September 2003).

Gates, Robert M., Secretary of Defense, United States of America, Statement to the House Armed Services Committee (HASC) during a hearing on President Barack Obama's fiscal year 2011 budget.

Goudarzi, Sara, *Flocking to the Coast: World's Population Migrating into Danger*, Live Science, http://www.livescience.com/environment/060718_map_settle.html (18 July 2006).

Hanlon, Edward, Jr., Commanding General, Marine Corps Combat Development Command. Naval Surface Fire Support Requirement for Expeditionary Maneuver Warfare. Memo to the Chief of Naval Operations (N7). 19 March 2002.

Hoover, James, Major, USMC, Interview conducted with, Fires Cell, MCCDC, January 29, 2010. Marine Corps Base, Quantico VA.

Iraq Lessons: The More Things Change," Newsletter of The Sea Power Centre Australia, Issue 6, August 2003.

Jane's Navy International, Volume 115, Issue 3, April 2010.

Joint Chiefs of Staff, United States of America, Joint Operations Concepts, Major Combat Operations (Draft 2006), C-8, C-13.

Kaeser, Hans Ulrich, *Abandon Ships: The Costly Illusion of Unaffordable Transformations*, CSIS, Washington, DC, draft dated 4 August 2008.

Larry Seaquist, Captain, USN, *The BBs are Capital Ships*, Proceedings, August 1989.

Philpott, Tom. Where Are The Battleships? U.S. Naval Institute Proceedings, March 1999, 29 December 2003.

Ralphs, Tracey R., *Tactically Responsive Firepower*, Military Review, July/August 2001, <http://www.geocities.com/equipmentshop/battleships.htm> (3 February 2004).

Ralphs, Tracy, Major, USA, *Where Are the Battleships?* Armed Forces Journal International, April 1999: 46-52 <<http://www.geocities.com/equipmentshop/battleships.htm>.

Riley, John C., *Operational Experience of Fast Battleships: World War II, Korea, Vietnam*. Washington DC: Naval Historical Center, 1989.

Rutherford, Emelie. *DDG-1000 Poised To Breach Nunn-McCurdy Cost Limits*, Defense Daily, February 4, 2010.

Saunders, Stephan. *Jane's Fighting Ships*. One Hundred and Fifth Edition. 2003-2003.

Sherman, Jason. *Keeping up with Jones*, Armed Forces Journal International, June 2000, 14.

Stearman, William L. *Closing the Naval Surface Fire Support Gap*. Marine Corps Gazette, December 2008.

Stearman, William L., *Keep Battleship Advantage; Ship Provides Versatility, Unmatched Presence*. <<http://www.geocities.com/equipmentshop/battleships.htm>, 7 Jan 2004.

Summerall, Robert F., *Iowa Class Battleships: Their Design, Weapons and Equipment* (London: Conway Maritime Press Ltd, 1988).

U.S. Department of Defense, *Conduct of the Persian Gulf War* (Washington, D.C.: GPO, April 1992). <http://www.ndu.edu/library/epubs/cpgw.pdf>

U.S. Government Accountability Office, "Issues Related to Navy Battleships," *GAO-06-279R*. (Washington, DC: GPO, 13 December 2005).

Welch, Shawn A. Colonel, United States Army, "Joint and Interdependent Requirements: A Case Study in Solving the Naval Surface Fire Support Capabilities Gap" (Joint Advanced Warfighting School, Norfolk, VA, 17 May 2007).

Endnotes

¹ Rene Torres, "Naval Surface Fires Support; Not Just a Platform Problem." (Contemporary Issues Paper, Marine Corps University, 2004), 1.

² William L. Stearman, "Closing the Naval Surface Fire Support Gap." *Marine Corps Gazette*, December 2008, 1.

³ William L. Stearman, "Keep Battleship Advantage," <http://www.geocities.com/equipmentshop/battleships.htm> (February 2004), 4.

⁴ William L. Stearman, "Closing the Naval Surface Fire Support Gap.", 1.

⁵ Sara Goudarzi, "Flocking to the Coast: World's Population Migrating into Danger," *Live Science*, http://www.livescience.com/environment/060718_map_settle.html (18 July 2006).

⁶ Jason Sherman, "Keeping up with Jones," *Armed Forces Journal International*, June 2000, 14.

⁷ Lieutenant General Edward Hanlon Jr., "Naval Surface Fire Support Requirement for Expeditionary Maneuver Warfare (Memo to the Chief of Naval Operations, 3900C428)", 19 March 2002.

⁸ Statement of General Michael W. Hagee, Commandant of the Marine Corps before the Senate Armed Services Committee, February 10, 2004.
http://www.au.af.mil/au/awc/awcgate/usmc/posture_feb04.pdf.

⁹ General James Conway, in response to a question from this author of this work on the way ahead for NSFS, United States Marine Corps' Command and Staff College, Quantico VA, 13 January 2010.

¹⁰ Chairman, Joint Chiefs of Staff, "The National Military Strategy of the United States of America" (Washington, DC: Department of Defense, 2004), 1.

¹¹ JCS, JOC Major Combat Operations (Draft 2006), C-8, C-13.

¹² A.D. Baker III, "The Naval Institute Guide Combat Fleets of the World" 1998-1999, Annapolis, MD: Naval Institute Press, 1998, 149.

¹³ Center for Naval Analysis, NSFS Cost and Operational Effectiveness Analysis final report CNR 210, Washington DC, October 1994, 3-4.

¹⁴ Col Shawn A. Welch, "Joint and Interdependent Requirements: A Case Study in Solving the Naval Surface Fire Support Capabilities Gap." (Joint Advanced Warfighting School, Norfolk, VA, 17 May 2007), 23.

¹⁵ The author of this work held the billets of Marine Corps Liaison, NSFS Liaison and Range Control officer for the Naval training range on Vieques, Puerto Rico from 2001-2003.

¹⁶ Lieutenant General Edward Hanlon Jr. 19 March 2002.

¹⁷ Advanced Gun System: United Defense, Products.

http://www.baesystems.com/ProductsServices/1_and_a_as_advanced_gun_system.html January 16 2004.

¹⁸ Christopher P. Cavas, "DDG-1000 Program Will End at Two Ships", Defense News, July 22, 2008. <http://www.defensenews.com/story.php?i=3639737>

¹⁹ Statement from Secretary of Defense Robert M. Gates to the House Armed Services Committee (HASC) during a hearing on President Barack Obama's fiscal year 2011 budget.

²⁰ Emelie Rutherford, *DDG-1000 Poised To Breach Nunn-McCurdy Cost Limits*, Defense Daily, February 4, 2010. http://findarticles.com/p/articles/mi_6712/is_22_245/ai_n52357950/.

²¹ Ibid

²² Tracey R. Ralphs, *Tactically Responsive Firepower*, Military Review, July/August 2001, <http://www.geocities.com/equiptmentshop/battleships.htm> (3 February 2004), 14.

²⁴ Interview conducted with Major James Hoover (USMC), Fires Cell, MCCDC, January 29, 2010. Marine Corps Base, Quantico, VA.

²⁵ U.S. Government Accountability Office, "Issues Related to Navy Battleships," *GAO-06-279R*. (Washington, DC: GPO, 13 December 2005).

²⁶ Anthony H. Cordesman, "The Lessons and Non-Lessons of the Air and Missile Campaign in Kosovo", (Washington, DC: Center for Strategic and International Studies, 17 September 2003), 44.

²⁷ "Iraq Lessons: The More Things Change, Newsletter of The Sea Power Centre Australia", Issue 6, August 2003, http://www.navy.gov.au/Publication:Semaphore_-_Issue_6.

²⁸ U.S. Department of Defense, "Conduct of the Persian Gulf War" (Washington, D.C.: GPO, April 1992). <http://www.ndu.edu/library/epubs/cpgw.pdf>, 235.

²⁹ Commanding General, Marine Corps Combat Development Command. Letter to Chief of Naval Operations (N86 and 85). 3900/C44. Subject: "Naval Surface Fire Support for Operational Maneuver from the Sea." 3 December 1996.

³⁰ CNA, *NSFS COEA*, October 1994, 39.

-
- ³¹ Col Shawn A. Welch, "Joint and Interdependent Requirements: A Case Study in Solving the Naval Surface Fire Support Capabilities Gap," 104.
- ³² Gary W. Anderson, "Taking the High Road to Hell: The Current State of the Navy-Marine Team." *Marine Corps Gazette*, November 2008, 20.
- ³³ CNA, "NSFS COE," October 1994, 89.
- ³⁴ "US Navy: What Became of the 313-Ship Fleet?" *Jane's Navy International*, April 2010, 13.
- ³⁵ Ibid, 17.
- ³⁶ Tracy Ralphs, "Where Are The Battleships?" *Armed Forces Journal International*, 1999, 4.
- ³⁷ William L. Stearman, "Keep Battleship Advantage", 2.
- ³⁸ Col Shawn A. Welch, "Joint and Interdependent Requirements: A Case Study in Solving the Naval Surface Fire Support Capabilities Gap", 48.
- ³⁹ Author's personal, first hand experience as the certifying NSFS evaluator for the Atlantic Fleet Weapons Training Facility (AFWTF) from 2001 to 2003.
- ⁴⁰ William L. Stearman, "Keep Battleship Advantage", 3.
- ⁴¹ Robert F. Summerall, "Iowa Class Battleships: Their Design, Weapons and Equipment", London: Conway Maritime Press Ltd, 1988, 152.
- ⁴² Larry Seaquist, Captain, USN, *The BBs are Capital Ships*, Proceedings, August 1989. 3.
- ⁴³ Riley, John C., ed. "Operational Experience of Fast Battleships: World War II, Korea, Vietnam." Washington DC: Naval Historical Center, 1989, 57.
- ⁴⁴ U.S. Congress. Senate, Senator Warner of Virginia and Senator Chafee of Arkansas speaking for the Department of Defense Supplemental Appropriation Authorization Act, 1981: 6607.
- ⁴⁵ William L. Stearman, "Closing the Naval Surface Fire Support Gap." 3
- ⁴⁶ Col Shawn A. Welch, "Joint and Interdependent Requirements: A Case Study in Solving the Naval Surface Fire Support Capabilities Gap", 92.
- ⁴⁷ Ibid.
- ⁴⁸ Statement from Secretary of Defense Robert M. Gates to the House Armed Services Committee (HASC) during a hearing on President Barack Obama's fiscal year 2011 budget.
- ⁴⁹ William L. Stearman, "Closing the Naval Surface Fire Support Gap", 4.