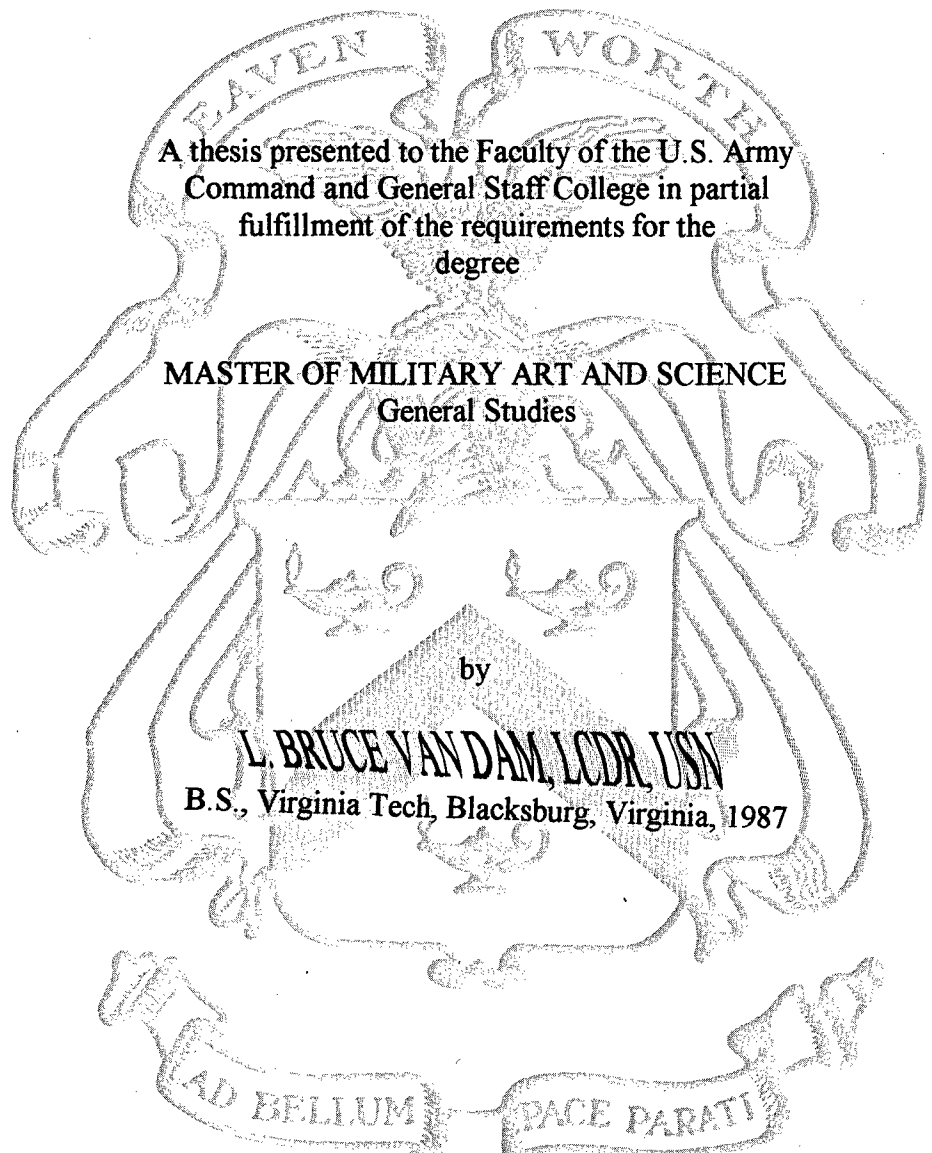
DOES THE PAST HAVE A PLACE IN THE FUTURE?
THE UTILITY OF BATTLESHIPS IN THE TWENTY-FIRST CENTURY



A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE
General Studies

by

L. BRUCE VAN DAM, LCDR, USN
B.S., Virginia Tech, Blacksburg, Virginia, 1987

Fort Leavenworth, Kansas
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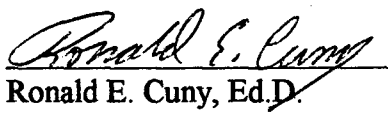
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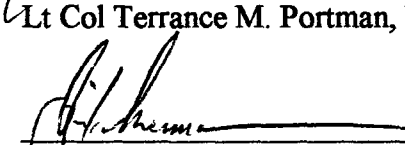
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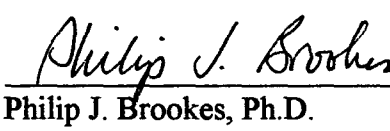
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ABSTRACT

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This thesis examines the Iowa class battleships and whether they hold utility for the future.

There is a myriad of writings concerning the history of the battleships and the arguments both for and against. The author uses this history to determine the key capabilities that a battleship provides and then identifies and reviews the arguments both for and against continued battleship service. This is then used to develop a comparison model that examines the battleship's possible strategic and tactical utility in future geopolitical climates. Keying in on the unique capabilities of the battleship, a comprehensive review is conducted to validate these capabilities against demonstrated wartime capabilities and the capabilities of current and proposed battleship replacements. Finally a cost effectiveness comparison is completed to determine: "Is there utility in bringing back the battleships?" and if so, "Is it great enough to warrant the associated costs?"

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Finally, I must get on my knees and thank my Lord God for the wisdom and motivation to see this through to the end.

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CHAPTER 1

INTRODUCTION

Background

The battleship once sailed as the undisputed "Queen of the Seas." During the years preceding World War II, a nation's maritime strength was measured in battleships, and conventions were held to limit the buildup of these mighty vessels because of their maritime influence.

With the beginning of World War II, this standard changed. On 7 December 1941, aircraft from carriers of the Imperial Japanese Navy attacked the United States Pacific Fleet, striking Battleship Row in Pearl Harbor, Hawaii. This single blow, which caught the American battleship fleet at anchor, was to change the face of maritime warfare forever, replacing many traditional battleship roles with the aircraft carrier. Battleship surface engagements became less frequent, and it became possible for enemy fleets to engage each other at such range that neither fleet ever sighted the other. In some such engagements, the aircraft from the carriers were the only offensive arm of the battle, and battleships only participated as antiaircraft platforms defending the carriers.

In response to the Japanese launch of the heavy eighteen-inch guns of the Yamato class battleships, the United States built the Iowa class battleships--the first of her class launched in 1943. The four ships of this class participated in every major amphibious landing in the Pacific theater, providing accurate, sustained all-weather, sixteen-inch and five-inch gunfire support for the Marines and Army soldiers storming the beaches. On 2

September 1945, the war ended as it began, on the decks of an American battleship--the USS *Missouri* (BB 63).

The postwar years would see the remaining battleships, with the exception of the *Missouri*, slowly removed from the active fleet, as the United States began to look to atomic weapons to provide its first line of defense. With the start of a conventional war in Korea, there was once again a call for the conventional might of the Iowa class, and they were called back into service.

The four ships of the Iowa class, USS *Iowa* (BB61), USS *New Jersey* (BB62), USS *Missouri* (BB63), and USS *Wisconsin* (BB64), all had the opportunity to perform naval gunfire support (NGFS), naval surface fires support (NSFS), shore bombardment, and deception operations off the coasts of Korea. Upon completion of the conflict, they were all decommissioned and sent back to the mothball fleet.

In August of 1967, under pressure from the Marine Corps, the decision was made to commission the *New Jersey* for the third time, this time to serve for the duration of hostilities in Southeast Asia. Following the conclusion of the Vietnam conflict, once again, the battleships were retired.

As the Cold War continued, recommendations were raised during the Carter administration to return battleships to the American arsenal. Believing them to be antiquated World War II technology, President Carter shelved these plans, leaving them to be resurrected by his successor, Ronald Reagan. Believing the battleship to be a cornerstone to his "big stick" Cold War policy, Reagan ordered all four Iowas to sail again. During the ten years following this decision, three of the four battleships would fire their guns in defense of Americans in foreign lands: first, when the *New Jersey* was

operating off of the coast of Beirut, Lebanon, and next when the *Missouri* and the *Wisconsin* conducted missions during the Gulf War. In 1991, after a triumphant return home, the battleships were quietly retired.

The Problem

On 12 January 1995, Navy Secretary (SECNAV) John Dalton signed the documents to strike the four Iowa class battleships from the Naval Vessel Registry, thereby eliminating the last major caliber (greater than five-inch) naval gunfire support assets from inventory and sending them to the scrap yard. Oddly enough, battleships found support in the halls of Congress, where members of the 103d Congress introduced and passed public law 104-106 requiring the return of two Iowa class battleships to the Naval Vessel Registry. This law requires the Navy to maintain two battleships and their associated support equipment. The requirement stipulates that the battleships be kept on-line until such time (actually sixty days after) that the Secretary can certify in writing to the Committee on Armed Services of the Senate and the Committee on National Security of the House of Representatives that the Navy has, within the fleet, "An operational surface fire support capability that equals or exceeds the fire support capability of the Iowa class battleships, to be able to provide for Marine Corp amphibious assaults and operations ashore" *(Iowa Class Battleships of the National Defense Authorization Act for Fiscal Year 1996* Statutes at Large 421, sec. 1011).

Despite assurances made to Congress by then Chief Naval Operations (CNO), Admiral Mike Boorda, it took two more years for the battleships to be placed on the registry. On 12 February 1995 the USS *Wisconsin* and the USS *New Jersey* were

reentered. The 105th Congress modified the contents of the addendum to Section 1011, Iowa Class battleships to allow the Navy to replace the *New Jersey* with the *Iowa*.

In late December 1998, the *Wisconsin* (currently located in Hampton Roads, Virginia) was officially reentered into the registry; on the 4th of January, the *New Jersey* was stricken from the list and the *Iowa* (currently berthed in Newport, Rhode Island) was added. With this action, legislation was passed allowing the state of New Jersey to put in a bid to have the *New Jersey* moved to that state for maritime museum purposes.

Why does there appear to be such controversy between the Navy and Congress? The Navy argues that the battleships are "in excess," a term defined as, "to provide no added capability that is not already duplicated by some other system" (Morison 1995, 1-2). Congress and the Government Accounting Office do not agree, contending that the Navy is not adequately fulfilling its mission to "provide accurate NGFS/NSFS for amphibious assault operations" (*Iowa Class Battleships of the National Defense Authorization Act for Fiscal Year 1996*, Statutes at Large 421, sec. 1026).

Significance of the Study

A new bill introduced into the National Defense Acquisition Act for Fiscal Year 1999, Reports on Naval Surface Fire-Support Capabilities, requires:

> Not later than March 31, 1999, the SECNAV shall submit to the Committee on Armed Services of the Senate and the Committee on National Security of the House of Representatives a report on battleship readiness for meeting requirements of the Armed Forces for naval surface fire support. (S.2057 Sec. 1027, 1998)

Additionally, this bill directs the SECNAV to explain why the Navy failed to comply with congressionally mandated public law for a period of two years. In order to determine what, if any, strategic or tactical utility battleships might have for the twenty-first century, there are many questions which must be answered. Does the battleship posses certain unique capabilities? What are the arguments both for and against keeping battleships and how do they apply? As with any system, do the costs outweigh the benefits? Are there new initiatives or existing systems/technology that fulfill the battleship's missions? How do they compare?

Capabilities

Why has the U.S. Congress taken a position that appears at odds with the official Navy position? Congress, although not enamored with battleships, has expressed concern over the Navy's willingness to "throw the baby out with the bath water" (Selle March 1992, 29-30). Before they sign off on the removal of the remaining battleships from the naval registry, they wish to ensure that proper consideration has been paid to fulfilling the Navy's commitment to provide fire support for ground forces. This stems from a series of Government Accounting Office investigations that reported the Navy lacks the ability to fulfill the naval gunfire support mission with current available assets.

There is an age-old debate in research and development whether systems development should be "capabilities based" or "threat based." Although often difficult to define, capabilities-based designing works on the maxim that a system must meet designed capability specifications. With threat-based design, the designer must use more predictive analysis to determine possible threats that the system must be designed to

counter. Upon determination of the anticipated threats, capabilities are developed to counter these threats, basically a capabilities-based process in reverse, with the threat giving birth to required capabilities.

Congress seems focused on the battleship's NGFS/NSFS role. But does this ship have other unique capabilities that are worthy of consideration? Proponents of the battleship reactivation present many arguments for keeping the battleships. They point to the demonstrated success during Desert Shield and Desert Storm. During combat operations there, the dreadnoughts performed in the strategic role of force power projection, while simultaneously fulfilling the tactical roles of *Tomahawk* Strike Coordinator, Primary Northern Arabian Gulf Logistics Center, Task Force Commander Flagship, naval gunfire support Coordinator, and Remote Piloted Vehicle mother ship. Following the Gulf War, Admiral Arthur, Commander, Navy Central Command (NAVCENT), stated that had there not been battleships available, there would have been no NGFS provided for the troops ashore due to the draft constraints and limited range of all other U.S. Navy and allied ships. Closely tied to this comment is also the argument of survivability in littoral waters of the armor-clad battlewagons.

Looking at history, proponents are quick to identify the significance of the battleship's survivability and durability in a combat environment. Originally planned and constructed during wartime, to go head to head with the eighteen inch guns of the Yamato class battleships, the *Iowas* were expected to take hits and keep on fighting. Examples of their construction include: eighteen inch armor belts that take advantage of years of metallurgy hardening research, system redundancy which ensured all major functions had between four to eight alternate control points, two of four shafts encased in

armor up to the strut bearing (taking advantage of lessons learned from the German battleship *Bismark*), and incorporated overlapping fields of smaller caliber fire to protect against the threat of enemy aircraft (Garzke and Dulin 1995, 107-151).

The battleship critics turn to history as well, reflecting upon the battleship's fall from glory with the advent of the aircraft carrier. Simply stated, the critics argument is, if the United States has aircraft carriers which are capable of performing many of the battleship's missions, aren't the battleships just excess? Others regard the battleships as fifty-five-year-old, outdated relics, which technology has left behind. With a mind-set framed by the Gulf War, and its technological crippling of Iraq, they view the battleships as anachronisms of the Cold War era.

Often a favorite of the Marines, the battleships have come to represent the Navy's resolve and commitment to support the amphibious assault ashore. A valuable, all-weather, fire support resource, its loss is felt strongly by mission planners. Although the Navy continues to experiment with new initiatives to provide long-range NGFS (now NSFS), the void must now be filled with carrier-based aircraft. The Marines argue that during a "Hot War" environment, it will be difficult to ensure dedicated assets are available, in the numbers required, due to priority of mission tasking.

Costs

If Congress's strongest argument is inherently linked to the accomplishment of a single mission area, one must ask, "Is it worth the expense?" Critics in the Department of the Navy contend that battleships are too cost prohibitive.

The Navy maintains that battleships no longer have a viable role in today's technological environment due to their excessive manning requirements, limited mission capability, costly maintenance requirements, and replacement by newer platforms. Future initiatives, including such items as the improved eight-inch naval gun, the arsenal ship, and the five-inch sixty-two caliber gun with the extended range guided munitions--it is argued--may satisfy the requirements previously filled by the battlewagons.

Proponents claim that further misunderstanding of the best tactical and strategic utilization of the battleship and the misapplication of carrier assets to fulfill the battleship's role have cost unwarranted lives and expense. Senator John McCain uses both tactical and strategic significance for battleships.

> The U.S. lost 1067 aircraft and aircrews attacking targets in Vietnam, 80 percent of which could, with no losses whatsoever, have been taken out with the 16 inch guns of the battleships had the battleship foes who ran the Navy (and still do) not prevailed and kept them out of the war except for the *New Jersey*'s six months off South Vietnam. (McCain, 1997)

The face of the Navy is vastly different from when the*Wisconsin* was in service in 1991. Between 1991 and the year 1999, active duty manning has decreased by about 29 percent, and the number of active duty ships has gone from 480 to 300. No longer is it practical for a combatant ship to be designed to have a primary warfare specialty. The ship of today must be flexible, dynamic, and fully capable of performing a myriad of tasking. With these challenges in mind, the cornerstones of the twenty-first century Navy budget programming decision process are: (1) Force Readiness, (2) Force Structure, and (3) Force Transformation.

The programming structure must become more integrated, effective, and proactive. "The Navy must continue to develop new operational concepts that leverage

current forces while exploiting our asymmetrical advantages and technological superiority" (U.S. Navy, *Vision, Presence, Power* 1998, 13). It could be argued that the belief in "leveraging current forces" provides the perfect logic for keeping the battleship (U.S. Navy, *Vision, Presence, Power* 1998, 13). By utilizing the current platform in traditional (and nontraditional) roles, the Navy can take advantage of budgeting and programmed funds to skip a generation in future ship design--the concept being that no technological threat is predicted that would subject a battleship to a severe disadvantage. This is based on the assumption that the next generation of battleship replacement platform would not significantly exceed the battleship's current capabilities. This is nearly certain because no special defensive measures are being currently designed.

The Future Threat Relationship

To properly weigh the importance of battleship capabilities, a basic examination of the "future threat" must be introduced. For this look into the future, the *National Security Strategy, National Military Strategy, Naval Doctrine Publication 1*, the *Quadrennial Defense Review (QDR)* and the Department of the Navy white papers *...From the Sea*" (1992), *Forward...From the Sea* (1994), *Operating Forward...From the Sea* (1997); and *Vision...Presence...Power* (1998) help to provide the vision of the Navy into the twenty-first century.

As the Navy strives to achieve "forward presence" through Naval Expeditionary Forces, the key attributes of flexibility and self-sufficiency will be watchwords. The four new operational concepts, serving as a template for the "Navy of the future," are Dominant Maneuver, Precision Engagement, Full-Dimensional Protection, and Focused

Logistics (U.S. Navy, *Vision, Presence, Power* 1998, 10). Any new ship or aircraft design must meet this template. How does the battleship measure up?

The primary four categories of "essential capabilities" the Navy Expedition Force of the next century must provide for the Joint Task Force Commander are "Network-Centric Warfare, Sea and Land Control, Power Projection, and Force Sustainment" (U.S. Navy, *Vision, Presence, Power* 1998, 21-22). If the battleship meets the operational template, where does it measure in meeting these capabilities? With new systems and technology coming online every day, is the battleship "outclassed?"

The Quadrennial Defense Review's (QDR) twenty-first century force-structure requirements depend on the roles, missions, and tasks the Naval services must perform. The force-structure outcomes the Navy is committed to sustaining comprise (U.S. Navy, *Vision, Presence, Power* 1998, 16): (1) 12 aircraft carrier battle groups--11 active CVs, and one reserve/training CV, (2) 10 active and 1 reserve carrier air wings (CVW), (3) 12 amphibious ready groups (ARG), (4) 50 nuclear-powered attack submarines, (5) 14 nuclear-powered ballistic missile submarines, and (6) 116 surface warships--112 in the active Fleet and four in the Naval Reserve Fleet. Will there be room for two battleships? Should room be made to support these capital ships?

Risks

With a predicted 80 percent of the world's population living within fifty miles of the coast by 2020, the littoral warfare environment takes on a new dimension (Global Population Distribution Database 1998, 7). The navy of the future must either be

designed for survivability or depend on weapon standoff ranges to keep the ship out of harms way.

How would a battleship fare in the littorals against the shore-based cruise missile threat? With Silkworm missiles and C-802s being proliferated, can the Iowas still fulfill the role demonstrated by the USS *New Jersey* during the Vietnam War?

Submarines firing torpedoes; ship-, shore-, or air-launched missiles; mines; and the weapons of mass destruction (WMD) must all be taken into consideration. While critics point towards these risks as overwhelming evidence that the battleship's susceptibility disqualifies their future service, a comparison must be made to determine the positive delta (if any) that modern warships and capital platforms maintain over the battleship.

A 1981 study determined it would take six Exocet missiles to affect the mobility of an Iowa class unit (Morison 1995, 16). Other studies exist modeling the modern torpedo threat. Is the survivability of the battleship worth added consideration?

Conclusion

What is the answer? Should the battleships be kept around into the twenty-first century? What mission and roles would they play? Current funding allows for a total of twelve carriers. Would a battleship be able to lighten the deployment cycle for the carriers, without significantly degrading national military responsiveness in the assigned theater? With the increase of military operations other than war (MOOTW), might a surface action group (SAG) centered on the battleship provide naval leadership with a flexible alternative to committing a carrier? Are there any specific missions and roles,

either strategic or tactical, that the battleship seems better suited to perform? How would they apply to the Navy of the twenty-first century? With the Navy adopting the *Forward...from the Sea* concept that focuses on the littoral warfare, what advantage is to be gained by having battleships?

Is the aircraft carrier the logical replacement for the battleship? If so, at what cost? With all the Navy's carriers now nuclear powered, is the battleship an old fossil-fueled dinosaur? And as has been argued before, are battleships too manpower intensive? Has their usefulness passed? Are they too vulnerable in today's technological age?

In order to determine the future utility of the battleship into the twenty-first century, an examination will be made of how the battleship supports the *Forward...from the Sea* concept. The costs and benefits will be determined, and the battleship's capabilities (both strategic and tactical) will be identified. Once identified, these costs and benefits will be cross-referenced against other assets in the naval arsenal. What unique capabilities does the battleship bring? What are other benefits that are also provided by other platforms? What are the costs associated with maintaining and operating battleships? All this data must be compared to assess whether the capabilities and benefits gained by battleship reactivation would support the cost or whether it is more feasible to attempt to meet these capabilities and requirements with future ship designs. Finally, what should be done in the meantime while these new ships are on the drawing boards? Should the remaining Iowa class battleships be returned to active duty, placed back into the "mothball fleet," or struck from the Naval Ships Registry altogether?

Thesis Assumptions

1. The mothball inactive reserve fleet has maintained the *Iowa* and the *Wisconsin* at a proper level of maintenance in order for the ships to be restored to active status without excessive unanticipated repairs.

2. When comparing the battleships to current platforms or proposed initiatives, it is assumed that similar modern electronic equipment (radar, communication gear, navigation) will have been installed on comparable platforms.

3. Historical and designed capabilities (from design specifications and after-action reports (AARs) are accurate and can be used to provide analytical relationships.

4. No significant system upgrades will be required for the Iowas.

5. Other than resource management adjustments for manning and fuel, costs for crew and fuel will not be increased by technological upgrades.

Definitions

Anti-air warfare (AAW). The area of warfare countering air threats both from missiles and aircraft.

All Weather Capable of accomplishing assigned mission without regard for changes in weather conditions.

Air and Naval Gunfire Liaison Company (ANGLICO). Organization, in U.S. Marine Corps divisions, responsible for control and use of naval gunfire and air support.

Armor-piercing (AP). Bomb or projectile with a relatively heavy case, lighter explosive charge, and delay fuse, designed to punch through armor or fortifications before exploding.

Antisubmarine warfare (ASW). The area of warfare countering sub-surface threats (submarines).

Battleship (BB). For this study, specifically the Iowa class—The USS *Iowa,* USS *New Jersey,* USS *Wisconsin,* and the USS *Missouri.*

Battleship Battle Group (BBBG). Battleship with escorts, usually as many as three.

Counterbattery Fire. Weapons fire, either main or secondary battery, brought to bear on an enemy position that is firing on friendly forces with the desire to neutralize the target.

Aircraft Carrier Battle Group (CVBG). Aircraft Carrier with battle group escorts.

Destructive Fire. Process by which weapons are brought to bear on a target with the explicit desire to bring about the complete destruction of the target.

Degaussing. Process by which a ship's magnetic field is neutralized for protection against magnetic mines.

Flagship. Ship where an officer of Flag rank "breaks his flag"--a term for "makes his official presence." Usually this refers to the ship where he and his staff will issue commands from.

Indirect fire. Gunfire at a target out of sight of the firing ship. Requires ground or air spotting to be effective.

Interdiction Fire. Gunfire brought to bear on an area designed to interrupt and/or disrupt enemy movement.

Landing Craft Air Cushion (LCAC). An air cushion landing craft launched from Amphibious ships designed to allow deeper inland penetration by Marine Corps forces during amphibious operations.

Main battery. A ship's principal offensive armament.

Mothball. The process of preparing a ship for long term inactivation. A complete overhaul is completed on major systems, and the systems are placed in "dry lay-up," a procedure of pumping dry dehydrated air into the systems to prevent moisture from damaging the equipment. In addition to the dry air, desiccant bags are placed inside electronic equipment to absorb any stray moisture that might enter the system. This procedure is conducted on all ships in the ready reserve fleet, allowing them to be restored to full operational status in a minimum of time.

Parbuckling. Method of moving a large shell by passing a cable around it, taking the free end to a capstan, and heaving around to slide the shell on its base. Used to move battleship main-battery shells from their stowage to the hoists.

Surface Action Group (SAG). Usually a command ship accompanied by escorts tasked to conduct operations.

Secondary Battery. A ship's second heaviest gun battery. This, in a fast battleship, consists of five-inch dual-purpose guns in twin mounts.

Shore-Bombardment. A primary mission of gunfire ships during an amphibious landing. Fires are designed to interdict and suppress enemy defensive preparations.

Special Treatment Steel (STS). Refers to the treating and rolling of armor steel to improve armor capabilities. This process included special hardening and bonding procedures.

Tender. Platforms specifically designed as floating intermediate maintenance facilities that provide a deployed unit with repair work, periodic maintenance, crew support functions (I.D. Card services, Official Photos, Dry Cleaning, etc.), and limited design modifications.

Tomahawk Land Attack Missile (TLAM). Otherwise known as the *Tomahawk* cruise missiles. Each battleship is configured to carry thirty-two.

Vertical Launch System (VLS). System installed on Ticonderoga class cruisers, Spruance class destroyers, and Arleigh Burke class destroyers to enable vertical launching of *Tomahawk* cruise missiles, Vertical Anti-submarine (ASW) Rocket (ASROC)—basically a rocket thrown torpedo, and surface-to-air missiles.

Delimitation

While the Government Accounting Office and Navy both cite the *Iowa* explosion as a supporting reason for the scrapping of all battleships, accidents and or mishaps, in the dangerous business of naval operations, are bound to occur. As the cause of the explosion has never been confirmed, the thesis will not address the argument that battleships are inherently unsafe.

CHAPTER 2

LITERATURE REVIEW

Do battleships have any viability or utility for the twenty-first century? In order to determine whether battleships are viable, a wide assortment of other questions need to be answered. What current and historical capabilities do battleships offer? How valid are the arguments for and against these old battlewagons? Do the costs outweigh the benefits? Could there be an alternative solution or maybe some new initiatives? This chapter will introduce the sources and material available for such a comparative study.

Much has been written on battleships to date, logging their performances in World War II, Korea, Vietnam, Lebanon, and most recently the Gulf War. Equal amounts of literature exist firing the proverbial broadsides of emotionally charged rhetoric for, or against, the future of battleships. In addition, in the last ten years, there has been a number of official studies completed to review the costs involved in sustaining a battleship ready force and proposing alternatives in meeting traditional battleship roles. Both the historical and the rhetorical arguments will be used in developing, building, and supporting the capabilities-based arguments of this thesis. Once this basis is established, the thesis will address the analysis of cost versus capabilities while examining other options. A review will be made of the available five general categories: historical analysis of battleship utility, point and counter point (outlining opponent and proponent positions), cost versus capability, comparisons with aircraft carriers, new initiatives, and operational experiences. The thesis sources are not limited to literature, but also include oral accounts, experience, and interviews.

Historical Analysis of Battleship Utility

First, the historical use of the battleship will be examined to introduce capabilities and missions a battleship has traditionally fulfilled. This data will be important for later analysis on current capabilities and may provide insight into utility that has not been previously considered in modern arguments. Many of America's greatest leaders have turned to the pages of history to give them insight into how best to apply their assigned forces during conflict, and once again, history has proven a valuable research tool. Where best to discover the seeds for future tactical and strategic utility of battleships than in their history? While current leadership seems focused solely on the NGFS aspect, the intent of this study is to sift through the historical data to find the nuggets of application that will carry over into the twenty-first century and then assess the feasibility and benefits gained.

The Iowa class battleships were originally designed to counter the Japanese Yamato class battleships (two total) in the mid-1930s. Heavily fortified, they were given nine sixteen-inch guns to counter the nine eighteen inch guns of their Japanese counterparts, twenty five-inch guns, and various smaller caliber guns to provide anti-air threat protection (Garzke and Dulin, 1995, 137). The first of the Iowa class was completed 22 February 1942.

Fitted with twelve 1.1-inch guns, twelve .50 caliber machine guns, eighty forty-millimeter Bofors, and fifty twenty-millimeter Oerlikons, the Iowa class was considered to have a significant AAW capability in addition to it's NGFS role (Garzke and Dulin, 1995, 139).

The protective systems of the Iowa class make these ships unique. With the Japanese advent of the Yamato class, U.S. battleships were more vulnerable to a hit from extended range. The Iowa class was specifically designed with improved armor for survivability. The armor protection of the *Iowa* provides an immunity zone of from 17,600 to 31,200 yards against the old sixteen-inch/45 caliber gun firing 2,240 pound armor piercing (AP) shells; against the 2,700 pound improved AP shell, this zone extended only from 20,400 to 26,700 yards. The 12.1-inch main side belt armor was superimposed on .87five-inch special treatment steel (STS) backing plates. The armor system was inclined outboard some nineteen degrees from the vertical, giving protection equal to that of 17.3-inch vertical armor plates. The lower side-belt plating, with the same inclination as the heavy main belt, tapered from 12.1 inches at the top to 1.625 inches at the bottom. For comparison purposes, the Ticonderoga class cruisers, and Spruance class destroyers of today have hulls composed of one-half inch standard steel plates, with no armored hardening applied. In addition to the heavier armor, the battleship hull is surrounded by "liquid voids" (storage tanks for potable and feed water, fuel oil, and lube oil), that act as an added preventive buffer from the sea, whereas modern ships often do not have this luxury. (Garzke and Dulin, 1995, 140)

Prior to the arrival of the aircraft carriers, the battleships sailed as the backbone of the fleet. During the Pacific naval campaigns following Pearl Harbor, the aircraft carrier rose in stature, replacing the battleship as the measure of sea power. Because of this shift in naval strategy, many strategists and tacticians made the assumption that the battleships' utility was gone. As support dwindled and focus shifted to aircraft carriers, these quiet warriors met the sharp steel of the political axe and were determined by

leadership to be in excess. Facing the strong lobby, among Navy leadership, these dreadnoughts were gradually placed in mothballs to wait a time when their services would be called upon again (Newell and Smith 1969, 138-143).

"How much the few remaining may continue to prove worthwhile investments, as the *New Jersey* off Vietnam illustrated in 1968-69" (Stillwell 1986, 39). The battleship filled a need not met with any other weapon, providing large-caliber gunfire support for troops distant from the coast. Her sixteen-inch guns reached miles inland, shattering concealed enemy targets, bridges, guns, and troop concentrations. Protected by heavy armor and mounting numerous rapid-firing five-inch guns, she steamed close to the coast, smothering hostile shore batteries. Stillwell notes that they were little hampered, even by storms; battleships were not restricted in operations, as were aircraft. They struck the enemy continuously, day or night, in any weather, at any time of the year, and did this without sacrificing the life of bomber pilots, crew, or costly jet aircraft (Stillwell 1986, 39).

In addition to the obvious NGFS and survivability aspects of the battleship, the ship can fulfill many other roles. Provided as a major reason for re-commissioning battleships in the early 1980s was the unique capability to carry large amounts of fuel and stores. Coupled with the extensive onboard machine shops and repair facilities, the battleship was the logical choice to build a battle group around. Even without an assigned battle group, the battleship was a proven logistics asset. During the Gulf War, the *Wisconsin* performed the role of Northern Arabian Gulf (NAG) logistics hub ensuring mail, parts, people and fuel were provided to all NAG units. Especially with the Navy's

current "right-sizing" of the fleet, and decommissioning of almost all tender assets, the battleship's logistical capabilities are significant (Stillwell, 1981, 86).

The battleship's onboard command and control facilities can provide a viable substitute to the aircraft carrier for staff embarkation. Currently, due to size constraints of the "small boys" (cruisers, destroyers, and frigates) these platforms cannot support a large staff for more than a limited period of time. With upgraded communications and intelligence equipment, the battleship is a prime candidate for selection as the Admiral's Flagship. A separate flag bridge, dedicated office spaces, and an abundance of berthing available for the staff are just a few of the benefits. Since their construction, they have carried senior leadership including heads of state in style. During the Gulf War, the battleships' (*Missouri* and *Wisconsin*) large communications suites supported the embarked Task Group Commander, the *Tomahawk* Strike Coordinator, and the NGFS Coordinator (Stillwell, 1995, 322-327).

For "Force Power Projection," the battleship is a formidable tool. A leftover from the days of "Big Stick" Diplomacy, a battleship's sleek lines, combined with her obvious bristling weapons, leave most overseas visitors in awe. Her ability to reach out and touch the enemy deep inland can stem the tides of negotiations. "During Vietnam, the North Vietnamese refused to participate in the "Peace Talks" until the *New Jersey* had been called off. They did not make such a condition concerning the aircraft carriers" (United States Navy Fire Support Association (USNFSA) 1998, 4-5). Similarly, during the Gulf War, many enemy prisoners of war (EPWs) expressed a significant fear of the battleships. Used correctly, the strategic impact of the *Iowas* can be far-reaching--even if only in the role of strategic deterrence (Stillwell 1981, 326-327).

Many of the original designed tasks have been forgotten in the oversimplification of the battleship as solely an NGFS platform. One example might be the Iowa class's anti-mine capability: the designers recognized that the battleships directed role of beach preparation and shore bombardment required the battleships be able to operate in mine infested waters. For this reason, battleships were designed with paravanes (anti-mine cables with "cutters", that are streamed to either side of the ship's bow, held in place by "fish"--torpedo like objects designed to keep the cable at depth and at specified angles from the bow). Battleships would follow the minesweepers towards the beach, providing an added measure of safety, driving before the other smaller combatants and amphibious ships (Reilly 1989, 119-123).

In his book *Operational Experience of Fast battleships; WW II, Korea, and Vietnam*, John C. Reilly, Jr. refers to the psychological role the battleships played--both for friendly troops and against the enemy. In *The Battleship Battle, 1964-1967*, Paul Stillwell discusses the reasons the Chief of Naval Operations (CNO) Admiral David L. McDonald opposed the reactivation of a battleship for use in the Vietnam War and then recounts the events that led to the activation of the *New Jersey* in 1967.

In a period where the Navy is less self-reliant and has greater reliance upon civilian contracting overseas to provide repair facilities for ships, the battleship provides an alternative. With "tender" level maintenance facilities that include motor rewind shops, lathes, drill presses, sand-blasting facilities, milling equipment, and circuit board repair facilities, the battleship assists in reducing reliance on outside sources.

With a fuel-carrying capacity of over one-million gallons of Diesel Fuel Marine (DFM) (8,800 tons fuel oil), 187 tons diesel, and 22.4 tons gasoline, the battleships have

the inherent ability to provide fuel bunker stores (refueling capability) for their surface action group (SAG) escorts (Garzke and Dulin 1995, 146-147).

Configured with a fifteen bed hospital, two operating rooms, a dental office with tour chairs, two doctors, two dentists, and assorted support personnel, the battleship has the inherent capability to provide medical and dental support to her crew and escorts.

Arguments Against and For Battleships

With a historical basis for the use of battleships developed, this thesis will now introduce and review the myriad of writings both for and against the future utility of battleships in the United States Navy. Some authors of books and other writings have already begun the journey this thesis will follow. Using these existing writings will help to establish a foundation for this research, and develop any final conclusions.

The Con's

Sifting through the assortment of books, articles, letters, and interviews, two positions emerge: battleships costs outweigh their benefits, and they are outdated and obsolete when compared with other present day technology. Norman Polmar, a well-known author, analyst, and defense consultant specializing in naval affairs, and head of the Naval Institute's computerized data base, clearly summarized many opponents arguments against future use of battleships. In his article "Battleships and Naval Gunfire Support," he stipulated that, "Supporters of the battleship are naïve in believing that they could be effective gunfire support ships" (Polmar 1996, C3 col 1). He succinctly laid out a series of points beginning with the fact that there are too few battleships. This he says, due to maintenance periods, leads to the probability of a battleship not being available on

short notice where it is needed. His second argument, "too expensive," points to the 1,500-1,600-man requirement and subsequent sixty million dollars a year operating cost. He makes the comparison that "each battleship crew could man up four Aegis Cruisers or eight anti-submarine frigates" (Polmar 1996, C3 col 1). His next two arguments are closely connected. He argues battleships are "too limited in role, and too limited in capability" (Polmar 1996, C3 col 1). Stating that a battleship's only role is naval gunfire support (NGFS), he points again to the expense of the battleship not being worth the single mission gain. Not forgetting the battleship's *Tomahawk* missile capability, he points to the new Vertical Launch System (VLS) capability ships (refit Spruance class) as logical replacements. Finally, he states, modern assault methods (helicopters and Landing Craft Air Cushion-LCACs) make the battleship obsolete. Further, with modern aircraft, submarines, and other weapons systems readily available to third world nations, it is too dangerous to risk committing battleships in hostile areas (Polmar 1996, C3 col 1).

In *The Cold War Navy in the Post-Cold War World--A Policy Analysis*, Christopher A. Preble, a former USN officer and independent defense policy analyst criticized the current Navy strategy of ...*From the Sea* as overly cautious and vague. He characterized the U.S. Navy as "an 800-Pound Gorilla" stating that the overwhelming strength of the U.S. Navy relative to that of any other world power is readily apparent (Preble 1993, 2). He advocated not only the removal of battleships from the Naval Registry, but also a closer look at what else the Navy can get rid of. The basis of his argument is that the size, material readiness, technological advantages, support services, and training of the Navy has given the U.S. such an overwhelming advantage, that it can afford to take a deep cut (Preble 1993, 1-6).

He feels the U.S. Navy will remain strong, and its personnel dedicated, in spite of cutbacks in ships and material, so long as it is not called upon to perform too many missions simultaneously and the pay and benefits are good (Preble 1993,13-19).

Robert L. O'Connell, Senior Analyst at the U.S. Army Intelligence Agency's Foreign Science and Technology Center, provides a different perspective with his book *Sacred Vessels: The Cult of the Battleship and the Rise of the U.S. Navy*. With provocative insight and wit, he conclusively demonstrates that the "vaunted battleship was in fact never an effective weapon of war, even before developments in aircraft and submarine technology sealed its doom" (O'Connell 1991, 391). He argues, "The world's navies failed to recognize the full implications of rapid technological change at the turn of the century because they were too narrowly focused in mindset. It (the battleship) symbolized everything that was acceptable and orderly about naval life" (O'Connell 1991, 3-5). He systematically refutes the logic of maintaining battleships, pointing out that technological advances have made the battleship obsolete. He identifies the problem with today's military (and the politicians that support this) as being "a stubborn and blindly conservative attitude that influences our logical approach to weapon selection" (O'Connell 1991, 3-5). In *Sacred Vessels*, Richard Hough wrote, "That the battleship has survived so long in the world's armories was evidence of the dreadnought's power to inflame men's imaginations" (O'Connell 1991, 6). Further, *Sacred Vessels* attacks the battleship on purely technological evolution. "The dreadnought's very shortcomings as a weapon, its propensity for under-kill," and its replacement by the aircraft carrier, should seal the battleship's fate (O'Connell 1991, 6). From Mahan to Yamamoto, O'Connell identifies historical arguments against the vaunted dreadnought.

Arguing that Mahanian theory promotes the concept of control of the seas, and relying heavily on rapid speed and maneuver, O'Connell argues the battleship is too slow and heavy to provide the rapid maneuver necessary to provide rapid response. Yamamoto's decision to use air power to conduct the attack on Pearl Harbor was to demonstrate the extended arm (read "range") of the carriers' weapon--the aircraft. The torpedoes and bombs dropped from the skies decimated the battleship fleet sitting at anchor, with minimal losses. Follow on battles in the Pacific, Coral Sea, Midway, and others emphasized a shift in maritime strategy, pitting fleets against one another out of gun-range and in some cases out of sight.

Although O'Connell credits the battleship performance as "useful for shore bombardment in support of amphibious operations, as antiaircraft platforms to protect carriers, and still less heroically as oilers," he caveats his praise by saying, "Far cheaper ships could have approximated most of these services" (O'Connell 1991, 317).

Finally, he compares the resurgence of the battleships in the 1980s as "nautical vampires, rising over and over to drink deeply at the public trough" (O'Connell 1991, 319). To those who would say Desert Shield and Desert Storm signified a flaw to his argument, O'Connell says, "We were witnessing, with a lingering sense of awe, the last gasp of a fire-breathing behemoth that in actuality was all but toothless from the moment of its conception" (O'Connell, 1991, 391-392).

With the tragic incident aboard the USS *Iowa*, renewed criticism arose about the risk versus utility of battleships. Painting the battleship's reliance on unsafe antiquated 1940's technology, the issue of whether they were too risky to operate fueled furious debate. Adding fuel to the debate was the Naval Investigative Service's inept handling of

the follow-on investigation. *Time* magazine's 01 May 1989 issue, reports, "A unanimous bipartisan ethics committee report proves devastating. The USS *Iowa* explosion renews debate about the usefulness--if any--of battleships" (*Time* 01 May 1989, 67). Without adequate resolution of the powder explosion's cause, the battleship's reputation would remain severely stained.

Senate transcripts, too, include arguments against future utilization of the battleships. Senator Bumpers argued that "operation of two battleships will waste taxpayer dollars. We have the solemn duty to the American people, in the interest of our national security, to spend their money based on what is the most effective platform and weapons system we can bring to bear against the Third World or any other adversary" (Bumpers 1990, S-11848). He goes on to say, "Clearly, based on past folly, battleships are not an effective weapons system" (Bumpers 1990, S-11848). Citing the *Iowa* tragedy, "we find it irrational to fund virtually obsolete, trouble-ridden battleships with our current budgetary problems." (Bumpers 1990, S-11848) With the future of naval warfare no longer based upon fleets engaging each other within sight, while conceding the capability of the battleship to perform surface-to-surface (anti-ship) warfare, they "seriously question the utility" (Bumpers 1990, S-11848).

While usually the leaders in promoting battleship reactivation, the Marine Corps is pushing newer methods of providing NGFS or NSFS as well. A December 1996 letter from Marine General Paul K. Van Riper (at the time the Commanding General, Marine Corps Combat Development Command) to the Chief of Naval Operations (N86 and 85 shops) stated how "extremely pleased we are with the recent contract award for the development of the improved five-inch naval gun and the Extended Range Guided

Munitions (ERGM)" (Van Riper 1996, 2). He went on to express pleasure "with the potential for development of the Vertical Gun for Advanced Ships" (Van Riper 1996, 3).

The Pro's

Support for the battleships comes from various sources. Writers and researchers have provided various inputs, some analytical and others emotionally charged, presenting an assortment of arguments favoring the continued operation of battleships. Congress, in mandating the retention of two battleships against the wishes of Naval leadership, has called the Navy to task. Using the Navy's emphasis on littoral operations since the dissolution of the Soviet Union, Senator John McCain challenged the Navy in "Why Battleships Are Needed" to "rationalize the deactivation of the battleships (McCain 1997, 2). While the Goldwater-Nichols Act legitimized the need for the joint services to work together for mutual support and economy of effort, the Navy, in McCain's view, appears to be back-stepping away from its traditional multi service NGFS or NSFS role. The Marines and Army are understandably concerned about the lack of effective fire support from the sea (USNFSA 1998, 3-4).

Senator Warner in debating the modified "Bumpers Amendment" stated the following arguments in support of the battleships: "Battleships can support amphibious landings, delivering a killing field of firepower to beaches where our Marines might be engaged in amphibious assault--a level of firepower that no other weapon in the American arsenal can deliver. The battleship gives us the capacity to confront future conflicts against Third World nations. Further, a battleship serves as a mobile platform for cruise missiles, enhancing our strategic triad. No other ship gives the United States

the visual military presence of the battleship" (101st Congress, 2nd Session, August 3, 1990, S-11848).

William Lloyd Stearman, Ph.D., former member National Security Counsel Staff (1971-76, 1981-93), in a letter to Congress made the following arguments for the battleships. First, he described the battleships as the Navy's "only remaining potential source of around-the-clock, all weather, accurate, high volume heavy fire support" (Stearman 1998, p1). From a 6 August 1997 letter from the Government Accounting Office to the Secretary of Defense, "The Navy admitted that it currently had no credible surface support capabilities to support forced-entry from the sea and inland operations by Marine Corps and Army forces" (Stearman 1998, 1). Quoting General Paul Van Riper, U.S. Marine Corps (USMC), he stated, "the proposed Extended Range Guided Munition (ERGM) five-inch gun would not meet the Marines' essential requirement for "high explosive" volume fire for landing forces...battleships could" (Stearman 1998, 1).

Senator John McCain, second ranking member of the Senate Armed Services Committee Sea Power Subcommittee, wrote, "The Navy's emphasis on littoral operations since the dissolution of the Soviet Union and subsequent atrophy of its fleet has increased the value of battleships immeasurably, both for their survivability and the fire support they can contribute to land operations. I can see no compelling reason for mothballing the last of the battleships, and every reason for retaining them in the active fleet" (Stearman 1998, 4).

Captain Raymond A. Celeste, Jr., USMC, summarized arguments first presented by David Evans of the *Chicago Tribune*. He stated, "based on the requirement for NGFS and for something larger than the five inch, fifty-four caliber guns currently in the fleet,

there is no question that guns firing relatively cheap ammunition are preferable to costly missiles" (Celeste 1996, C3 col 2).

Colonel James B. Soper, USMC, felt Polmar missed the mark in believing there is a substitute for the battleship NGFS role. He laid out three quick arguments. First, the VLS modification is not going on all destroyers. Second, the type of missile to be employed (read *Tomahawk*) is not appropriate for the NGFS mission. Third, the modification, deployment, and testing of such a system had not occurred. Although correct that TLAM is not an NGFS weapon, Soper seemed to incorrectly attribute Polmar as saying VLS was a substitute for NGFS. Polmar did not make such an argument. He limited his mention of VLS to replace the armored box launcher *Tomahawk* capability of the battleship. As for the case regarding VLS testing and deployment, Soper was incorrect. Spruance class destroyers and Aegis cruisers have had VLS since 1988, and the system was used effectively during Desert Shield and Desert Storm. What remained are Soper's arguments regarding the cost of NGFS bullets versus other methods of fire support (albeit missiles), and the fact that Polmar did not address what should fulfill the battleship's NGFS mission (Soper 1996, C3).

In "Naval Gunfire-A Response," Captain Matthew P. Bragg, USMCR, a former air spotting instructor for NGFS at the Naval Amphibious School, Little Creek, Virginia, clearly summarized all NGFS assets available in the Navy and compared their capabilities. His conclusion is that the sixteen-inch, fifty calibers found on the battleship, combined with the armor of the battleships, makes these ships a persuasive asset (Bragg 1990, 17-18).

Commander Selle, USNR (Retired) who served in the Office of Naval Intelligence (Reserve) for seventeen years and who wrote *The Best Kept Secret in Pentagon Room 4E686*, provides a Navy perspective in "Out With the Bath Water, Out With the Baby? Save All Four battleships." He felt that "it is vital for us to recognize the undoubted utility and flexibility of the battleships" (Selle 1992, 29). His arguments were summarized as, with upgrades in technology, the battleships could overcome their faults. The sixteen-inch shell could be replaced by a thirteen inch tapered round to increase ranges up to seventy-five miles. The five-inch guns could be removed and replaced with vertical-launched missile cells to provide an AAW capability and to reduce manpower numbers. He felt that the battleship still has utility as a bridge between the Navy of the past, and of the future (Selle 1992, 30). "Battleships Aren't Old...Just Misunderstood," another article by Commander Selle, continued many of the same arguments, but also identified the charismatic appeal of the battleship, and its "power presence" as significant assets (Selle 1995, 76).

"Battleships Aren't Dead Yet," by Ernest Blazer, reported on the persistent opposition in Congress to retiring the battleships. Centered around the argument, "What will replace the battleship in supporting the Marines on the beach," senior Navy officials were continuously sniped at while trying to present their proposal to scrap the battleships (Blazer, "Aren't Dead" 1995, 7). The argued Navy position summarized by Vice Admiral Thomas J. Lopez, then Deputy CNO for Resources, Warfare Requirements and Assessments, was "I love the sixteen-inch guns. But they're an old system, and as such are too manpower intensive" (Blazer, "Aren't Dead" 1995, 25). "Battleships Caught in Congressional Crossfire," also by Ernest Blazer, while addressing Secretary of the

Navy's decision to "scrap or sell its four Iowa class battleships," raised the debate, "over the Navy's commitment to providing strong gunfire support to troops ashore" (Blazer, "Caught" 1995, 6). Pointing to the Persian Gulf experience, Blazer quoted then-Seventh Fleet Commander, Admiral Stanley R. Arthur, "Without the battleships, there would have been no naval gunfire support" (Blazer, "Caught" 1995, 7). All other ships, both American and allied, lacked the sufficient range due to minefields off the Kuwaiti coast. Finally, while acknowledging the temporary reprieve granted the battleship by Congress, Blazer raises naval analyst Norman Polmar's fears that "the battleship may be doomed by the sheer effort needed to revive them...locating 1500 skilled sailors to man them for a crisis" (Blazer, "Caught" 1995, 7).

C. E. Myers, Jr., in his commentary "Not So Fast," pointed out that one of the original reasons for reactivating the battleships was the belief that "Battleships could provide the weapons' developers a twelve to fifteen year respite during which they could create new NSFS elements" (Myers 1995, 75). He stated that, "While advertising its littoral warfare focus with the theme of ...*From the Sea*, the Navy began to mothball the world's most formidable coastal fire-support ships, justified under the guise of affordability" (Myers 1995, 75). Using history as his tool, he sculpted a series of arguments that address, "supporting the carrier, survivability, modern success of dated weapons, and a series of proposals for modernization of the battleships to make them a more capable platform in today's tactical and technical arena" (Myers 1995, 77). Seeming to refute O'Connell's historical arguments, Myers concludes, "even in the era of the airplane and missile, battles were decided--or might have been decided--by the presence of armored gun-ships" (Myers 1995, 78). "No surface vessels possess the

bombardment power--actual or potential--of the battleship" (Myers 1995, 78). He argues that with improvements the battleship is unequalled (Myers 1995, 78).

In his commentary "For Now, Iowa Battleships Still Have A Vital Role," Samuel Loring Morison, a military affairs consultant and naval historian argues that it is "unrealistic to believe we will not require battleships to supplement the equation that enables the Navy to be capable of fighting two major regional conflicts at once" (Morison 1998, 35). He looks at the current Navy position on battleships, and asks "Where is the replacement?" (Morison 1998, 35). Examining the ERGM program, and others, he comes up with the conclusion "no suitable replacement will be available until 2008 at the earliest, and until one is (available), the battleships cannot be considered to be in excess." (Morison 1998, 36). Morison then proceeds to shower some light on the Navy's attempts to circumvent congressionally mandated requirements to maintain two battleships (*Iowa* and *Wisconsin*) in reserve readiness (Morison 1998, 36). He feels the Navy's dismantling of the support infrastructure necessary to maintain the ships and the disposal of warehouse stockpiles of spare parts is just the beginning of the case against the Navy. Working in concert with congressional leaders from New Jersey, deals were made to garner support for the scrapping of battleships in exchange for the promise to provide the USS *New Jersey* to her namesake as a museum (Morison 1998, 37). "By nature," scolds Morison, "expeditionary warfare, a major component of littoral warfare, demands effective, all-weather, 24-hour, fully capable NSFS. The sixteen-inch gun is the only weapons system that can provide this. Naval leadership should be more realistic in policy decisions, and place more importance upon requirements instead of political correctness" (Morison 1998, 37).

Lieutenant Commander Clarence Todd Morgan, USN, argued that in today's changing world, "two elements will dictate force structure and operational doctrine: fewer resources in military budgets, and emerging threats that are diverse as well as unpredictable" (Morgan 1993, 54). With this changing environment, he predicts increased reliance on joint and combined operations, and routine employment of the Navy and Marine Corps team in an expeditionary role. "The National Security Strategy's emphasis on regional threats demands flexible and effective NSFS for these increasingly important expeditionary missions" (Truver and Polmar 1985, 130). "The inadequate NSFS [capability] places ground units at great risk and constrains their operations ashore. Enemy defenses that should have been suppressed by NSFS will inhibit freedom of maneuver" (Morgan 1993, 54). Morgan further reviews the NSFS requirement in an expeditionary mission and concludes that with "the decommissioning of the battleships, current fleet NSFS weaponry is inadequate" (Morgan 1993, 55). He proposes a series of near-term solutions and reviews the status of programs touted to be "sixteen-inch gun replacements." Morgan than proceeds to assess midterm and long-term solutions, looking out of the box to other services to fulfill NSFS mission requirements. His final conclusion is that while the Navy probably can look to meet these mission requirements with some continued development of weapon systems, "with the gap left with the decommissioning of the battleships, we should have started looking for solutions *yesterday*" (Morgan 1993, 53-58).

In the *Jane's Defense Weekly, International Edition*, Barbara Starr reports on "U.S. Congress' General Accounting Office recommendation that the remaining two operational US battleships, the USS *Missouri* and USS *Wisconsin*," deployed at the time

to the Persian Gulf, "be decommissioned" (Starr, 1990, 1252). Starr quotes Secretary Garrett, "The battleship is an extremely capable platform as it relates to power projection, deterrence and forward presence. Without battleships, there are very few assets for naval gunfire support. While similar guns and missiles are available, nothing can replace the capacity for NGFS that you derive from the 16 inch guns on the battleships" (Starr, 1990, 1252).

The United States Naval Fire Support Association (USNFSA), an advocate organization for the return of the battleships, cites the National Defense Authorization Act for fiscal year 1999 (placed in the Senate 1998), to support USNFSA's arguments that "the Navy is dragging their feet and obstructing" efforts by Congress to adequately support the battleship programs (USNFSA 1998, 3). In this legislation, the Navy Secretary is directed to provide a report to the Committee on Armed Services of the Senate and the Committee on National Security of the House of Representatives. The report must outline the Department of the Navy's plans for providing future NGFS or NSFS, Iowa class battleships and their associated ammunition and support equipment, and the costs associated with these plans. In addition, because of the extensive delay in compliance with earlier congressional mandate, the Navy Secretary is to provide his reasons for failing to comply (105th Congress, 1998, S.2057, SEC. 1027.).

Cost-Benefit Analysis

In order to effectively analyze the feasibility of future battleship utility, the results of various government documents and studies were reviewed. Two studies completed by the Government Accounting Office (GAO), "Battleships: Issues Arising From the

Explosion Aboard the USS *Iowa"* and "Navy Carrier Groups: The Structure and Affordability of the Future Force" provided valuable cost data, as well as insightful policies and perspectives from non-Department of Defense agencies. Although the title of the first report misleads the reader to believe it deals solely with the *Iowa* explosion, the study goes beyond the explosion to discuss the actual 1990 arguments for doing away with the battleships. Specific arguments include the high manpower requirement and large fuel consumption rates. Major battleship capabilities were assessed, and predictions were made as to the future utility of the remaining battleships. Based on the Navy responses to many queries, the results seem to show that Vietnam was the last opportunity for a battleship to provide viability to a modern conflict. It is worthwhile to mention that these conclusions were drawn prior to the battleships' participation in Desert Shield and Desert Storm.

Various articles are also available which shed light onto the costs associated with the reactivation of a battleship. The 27 January 1986 issue, *Aerospace Intelligence*, reported on the Navy's plans for reactivation of the *Wisconsin*. "Congress has appropriated $469 million for the reactivation and refurbishing of the *Wisconsin*" (*Aerospace Intelligence*, 1986, 7). This cost was about ninety million dollars more than each of the other Iowas because *Wisconsin* required special repairs due to a fire that happened when they were preparing her for decommission in the 1950s.

Comparison with Carriers

The second reason for retaining battleships is that battleships, as part of multi-ship surface action groups (SAGs), can perform many of the functions of a Carrier Battle

Group (CVBG) but at greatly reduced cost. The Navy has been very careful not to make this argument. It has always considered battleships additive.

Many analysts and congressional leaders reject the Navy's opinion. Exercising bipartisan muscle, Senator William Cohen, Republican-Maine and Senator Edward Kennedy, Democrat-Massachusetts have continuously raked Navy officials over the coals. Senator Cohen interrupted Nora Slatkin, Assistant Navy Secretary for Research, Development and Acquisition, with the question, "When are we going to replace the battleships?" When Slatkin and Vice Admiral Thomas J. Lopez, Deputy Chief of Naval Operations for Resources, Welfare Requirements and Assessments, tried to defend the Navy's position, Kennedy and Cohen refused to let the matter drop, criticizing the Navy for talking about a substitute for over ten years, but producing nothing (Blazer 1995, 25).

SAG and CVBG perform many similar functions, but at a vastly different cost. A Navy Program Assessment and Evaluation (PA&E) estimated the annual operating and maintenance cost of a CVBG with one carrier and six escorts at $660 million and that of a SAG with one battleship and three escorts (which is all battleships require) at $150 million (U.S. Navy 1995, 12). The cost of three escort ships (one cruiser and two destroyers or frigates) is estimated to be around $107 million. Extrapolating from this the annual operating and maintenance costs of one carrier is seen to be about ten times that of a battleship (U.S. Navy 1995, 12). "For years, senior military officials and various cold warriors regarded the CVBG as sacrosanct. Reductions in carrier forces, they argued, would reduce the United States to a second-class military status. But with the end of the Cold War, the need for a Navy centered around the aircraft carrier has disappeared" (Preble 1993, 07).

Both the SAG and CVBG have significant capabilities against shore and surface targets. The guided missile cruisers and destroyers of the SAG provide anti-air and anti-submarine coverage. Battleships, as part of surface action groups [which include one battleship, one cruiser, and two destroyers (DD and DDG)], are far less expensive to operate than carrier battle groups and the battleship can perform a similar mission within the battleship's range that frees the carrier battle group to be used elsewhere. They require about one-third the manpower and one quarter the dollars.

Senator Warner, Chairman of the Sea Power Subcommittee, wrote, "The cost of maintaining these valuable ships in 'mothballs' is small compared to the cost of destroying their capability. Once they are gone, we cannot recoup our loss" (Warner 1996, 1). The Navy's official 1996 estimate for maintaining *Iowa* and *Wisconsin* on the Naval Ships Register was "about $75,000 each a year" (Stearman 1998, 3-4). Senator McCain compared this figure with the initial purchase price of a single new F/A 18 E/F Super Hornet ($61million according to the 1997 Congressional Budget Office estimates) (Grant 1997, 16).

New Initiatives

Finally, because the Navy is required to provide Congress with the facts and figures regarding the battleships' equivalent replacement for NSFS, this thesis will review and examine the proposed initiatives. By applying a comparative analysis of capabilities and cost, An objective assessment on their success or failure to fulfill the battleships' "sixteen-inch shoes" should be provided.

Some of the proposed technological initiatives that the Navy claimed will replace the battleships' NSFS were the "the eight-inch gun," "the arsenal ship", and "the 5-inch 62" (with the new Extended Range Guided Munitions). Official Navy web sites outlined the proposed capabilities of these systems. The articles also included a timeline assessing when these systems will be ready for integration into the fleet with further comments by Naval leadership comparing their role to the performance of the battleships.

In a monograph addressing the Navy's "proposed arsenal ship replacing the battleship in the tactical NSFS role, while adding a new deep strike capability," J. M. Lance traces the genesis of the program. Although identifying areas of similarity, Lance concludes that comparing the battleship and the arsenal ship is "difficult at best" (Lance 1996, 11). Senator McCain states, "Missiles are not a substitute for the kind of impact well-directed artillery fire can have on the battlefield" (McCain 1997, 01). It is worth noting that after spending over a billion dollars on the arsenal ship concept, the Navy scrapped the program despite recommendations to the contrary by the NDP, QDR, and other studies.

Proponents discuss individual aspects of the battleships. For example, in the monograph "Battleship Dominance in the First Days of the Next War: Cruise Missiles or Bombers," C. E. Forshee seems to be comparing apples and oranges--bombers can carry a variety of payloads, while battleships' cruise missiles are especially good against anti-air targets. Although his conclusion is rational and without fault, a criticism is that he failed to consider the sixteen-inch guns in the equation ("In the follow-on days of the next war") (Forshee 1997, 11).

Operational Experience

It would be remiss if this thesis did not examine the aspects of operational experience. Although this area in many ways parallels the historical review of the battleship, it provides an opportunity to present layman's words and opinions to the decision of whether battleships have future utility. First, the support of retired U.S. Army Lieutenant Colonel Charles Fulton, who served as a forward air controller (FAC) during Vietnam, and had the opportunity to control the battleship *New Jersey* during combat live-fire missions was requested. (See Biographical data enclosure 1). Some of his comments follow:

Comparison of current fire support systems:

> I don't think one can compare MLRS, artillery, 5in (Navy), and the 16in of the battleship. Each has their unique niche. From an off shore viewpoint, I would think one would compare the cruise missile with the 16in gun. Even then it depends on the setting. Certainly there is no comparison between the 5in and the 16in. Volume of fire is also not a good comparison as sometimes it is really nice, but then there are always those times when you really want the big bang. I do know the 5in would not have done the job on the targets I fired the *New Jersey* on. (Fulton 1998, 2)

Impressions of the Battleship:

> I can't speak for the grunt or the bad guy, however from my limited experience of shooting the *New Jersey* in anger, I can say it ruined things in a very big way. In an other than high intensity environment, I can think of nothing more intimidating than looking off shore and seeing a battleship. As a show of force it has no comparison. The *New Jersey* was visually intimidating to me and I knew she was on my side. (Fulton 1998, 2)

Based upon my own personal service on two of the four Iowa class battleships, I have included data, experience, and opinion regarding the utilization of battleships from 1986 to1991. I have limited my comments to operational experience to avoid partiality and drawing an overall conclusion.

I began my battleship experience during a First Class Midshipman Cruise aboard the *USS IOWA* (BB 61) in August of 1986. I requested and received orders to join the Surface Warfare community and was assigned to the pre-commissioning crew of the Battleship *Wisconsin* (BB 64) as the 5th Deck Division Officer. My billets on board the *Wisconsin* also included more than twenty months as the "Machinery" Division Officer, and another fourteen months as the Fire Control Officer (Officer-in-charge of all 5" and 16" gunfire control systems) during combat operations in the Gulf War.

I am qualified as a Battleship Gunfire Director Officer (DO), Battleship MK 37 and MK36 Gun Fire Control System (GFCS) Plotting Room Officer (PRO), Battleship Engineering Officer of the Watch (EOOW), In port and Underway Officer of the Deck (OOD), and Tactical Action Officer (TAO). I have also completed training at the Surface Warfare Department Head Course in Newport, Rhode Island, the Joint Maritime Tactics Course in Damneck, Virginia, and the Multinational Maritime Warfare Commanders' Course in Halifax, Nova Scotia, Canada, and completed one semester of the U.S. Navy War College Strategy and Policy Course of Instruction.

Conclusion

History provides extensive data on battleship missions. While some of the original capabilities have been overwhelmed by technology (i.e., the anti-air role), there are many others, which may still have utility (NGFS, survivability, logistics, etc.). What is the quantitative value of these capabilities? Are they redundant in today's Navy architecture? Do costs outweigh benefits? Or have these capabilities already been integrated into newer ship types and the battleship truly is in "excess?" By examining the

historical data, and current battleship theorists' writings, a conclusion should be able to be reached whether there is feasible utility for battleships in the twenty-first century. Comparing these capabilities to existing systems, and proposed systems will aid in determining whether the battleship is truly in excess. Finally, by evaluating the costs associated with the capability benefits, a determination can be made whether future battleship utility is acceptable.

Charles "Charlie" Fulton

(Biographical Data)

(Military Experience LTC US Army RET 1962-1984
Master Army Aviator 4000 hours(1000 combat), fixed and rotary wing qualified
Dual Branch Qualified, Aviation and Field Artillery
Key assignments

AVIATION	Field Artillery
Section Leader, 219th Avn Co (Recon), RVN	HHB Cdr, 23rd Inf Div Arty, RVN
Avn Off, 10th Arty Gp, Germany	S-3, 319th FA Bn (155mm SP) DS
Avn Off, 23rd Inf Div Arty, RVN	1st Armored Div, Ft Hood, TX
Cdr, 162nd Avn Co (Cbt Aslt), Ft Hood, TX . GS	XO, 73rd FA Bn (155mm & 8in SP)
Cdr, 4th Avn Bn (Cbt), 4th Inf Div (Mech), Ft Carson, CO	1st Cav Div, Ft Hood TX
Div Avn Off, 4th ID (Mech), Ft Carson, CO	XO, 6th FA Bn (155mm SP) DS
Dept of the Army, DCSOPS, Aviation Tm Ldr Hood, TX	!st Cav Div, Ft Hood TX
For (then) current and future aircraft G-3 and Force structure	S-3, 1st Cav Div Arty, Ft
	Tng Off, 1st Cav Div, Ft Hood, TX

Combat Experience

"RVN, 1965-66 Recon (scout) with the mission to find, fix, kill, and report the bad guys via onboard ordnance, air strikes, artillery or naval gunfire when available. Operated throughout the northern half of the II Corps area but my primary AO's were Qui Nhon-Bong Son and Pleiku. As I flew deep missions, artillery was seldom available. Air strikes were normally available but the Air Force was very jealous of the Army working their birds. The fighter jocks didn't seem to care who worked them. Along the coast, Navy Destroyers were occasionally available and could really raise hell if you had targets that availed

themselves to the relatively flat trajectory fire. The only other annoying problem I experienced was they're having to cease-fire every little bit to relay their guns on the target.

RVN, 1968-69 Provided and coordinated all aviation support to the 23rd Inf Div's artillery (105mm, 155mm, 175mm, and 8in). Also flew recon etc. My AO was primarily the southern half of I Corps, operating out of Chu Lai (Ky Ha). This tour artillery was my primary fire support means as it was usually within range and could be quickly had. Did not get the opportunity to use any destroyers this time around but did get the opportunity to shoot the *New Jersey* one fine day. The targets were bunkers and tunnels in a mountainous area outside our artillery fans. I don't recall how many rounds per mission but it wasn't many. The destruction and havoc they wrought was just awesome. I would compare each round to a 2000lb bomb. I was also impressed with their accuracy. Would have loved to have kept her around a few more days but no joy as she had other appointments further north."

CHAPTER 3

RESEARCH METHODOLOGY

The Research Plan

The plan to evaluate the future utility of battleships in the twenty-first century consists of five parts. As mentioned in chapter 1, this study has focused on the 'capabilities-based' arguments for determining future utility of battleships, instead of the 'threat-based' approach. Because the nature of capabilities-based studies inherently addresses threat in a general manner, some arguments will delve into threat-related studies, but will avoid an in-depth threat analysis.

The first part reviews the historical use and application of the battleship. The purpose of this part is to assess past utility and to determine the capabilities of the platform as they may apply to the naval concept of *Forward...From the Sea*. A historical perspective also highlights some of the strengths and weaknesses of the battleship.

Obtaining the historical capabilities information is possible through a detailed review of the battleship's designed capabilities and through examining the historical utilization of the battleship during wartime. These reports are found in historical reviews, as well as official government documents, and provide factual data to support future capabilities. Much of this data was outlined in chapter 2.

The second portion of the research review will concentrate on using Tyrus Hillway's 'Critical Interpretation' method, "Tying opinions together to determine a conclusion" (Hillway 1997, 37) This will provide an opportunity to address, assess, and interpret these varied arguments and determine their relative weight. Once both sides of

the argument have been 'interpreted', the remaining data will be used in the follow-on comparative studies to lend weight to arguments for and against the cost and benefit of future utility of battleships in the twenty-first century. As shown in chapter 2, these arguments are plentiful and include a wide range of arguments that go beyond a capabilities focused study. Those arguments that are threat-based in nature will be addressed in this section and will be associated with the related capabilities studies.

The third portion of the research reviews modern day naval requirements to determine the capabilities necessary for the warships now and into the twenty-first century. A case study approach was selected to highlight determined battleship capabilities in relation to future application. With the Navy embracing the *Forward...From the Sea* concept of maritime strategy, the battleship must prove itself useful in this environment if it is to demonstrate future utility. In addition, it is necessary to identify the U.S. national, strategic and military objectives from *the National Security Strategy* (NSS), *National Military Strategy* (NMS) and *Joint Vision 2010* to determine anticipated future operational capability requirements for the military of the twenty-first century. With the assumption that these sources accurately anticipate and identify future capabilities and force requirements, a comparison model (descriptive analytical) to determine the effectiveness of the battleship will be used (see appendix 1).

Obtaining the capabilities case information is possible because of the availability of after action reports (AARs) and analysis that is available for the *Iowa* class battleships from World War II until the present day. Detailed accounts and logs have been compiled in Navy records, and analytical studies were completed to determine overall performance effectiveness.

The battleship may prove to have utility when compared to anticipated future force requirements; however, there is no increased benefit if these capabilities are not unique or if the capability of the battleship significantly exceeds the capability provided by other available assets. Assuming the advertised capabilities of current and proposed systems (future initiatives) are accurate, how well do they meet the requirements of the Navy in *Forward...From the Sea*, and *Joint Force 2010*? Using a comparison matrix, the data from figure 1 will be used as a baseline to quickly compare the battleship's capabilities against those of other systems (see appendix 2).

Finally, even if the battleship is determined to provide some unique capabilities, the benefits gained must exceed the required costs associated with fielding the battleship. Specifically, it must add the costs associated with maintaining, manning, and operating the battleship against the costs of similar systems in dollars and lives. While costs associated with one program vice another may prove monetarily to favor a system, the 'risk factor' to human life must also be taken into account, and if significant, may outweigh the monetary benefits. Information regarding the cost in dollars and lives is available through the GAO studies, and U.S. Congressional testimony.

The options associated with the utility of the battleship in the twenty-first century are threefold. First, the battleship may prove, due to cost or excess capability, not to be a viable option for the future, thus supporting their removal from the Navy's inventory. Second, they may prove to have future utility, but due to current cost constraints, manning constraints, or current critical need in inventory, they are retained in the 'mothball fleet' in inactive reserve. Finally, the battleship may prove to be a required asset and be reactivated into active service until such time as another platform can be

developed and fielded to replace them. There are costs associated with all three options, and these must be compared separately in determining cost versus benefit analysis. This data will also be incorporated into figure 2 in comparison to other similar capability platforms.

CHAPTER 4

RESEARCH

Introduction to Analysis

What utility would battleships have into the next century? The arguments against and for the battleships differ greatly, often arguing similar points in different ways--agreeing to agree, then diverging into their "buts." While chapter 2 outlined many of these arguments, this thesis will try to answer the "buts" by examining the battleship's historical capabilities (both designed and operational), and then determining whether they are still viable today. If battleships still hold viability, then how are the services currently meeting these needs. How do they plan on conducting business in the future? Finally, the thesis will address the question that plagues every program in the government--cost. What is the most cost effective way of accomplishing the mission? Where does the Navy stand today?

Norman Polmar, a well-known Naval Analyst and consultant, summarizes the arguments against battleships:

Too few in numbers: With only four ships , one of which is probably in overhaul at any given time and others widely scattered, the probability of a battleship being available on short notice where needed is small (Polmar 1990, 24).

Too expensive: While re-commissioning each battleship costs only some $300 to $400 million apiece (i.e., enough to buy two frigates), the manning of the ship requires 1,600 men and costs some sixty-million dollars per year. The biggest of these expenses is the manpower, which he says is comparable to the crews of four Aegis cruisers or eight

Perry class guided-missile frigates. With the Navy of the future moving away from being manpower intensive, the *Iowas* are behind the times (Polmar 1990, 24).

Too limited a role: The Iowa class has no anti-submarine and no anti-air capability; this class requires escorts. Escorts, he points out, cost money (Polmar 1990, 24).

Too limited in capability: The Iowa class' main battery is the sixteen-inch guns and thirty-two *Tomahawks*. Because modern assault methods call for using helicopters and LCAC's to carry amphibious assaults and raids further inland, he claims the range of the sixteen-inch gun is no longer viable. Also, due to the 'Third World' having easy access to mines, anti-ship missiles, submarines and aircraft, the risk is too high to place these ships at risk in hostile areas. He puts his support behind the arsenal ships which could fire *Tomahawk* missiles over 1,000 miles and smaller Army missiles 160 miles (Polmar 1990, 24).

Too late: Where, argues Polmar, is the Navy going to get experienced crews to man these ships? The training and experience have degraded beyond the ability to bring these ships back (Polmar 1990, 24).

In addition, other battleship critics say, "the battleship is an old system" (Blazer 1995, 25). The maintenance infrastructure required to support fifty-year-old technology is costly and requires a separate training and procurement pipeline. Technology should be able to provide a new system that can perform the same functions, but at a fraction of the cost. The critics point to new initiatives as the way of the future.

The battleship proponents arguments are summarized:

Survivability: The battleship can travel in harms way where the thinly armored (1/2 inch to 7/8 inch) modern ships cannot, providing greater protection against small arms and minor caliber weapons. Tests have shown that these ships, built with redundancy, can risk being hit without any major threat to her crew. Proponents agree that while requiring an escort, these ships are force multipliers because of added capability.

Flexible Utility as Battleship Centered Surface Action Group (SAG): The battleship can replace the carrier as the center of a non-carrier battle group. Pointing to all major conflicts since World War II as examples of America not being challenged in the air (Korea, Vietnam, Arabian Gulf), these proponents argue the battleship, with an Aegis destroyer for anti-submarine warfare and anti-air warfare support, can provide immeasurable value to any amphibious group while conducting overseas presence and power projection. With the threat of low-intensity conflict certain to rise over the Third World for the next ten to twenty years, the flexibility to transit the Panama Canal and travel sustained distances at high speed (32+ Knots) make them valuable assets.

Naval Surface Fire Support Capability: Simply stated, there is nothing in the inventory to replace them yet, so the Navy should keep them until such time as a replacement is fielded. The Navy, with its littoral strategy and joint commitments, must provide Marines and Army soldiers alike with the naval surface fires support that is promised them.

Cost Effectiveness: Whether as 'a filler' until a new system is fully developed and fielded that will contribute the capability currently provided by the battleship, or modifying them to perform a function in the Navy of tomorrow, the battleship's

numerous benefits outweigh the costs. The more than two-billion dollars invested in bringing the battleships back during the 1980s has provided the U.S. with assets that have ten to twenty years active functioning life--with little further investment. Proponents further point to proposals to reduce the crew requirement without significantly degrading the capability--further reducing cost.

Who is right? There are numerous counter-arguments that can be made to both lines of logic. The battleships might have unique capabilities, but if they no longer apply to current warfighting doctrine, then they serve no real strategic or tactical role. Although costly, would new technology cost more? While the critics argue that the battleship costs are much higher than for smaller combatants for operation, maintenance, and manning, the proponents argue that the benefits exceed the costs. Are apples and oranges being measured? The carrier (with airwing)--proponents argue--has a crew three to four times the size of the battleship and should be the true measure of comparison for manning and cost. How are characteristics and capabilities measured and compared which share similarities, but also are so different? While new doctrine professes a desire to conduct amphibious raids and assaults far inland, this doctrine counts on the utility of NSFS to enable them to achieve these objectives. Where will this come from if the battleship is gone, and the replacement is still on someone's drawing board? Or is the capability already in the Navy's inventory?

Capabilities

In order to determine whether the battleship has unique capabilities that provide utility into the twenty-first century, the thesis begins by examining the historical records

to determine what capabilities the Iowa class were designed to perform. Because the *Iowas* have seen upgrades to weapon systems and adopted new missions along the way, the design aspects covered the initial design and then subsequent major design modifications. Next, the thesis will examine operational experience to determine the Iowa class' tactical and strategic performance. Not only was the level of performance in designed capabilities examined, but an attempt was made to also identify other implied capabilities (power projection, psychological, etc.), and to assess their overall value to the cost-benefit equation. For operational capability reference, the major U.S. conflicts the battleships played a role in were examined, and data was extracted from their performance as outlined in after action reports (AARs) and performance reviews.

Designed Capabilities

Battleships represent the culmination of centuries of naval strategy and warship design. Designed to project power around the globe, battleships were considered the ultimate weapon prior to the nuclear age. Unlike modern warships, battleships were designed not only to deliver an awesome offensive capability, but also to withstand the same punishing firepower delivered by an enemy.

In 1928, as the Navy seriously contemplated the problem of building treaty compliant battleships, the Secretary of the Navy approved outline characteristics for new ships with 35,000-ton standard displacement, one-hundred foot beam, nine sixteen-inch guns, maximum speeds of twenty-two to twenty-three knots, a conventional five bulkhead side protective system, 13.5-inch vertical side belt armor, and 4.5-inch deck armor (Garzke and Dulin 1995, 27).

Further battleship design studies were prepared during 1931, 1933, and 1934. In 1934, the Bureau of Construction and Repair was directed to design the largest practical battleship, carrying twenty inch guns, which could transit the Panama Canal (Garzke and Dulin, 1995, 27). This series of studies led to the Navy ordering seventeen new battleships, and six battlecruisers, in five classes. Of these, ten battleships (*two* North Carolina class, four South Dakota class, and four Iowa class) and two Alaska class battlecruisers entered service. Two more Iowa class and the five proposed Montana class battleships were never completed, and were finally scrapped in the years following World War II.

In 1937, the U.S. Navy began investigating battleship designs with a standard displacement of 45,000 tons. This interest was triggered by the possibility that Japan would fail to ratify the 1936 London Naval Treaty, which would automatically increase the displacement limitation from 35,000 to 45,000 tons. In fact, history would prove them correct, as the Japanese launched their 71,689-ton Yamato class battleship in 1941 and sister ship *Mushashi* in 1942.

Initial studies evaluated a more heavily armed version of the South Dakota design, with the addition of a fourth, triple sixteen-inch gun turret, increased horsepower to support continuous twenty-seven knot operations, and increased armor. In January 1938, the Preliminary Design Branch of the Bureau of Construction and Repair prepared a series of designs for high-speed battleships. Initial designs were discarded due to limited protection against anything greater than eight-inch shells, but in February 1938, the first fast battleship designs with protection against sixteen-inch shellfire were prepared. The displacement of these designs was greatly in excess of the 45,000-ton

limitation set by the 1936 London Naval Conference. The General Board first proposed 'fast battleships' of the 45,000-ton class I March 1938. The emphasis was on high speed (32-plus knots), good protection, and powerful armament (nine, sixteen-inch guns). The secondary battery would be twelve, five-inch guns in an effort to minimize the displacement.

In June of 1938, the General Board selected the 'fast battleship' design of May 1938. This design would be the first (and only) class to use the more powerful sixteen-inch, fifty caliber triple turret, 215 tons heavier than the sixteen-inch, forty-five caliber used by the South Dakota class, and have a maximum speed approaching thirty-three knots. The approved design weighed in at just over 45,000 tons.

The *Iowa* and *New Jersey* were formally authorized on 17 May 1938, shortly before the final characteristics were officially confirmed. *Missouri* and *Wisconsin* were authorized for construction on 6 July 1939. Prior to construction, a newer model, the MK VII, of the sixteen-inch, fifty caliber turret was designed and incorporated into the Iowas plans. With growing concern over the protective aspects of the design, the unit propulsion plant was later changed in favor of an eight-compartment plant based on survivability studies done at the New York Navy Yard. In December of 1941, queries from the Chief of Naval Operations arose over "...what improvements would be necessary to BB-61 class to give them as good protection as that possessed by the BB-57 class" (Garzke and Dulin, 1995, 115)? The reply which followed said, "Basic protection of the BB-61 is directly patterned after that of the BB-57. The only area where the ship suffers by comparison is the greater unprotected length (56 feet) forward. This is offset by the greater subdivision of the larger ship" (Garzke and Dulin, 1995, 115).

The keel of the *Iowa* was laid on 27 June 1940. The ship was launched on 27 August 1942, and was commissioned 22 February 1943. With the added improvements in armament (sixteen-inch, fifty caliber's), equal or greater protective armor, improved eight-compartment propulsion plant, increased horsepower (33kts vs. 27.5kts), and improved maneuvering diameter (turning radius), without question, the Iowa class battleships were the best ever built. They possessed an unmatched combination of great offensive power, good protection, and high speed. Battleships of other nations occasionally equaled or surpassed them in specific categories, but no other capital ships ever built had such an impressively balanced combination of military characteristics. (See Appendix 2)

Maneuverability

As already mentioned, the Iowa class had a designed maximum speed of thirty-three knots, and *Jane's Fighting Ships* reports the ships' actual speed at greater than thirty-five knots. High speed trials conducted by the USS *Wisconsin* off the East Coast in April 1990 attained greater than thirty-two knots in moderate seas (during sea-states between three and five) (Garzke and Dulin 1995, 114).

Two distinguishing characteristics of the Iowas were their bows, equipped with a modestly sized bulb to improve the high-speed resistance characteristics and with a cruiser stern, featuring twin skegs on the inboard shafts. The skegs were armor-protected tubes that provided increased protection to the number two and number three shafts against damage from torpedoes or mines. These skegs, by design, acted as twin keels for the stern section, and "greatly augmented the structural strength" (Garzke and Dulin

1995, 143). These two shafts, had five-bladed propellers vice the outboard shafts with four-bladed propellers, and were considered the 'power screws' because of the higher torque ratio and there influence to ship's speed. The positioning of the rudders in large armor castings offset from the inboard propellers made the ships very easy to handle in deep water, able to execute very tight turns with relatively small heels. In deep water, these ships maneuvered like their much smaller sisters, the destroyers. In shallow water, use of opposing propellers to "twist" the ship was necessary. This characteristic was designed to permit the battleship to affect her position inside a constricted fire-support area (FSA) when providing NGFS.

An example of this maneuverability was the Iowas' capability to drop a "man-overboard dummy" off the port side during a drill, and pick it up on the starboard side after executing a "figure-8" turn (Garzke and Dulin 1995, 116).

Main Battery

The best known capability of the Iowa class battleships is the main battery of nine sixteen-inch, fifty-caliber guns in three turrets. Firing a variety of high explosive and armor-piercing rounds weighing 1,900 pounds and 2,700 pounds respectively, they had historically been recognized as the premier NGFS platform of the United States Navy until the last one was retired in 1991. Design improvements in 1939 gave the Iowas an improved gun system that made them superior to the battleship classes serving before them. Even the South Dakota class, designed just prior to the Iowas, was outfitted with the sixteen-inch, forty-five caliber vice the sixteen-inch, fifty caliber MK VII turret onboard the Iowas.

TABLE 1. ARMOR PENETRATION COMPARISON

16"/45 Gun (Mark 6) 2,700lb. AP shell		
	2,300 FPS (701 m/s) muzzle velocity	
	Belt penetration	*Deck penetration*
@ Muzzle	29.74" (775mm)	
@10,000yds	23.51" (597mm)	1.87" (47mm)
@20,000yds	17.62" (447mm)	4.29" (109mm)
@30,000yds	12.77" (324mm)	7.62" (194mm)
16"/50 Gun (Mark 7) 2700lb. AP shell		
	2,500 FPS (762m/s) muzzle velocity	
	Belt penetration	*Deck penetration*
@ Muzzle	32.62" (829mm)	
@10,000yds	26.16" (664mm)	1.71" (43mm)
@20,000yds	20.04" (509mm)	3.90" (99mm)
@30,000yds	14.97" (380mm)	6.65" (169mm)

Source: Garzke and Dulin 1995, 138.

Belt penetration refers to the depth a shell will penetrate into the armored side of a ship while deck penetration refers to the oblique penetration of a ship's deck. Because of the differences in angle and velocity of impact, these figures are significantly different, and inversely proportional. As a projectile is fired at greater distance, the forward velocity decreases (belt penetration), while its downward velocity increases (deck penetration). Captain Edward Snyder of the USS *New Jersey* in 1969 stated, "The armor piercing capability of an Iowa class battleship's sixteen-inch AP shell is the equivalent of 32 feet of reinforced concrete" (Garzke and Dulin 1995, 137).

All turrets had training arcs of 300-degrees. A minimum crew of seventy-seven men was required for each turret. The rate of fire was two rounds per minute per gun

with an experienced crew. Total magazine capacity was about 1,220 rounds, and a trolley system ran the length between turrets one and three, allowing transfer of ammunition between turrets in emergencies.

When the *New Jersey* was reactivated in 1967, the powder bags for firing full charges were modified by the incorporation of "Swedish additive" jackets. These jackets, each filled with about four pounds of titanium dioxide, were wrapped around the six powder bags in each full charge. The insulating layer formed by this additive significantly reduced bore wear (by 75 percent for AP rounds and 87 percent for high capacity rounds). During the refit of all Iowa class battleships in the 1980s, a velocimeter was added to measure the muzzle velocity of the shells departing the end of each gun. This reduced the steps necessary to calculate anticipated muzzle angle necessary to achieve a specified range to the target.

Anti-Aircraft Battery (AAW)

The Iowa class benefited by early combat lessons of World War II in the area of AAW. The initial design was to include twelve 1.1-inch and twelve, fifty caliber machine guns. Following Pearl Harbor, each battleship was built with eighty, forty-millimeter Bofors and fifty, twenty-millimeter Oerlikons. With the ship's hull length, the guns benefited from improved arcs of fire, and coupled with excellent fire-control systems, the Iowas had the greatest anti-aircraft capability of any ships in World War II (Garzke and Dulin 1995, 139).

At the completion of the war, as the Japanese began using kamikaze tactics, the battleship guns had less effect, due to lack of stopping power against these human

missiles. It was determined that only three inch projectiles and larger would have sufficient stopping power, preventing the damage related to the flying remains from the kamikaze aircraft. In a modern context, this is significant because modern cruise missiles are very similar to these manned suicide aircraft. AAW doctrine for the battleships during the 1980s was to open fire at long range with the five-inch guns, and then, as a fallback, commence a barrage fire at 6000 yards--putting up a curtain of lead for missiles to fly through. In addition, the Iowas were fitted with four close-in weapon systems (CIWS). These were gattling guns that fired depleted uranium bullets against high-speed air tracks on an impact trajectory with the ship. These systems only had a maximum range of 1.5 miles, and even if they hit an inbound missile, it was understood that large parts of the missile could cause additional damage due to the inherent associated kinetic energy. Although a significant AAW player during World War II, the battleship no longer has a significant role in today's Navy without upgrades.

Aircraft

Each battleship was originally designed with two catapults, and the ability to carry and service four spotter aircraft for long-range fire. In 1950, the planes and catapults were removed and a deck prepared to allow for helicopter operations during the Korean War.

In 1989, the Iowas were also provided with the "Pioneer" system. Still able to land most helicopters in the U.S. inventory, the battleships now had the added capability to launch and recover remotely piloted vehicles (RPVs). RPVs were unmanned large model airplanes originally obtained from the Israeli military--they have been replaced

today by unmanned ariel vehicles (UAVs). These organic RPVs were equipped with day and night (infrared and low light sensitive) cameras that transmitted images back to the mother ship. The images were used to provide long-range spotting for NGFS, timely battle damage assessment (BDA), low altitude--high resolution intelligence gathering, target identification, and reconnaissance. Although the RPV used barely any fuel, was relatively inexpensive, and had a small radar signature, probably the best characteristic was that it was unmanned, and therefore, posed no risk of pilot loss.

Survivability

Using the successful designs of the South Dakota class, the Iowas enlarged the protection area to encompass the more powerful machinery plant. The armor provided an 'immunity zone' of about 17,600 to 31,200 yards against the old sixteen-inch, forty-five caliber gun firing 2,240-pound armor-piercing shells; against the more modern sixteen-inch, forty-five caliber gun firing the 2,700-pound AP shells, this zone extended only from 20,400 to 26,700 yards. This immunity zone referred to the coefficient of impact angle and velocity of a shell fired from the specific gun type, within a specified range. At lesser or greater distances, the Iowas would suffer some damage, depending on impact angle, size, and velocity of the projectile.

The 12.1-inch main side belt armor of the *Iowa* was superimposed on 0.875 inch special treatment steel (STS). To provide greater strength, a newly discovered method of welding was introduced, which replaced the previous riveting method of attaching sections and plates together. The armor plates were inclined outboard at about nineteen degrees from the vertical, giving protection equal to 17.3-inch vertical plates (French

made *Exocet* ASM is designed to penetrate between seven to ten inches of vertical armor plate equivalent). The lower side belt plating, with the same inclination as the heavy main belt, tapered from 12.1 inches at the top to 1.625 at the bottom.

Another new development in the area of protection was improved deck armor. Recognized as a flawed weakness even before Pearl Harbor, the attacks on U.S. battleships at Pearl Harbor would further demonstrate the vulnerability of the lightly protected main decks. The Iowa class ships were designed with heavy deck armor protection as shown.

TABLE 2. DECK ARMOR THICKNESS

	Over machinery spaces	Over magazines
Main deck	1.50"	1.50"
Second deck	4.75" + 1.25"	4.75" + 1.25"
Splinter deck	0.625"	None
Third deck	0.5" or 0.625"	1.00"
Total	8.75"	8.50"

Source: Garzke and Dulin 1995, 140.

This deck armor provided adequate protection against oblique impact from shells, and standard bombs. High-level bombing and use of armor piercing shells modified for use as bombs would still pose a potential menace to the horizontal protection of these ships. Design and construction of the Iowa class ships were too far advanced to compensate for this new threat, which soon made it practically impossible to provide horizontal protection against armor piercing bombs.

The conning tower, the primary ship-control station for maneuvering the ship was provided heavy protective armor. 17.5-inch side plating, 7.25-inch roof plates, and four inch deck armor made this a well-protected vault from which to safely conduct operations. The communications tube armor was sixteen-inches thick and provided safe communications (improved with sound powered and electronic communications devices during 1980s refit) between ship control, fire control, engineering, and damage control stations.

To permit ship control personnel to visually observe what was going on and to safely navigate, three periscopes were provided and special beveled eye slots were provided to allow occupants to look out of the armored room. Each of these eye slots were covered by two 1.25-inch fragment protective glass panels. A modification, proposed prior to the 1991 decommissioning of the *Wisconsin*, included incorporation of a video camera device. This would provide the ship control stations with a television quality 360-degree view around the ship and would provide a magnification capability as well.

Details of the side protective system for the Iowas, other than the armored belt specifics, are still classified. The South Dakota class design had a four-layer system with the two outboard layers liquid loaded. The Iowa class schematics show a similar system with liquid diesel fuel, reserve feed-water, and fresh (potable) water voids outboard divided by 1.12five-inch bulkheads. Near the waterline, there were at least four voids in series, while near the keel, the number of voids tapered down to two. The concept was that if a projectile were to pierce the outer armor, passage of remaining shrapnel would significantly reduce the kinetic and thermal energy. Studies following the USS *Stark*

missile incident demonstrated how similar liquid voids provide protection against collateral damage from unused missile fuel by providing a neutralizing buffer area. "Fired from planes (AM.39), or surface vessels and ground vehicles (MM.38, 40), or even from submarines (SM.39), the Exocet is regarded as one of the deadliest anti-ship missiles in the world. Famous for its devastating impact in the Falklands War, and the attack against the USS STARK in the Persian Gulf, it only has the capability to penetrate between 7 to 10-inches of armor" (Morison 1995, 01).

The battleships' survivability has repeatedly been examined. A 1981 naval intelligence study showed "it would take six Exocet missiles to slow an Iowa class unit, and then only if hit in the less defended bows" (Morison 1995, 01). Another analysis showed that it would take five MK 48 torpedoes, striking simultaneously at sixty feet apart on the same side to sink a battleship. The reason that this scenario would put an *Iowa* at risk is because the flooding of the outer strakes would occur too quickly for counter-flooding to circumvent. Should this happen, the weather deck would be at the waterline, and the righting moment might be overcome. If the hits are not simultaneous, the ship should be able to survive. "To seriously threaten an *Iowa* with torpedo damage you would have to penetrate through the hull, through all three torpedo bulkheads, and finally rupture the holding bulkhead into the citadel...and it would take multiple ruptures" (Derdall February 1999, 01).

Logistics

Designed to be self-sufficient, the battleships' repair facilities rivaled those of the Destroyer Tenders. Machinery shops provided lathes, grinders, mills, drill presses, and assorted other equipment. Motor and generator rewind facilities enabled the battleship to repair and rebuild engines and generators, even with the capacity to "bake" the windings in one of two special ovens. Sand blasting facilities, welding and soldering equipment, and the available bar stock (raw uncut metal bars) provided the battleship the capability to design and build replacement parts on the premises. A large sewing loft, complete with industrial sewing machines, bales of canvas, and other materials, provided the battleship with the capacity to mend and repair.

For crew services, the Iowas were configured with a fifteen bed hospital, two operating rooms, a dental office with four chairs, and the associated support personnel, three barber shops, laundry and dry cleaners, two small shopettes, and a snack bar. Even an onboard closed circuit television station, shipboard newspaper, and AM-FM radio station were available to simulate the comforts of home.

Besides the repair facilities, the battleships' capacity to carry over one-million gallons of DFM, large-capacity water tanks, and large storerooms, provided the capability to provide fuel bunkering (transferring), water supply, and parts to support assigned escorts. Sailors from escort ships could take advantage of the medical and dental support and other conveniences depending upon availability. The battleship's meteorological center provided escorts with the most current weather prognosis, and upgraded navigation, radar, and electronics equipment provided valuable information that could be shared among the force.

Operational Experience

World War II

Although the American Pacific Fleet was caught unprepared on that Sunday 7 December 1941 morning, the battleships of the United States Navy were far from out of the war. When the Japanese left, four of the eight battleships were sunk, the others damaged, and the USS *Pennsylvania*, in dry-dock, sustained severe damage. Within twenty-four months, all but one (USS *Arizona*) of the battleships had been refloated, repaired, and dispatched on operational duty.

Naval warfare would be revolutionized as the aircraft carrier gained prominence, demonstrating superior offensive maneuver. Battleship surface action groups still searched out enemy surface action groups and traded volleys of high-caliber projectiles, but against enemy carrier aircraft, they were extremely vulnerable. Carrier aircraft searched out their enemy at long range, striking often hundreds of miles from their mother ship. As part of large task groups and task forces the battleship would provide AAW defense for the carrier or shore bombardment NGFS for the amphibious group.

Although the aircraft carrier opened a new dimension in maritime warfare, the battleship still demonstrated utility during the course of the war. From the landing at Casablanca to the Japanese surrender onboard the *Missouri*, battleships continued to provide valuable service. The USS *Massachusetts* (BB-59), and the USS *Texas* (BB-35) participated in the shore bombardment during the North Africa landings in November 1942. The *Massachusetts* dropped five hits on the unfinished French battleship *Jean Bart*, knocking her one operational fifteen inch turret out of action. She later engaged French destroyers, dodged torpedoes, and sank two of the French ships. During shore

bombardment, the *Massachusetts* was rewarded with large secondary explosions as an ammunition dump at El Hank blew up. Twice hit by 240mm shells, the *Massachusetts* proved her survivability sustaining only small fires and minor damage.

Commander Amphibious Force, Atlantic Fleet, had the following praise regarding the performance of battleships during Operation Torch, "The Torch operation served as a severe material test for the heavy armaments of the capital ships engaged. Turret and loading crews were called upon to serve their guns for long periods of actual firing time. The performance of turrets of battleships and heavy cruisers was excellent. The few casualties that occurred were soon restored. It may be said, in general, that naval gunfire gave substantial assistance to the landing forces and aided materially in overcoming enemy opposition" (Reilly 1989, 7).

In December 1943, the first Pacific Theater gunfire strike carried out by the fast battleships was focused to prevent Nauru Island from being used as a base for attacks on our forces. The W*ashington,* the *North Carolina,* the *Massachusetts,* the *Indiana,* the *South Dakota,* and the *Alabama* bombarded the island. Although lacking an enemy surface target, this bombardment was an extremely valuable influence in drawing the units together as a mutual supporting and effective fighting group. Morale and temperament were significantly improved.

Battleships participated in the pre invasion bombardment at Kwajalein Atoll. The *Massachusetts* main battery firing results follow for the preparatory phase:

TABLE 3. MAIN BATTERY

Rounds fired in bombardment - 362	
Hits in areas assigned	86 %
Hits in adjacent areas	2 %
Wild shots in other than adjacent land areas and in the water	12 %

Source: Reilly 1989, 31.

The *Iowa* and the *New Jersey* alternately bombarded enemy installations on Mille Island in accordance with the CTU 50.10.1 Bombardment Plan. At approximately 0907, enemy shore batteries commenced firing at the screen and battleships. At about 0940, the *Iowa* received a hit about eighteen inches above the top of barbette on the left side pate of turret two from a six inch projectile. The only evidence of the hit was a slight crease, almost unnoticeable, created on the side of the turret. Fragments caused minor damage, but thankfully, nobody was injured. Later in the afternoon, a four and one-half inch shell struck and penetrated through the twenty-five pound STS at frame 134 port side. Most of the fragment from this projectile, including the base plug, were found in the second deck void. The "M" and "Q" degaussing coils running through the void were cut. Repairs were quickly begun, and evidence of damage erased within seventy-two hours (Reilly 1989, 35-42).

In April 1945, the *Missouri*, off Okinawa, was attacked on two occasions by kamikazes. The first incident occurred on the eleventh when a plane crashed against the starboard side, just below the deck edge. Slight structural damage occurred, and a small

gasoline fire. The second aircraft struck 16 April just astern of the ship, causing slight shock and fragment damage.

Upon the arrival of Iowa class battleships in 1944, they were quickly integrated with the bombardment groups, and executed missions in Kwajalein Island, Mille Atoll, the Caroline Islands, Saipan, Tinian, Okinawa, and Iwo Jima.

Rear Admiral W. Hill, the Naval Gunfire Support Commander at Saipan, had the following to say, "There can be little doubt that NGFS is the most feared and most effective of all weapons which the Japanese are confronted in resisting a landing or assault. Without exception, POWs have stated that NGF prevented their movement by day or night and was the most deciding factor in accomplishing their defeat" (Ralphs 1998, 8).

In a telegraph intercept to the Japanese Chief of the General Staff, General Kuribayashi (Commanding General of Japanese forces Iwo Jima) said, "The violence of the enemy's bombardments are beyond description...The power of the U.S. warships make every landing operation possible to whatever beachhead they like" (Ralphs 1998, 8).

In an excerpt from the Imperial Japanese General Headquarters *Study of United States Amphibious Techniques,* "The U.S. battleship has the firepower equivalent to five Japanese divisions" (Ralphs 1998, 8).

Korean War

Nine of the U.S. Navy's ten fast battleships were inactivated in the general force reduction following World War II. The *Missouri* was the only American battleship still

active when the Korean conflict broke out in June 1950. The *Missouri* arrived in Korean waters in September 1950 for duty as a gunfire support ship; her three sister ships were recommissioned during 1950-1951. All four ships of the Iowa class deployed to the Far East and operated in the Korean combat zone at least once before the war ended in 1953.

TABLE 4. BATTLESHIP PARTICIPATION DURING THE KOREAN WAR

Missouri	SEP 50-MAR 51	*Iowa*	APR 52-OCT 52
New Jersey	MAY 51-NOV 51	*Missouri*	OCT 52-APR 53
Wisconsin	NOV 51-APR 52	*New Jersey*	APR 53-JUL 53

Source: Reilly 1989, 123-124).

As part of their shore bombardment operations, the battleships were tasked with (Reilly 1989, 123):

1. Gunfire support of the ground forces on the flanks of the battle line. Much of this support was in the form of illumination and night unobserved harassing missions.
2. Interdiction of the enemy's coastal MSR's and logistics trains. Bridge removal.
3. Destruction of enemy anti-invasion defenses.
4. Siege and or harassment of Wonsan, Hungnam, Songjin, Chongjin, and the Yalu, Chinnanpo, Haeju and Han River areas.
5. Gunfire support for the minesweepers.
6. Participation in amphibious demonstrations.
7. Gunfire support of Commando and Guerrilla raids.
8. Flak suppression in support of air strikes.

In early February of 1953, NGFS matters were discussed in an informal conference between the Naval Liaison Officer, Eighth U.S. Army Korea, Artillery Officers Eighth Army and Tenth Corps, and Senior Advisor to the First Republic of

Korea Corps, in respect to certain questions raised by the Pacific Fleet Evaluation Group. The main conclusions of the Army representatives could be summarized as follows:

"NGFS is very essential as it can give the troops two things that are beyond artillery capabilities: (1) Ships by moving north of the bombline can shoot back along a direction paralleling the front lines and can reach targets on the reverse slopes of ridges that the artillery, although it has the sufficient range to do so, is unable to reach. (2) Ships can fire on targets beyond artillery range using greater destructive force (sixteen-inch gun)" (Reilly 1989, 124)."

"Ground troops are well satisfied with NGFS accomplishments as regard accuracy and effectiveness *but they would like more of it*! For example, the Tenth Corps during the month of January 1953, received only four missions, and none during the first twenty days of February. The effectiveness of sixteen-inch guns is much greater than the smaller caliber five-inch and eight guns" (Reilly 1989, 124)

A point paper from the ANGLICO officer assigned to the 1st Marine Division (1st MARDIV) to the commanding officer gave an assessment of the battleship's success. He had, had the opportunity to use the battleship for five days in late September 1951. The first day was rough, with all four salvos unobserved, before darkness fell, and cease-fire was ordered. The subsequent four days of action were highly successful. Prisoners of war reported that during just two days, over forty-seven bunkers were destroyed, eighty-five bunkers estimated destroyed, three hundred and fifty confirmed killed-in-action, and six hundred wounded-in-action. In the opinion of the writer, "NGFS can be of inestimable value to all operations where the tactical position permits, and highly recommended that it be given the consideration due it" (Reilly 1989, 132).

Commanding General of 1st MARDIV submitted a report to the Commandant of the Marine Corps emphasizing the psychological as well as material damage the Iowas were inflicting on the North Koreans.

> The enemy had a healthy respect for the major caliber firing. On one occasion a prisoner-of-war (POW) stated that he had been told by his battalion political officer that the United Nations was firing "atomic artillery shells" because of the size of the craters that the sixteen-inch shells made. (Reilly 1989, 133)
>
> Another POW flatly stated he was induced to surrender after his unit had suffered 'heavy casualties' in one bombardment and, when one shell landed near his position and failed to go off, the size of the dud, a sixteen-inch high capacity explosive shell, convinced him it was time to surrender. (Reilly 1989, 133)

In a separate letter from the Commanding General of 1st MARDIV to Commander 7th Fleet, he emphasized the role NGFS played in his command completing its mission. His enemy was entrenched in heavily constructed fortifications on steep reverse slopes--out of the line of fire of allied artillery. As they were, the only vulnerability they had was to low level air attack or NGFS. Because of the restrictions placed on flying combat air-support missions by higher command, NGFS was the only option.

Without this valuable firepower, the Army and Marines must trade lives to take objectives. Over 70 percent of all current military targets in troublesome North Korea are within easy normal sixteen-inch range as are nearly all of its cities (Ralph 1998, 34). Should the U.S. Navy ever be engaged in hostilities under such circumstances, why risk expensive aircraft and priceless aircrews striking targets within range of a battleship's weapons?

The Navy liaison officer (a Navy senior Captain), 8th U.S. Army provided the following findings to the Commander, U.S. Pacific Fleet evaluation group regarding the effectiveness of different caliber gun systems used:

> It was generally noted that the larger the caliber, the more accurate the initial salvo. This perhaps indicated the larger caliber weapon ships fire control systems were better adapted to the firing of shore bombardment. (Reilly 1989, 180)
>
> There were no enemy fortifications known which could withstand the fire of sixteen-inch guns. It is also felt that 8-inch guns were capable of destroying any fortifications in the I ROK Corps sector, however at extreme range, 8-inch failed to destroy these enemy positions, only inflicting heavy damage. (Reilly 1989, 180)
>
> In many cases, five-inch guns were not effective against strong fortifications, and it generally took a large number of rounds to destroy or do permanent damage. five-inch was much more effective against soft targets and troops in the open. (Reilly 1989, 180)

Psychological Effects

Aside from complementing the artillery and aircraft fires, the battleships demonstrated significant psychological importance. Forces from the United Nations, U.S., ROK, and the enemy all learned to have great respect for the destructive capabilities of the naval gunfire.

> The ability to strike the enemy from so many different angles made NGFS especially effective. The fact that it could hit deep inland and in the enemy rear areas made it a constant threat and played much on enemy nerves. PW reports verified this. (Reilly 1989, 184)

Command and Control, Anti-Mine Warfare and Survivability

Selected as flagship for Task Force 95 because of her "her survivability, presence, power, and logistical capabilities," USS *Missouri* escorted the 50,000 American soldiers and Marines in route to Wonsan Harbor. It was from here that Admiral Smith would

send his message beginning: "*The United States Navy has lost command of the sea in Korean waters*" (Newell and Smith 1969, 131-132). He was referring to the heavy mining conducted by the North Koreans across his route. The battleships have a triple bottom to protect against mines and under keel torpedoes. The battleship's uniquely designed underwater protection, a series of protective layers extending some seventeen to twenty feet on each side of the ship and the ability to rig the ship with paravanes provides the battleship with some measure of anti-mine security.

On 20 May 1951, the *New Jersey* was struck on top of turret one by a projectile (approximately a four-inch round) from a shore battery, while sailing off the shore of Wonson Harbor. A second projectile was airburst off the port quarter. Only slight damage was noted (Reilly 1989, 219). On 15 March 1952, while steaming off Sonjin, Korea, a 152mm-shore battery fired upon the *Wisconsin*. The projectile struck the 02 deck (deck immediately above the superstructure deck) between frames 144 and 145. Damage was limited to a twenty-four inch by thirty-inch hold in the 02 deck, starboard side. The *Wisconsin* conducted a counter-battery mission using the sixteen-inch guns back at the believed location of the shore battery. The *Wisconsin*'s nine-gun broadside fell high, resulting in the mountain above the battery collapsing on top of them (Reilly 1989, 219). Neither of these incidents resulted in friendly fatality, nor did they inhibit the battleship from performing its mission.

Conclusion: Korean War

In reviewing the Korean War, the lack of naval or significant air opposition, unrestricted communication, unmolested logistic support, and the access to a nearby

secure base must be recognized. Following on the heals of World War II, these were significant changes, and affected how the battleships were utilized. The Iowa sisters were not used in the traditional anti-ship role, but instead, fulfilled the mission of shore bombardment (during the Hungnam evacuation, and Inchon invasion) or artillery and combat air support augmentation. The battleship could strike from any angle at the enemy, affecting them *psychologically* almost as much as physically. Use of a battleship to strike targets freed aircraft to perform more critical missions, and proved to be far less risky. With no air threat to speak of, the recommended modifications to upgrade the Iowas' AAW protection were not conducted. As was seen at the end of World War II, the days of the BB's AAW role were numbered.

What capabilities did the battleship prove? Once again, war validated the battleships' awesome NGFS role and emphasized their survivability. The U.S. Navy was reintroduced to the impact of their presence on the morale of friendly and enemy troops. A visual demonstration of U.S. national resolve, the battleship made her presence and commitment known. The shore battery that hit the *Wisconsin* further demonstrated the survivability of these great ships. The mining of Wonsan Harbor opened up an old chapter of Naval Warfare and the Iowas strapped on their paravanes and provided added *anti-mining* security to ships following the minesweepers into the harbor.

Vietnam War

"Off-the-record, Marines of all ranks like and badly want battleships reactivated" (Ralphs 1998, 8). Just compare the differences of effects between the battleships and any other Navy surface combatant when firing their respective weapons systems. The

classical example of this preference is Vietnam. In August of 1967, the decision was made to commission the *New Jersey* for the third time, this time to serve for the duration of hostilities in Southeast Asia. Many debates arose over why the Secretary of Defense chose the battleship over another eight-inch cruiser, some contending it was because the sixteen-inch gun had greater range. In actuality, he stated his primary contention was that "the battleship was significantly harder, in another words, less vulnerable than the cruiser" (Reilly 1989, 191).

From day one on-station (30 September 1968), the *New Jersey* was a success, racking up mission after successful mission. Just fifteen days into her tour of duty, came the North of Tiger Island mission. With A-7's from USS *America* doing spotting, the *New Jersey* fired on coastal artillery and anti-aircraft sites on Hon Matt Island.

> As the debris settled, the spotter reported, "Cease-fire! Cease-fire! You've blown away a large slice of the island—it's down in the ocean. (Reilly 1989, 191)
>
> Army Captain Charles S. Finch, Jr., serving as an airborne spotter for New Jersey reported, "The battleship is best at rooting out and destroying enemy bunkers. The eight-inch, 155mm, and 105mm land-based artillery make a small impression on the land, compared with what the sixteen-inch does; it really clears out the area. (Reilly 1989, 191)
>
> On Christmas day, with General George S. Brown, CG, 7th Air Force and RADM David H. Bagley, CTG 70.8 observing, New Jersey's one day total was: "117 structures and 32 bunkers destroyed, and eight secondary explosions ripped through two storage areas near Quang Ngai. An estimated 40 killed communist troops. Heavy damage to 93 structures, 110 meters of trench line and several tunnel complexes destroyed. (Reilly 1989, 194)

The *New Jersey*'s modus-operendi had changed and a greater portion of missions was called for by aerial and ground spotters that significantly improved accuracy. Unopposed by an enemy surface fleet nor facing an effective enemy air force, the *New Jersey* operated with impunity along the coast of Vietnam. Considerably different from

the traditional saturation type bombardment provided for amphibious operations of World War II and Korea, Vietnam used the battleship to supplement the role of artillery and air bombardment. Fire for destruction or harassment was the objective of essentially all fire missions. The targets in general were relatively small and soft, and the enemy troop concentrations small. Unlike Korea, which was fairly static with a well-defined forward edge of the battle area, Vietnam was a counterinsurgency type operation with enemy troops and facilities thoroughly interspersed with friendly installations. Primary targets shifted from exposed personnel in the open to bunkers. This forced most missions to be conducted on either point or small area targets.

> The U.S. had identified a North Vietnamese Army (NVA) Corps Command Post (located seven stories beneath the earth). Hundreds of sorties (B-52 and attack aircraft) were flown in an attempt to destroy it. Nothing succeeded. The USS *New Jersey* fired 12 rounds of 2,700 lb. Armor Piercing (AP) in less than one minute and the command post was destroyed. (Ralphs 1998, 8)

The battleships' inherent ability to provide continuous all-weather delivery of a variety of heavy ordnance on targets twenty-two miles inland added a dimension of flexibility not shared with other platforms. If available, a battleship ensured total destruction of a high value target without interference or distraction from anti-air batteries. Unlike a bombing raid, a battleship spotted on target continued until the target was evaluated destroyed because of ability to continue to bring ordnance to bear--while bomb raids required accurate battle damage assessment (BDA) and target reassessment. If BDA determined the target still active, the entire process of target reconnaissance, re-briefing, and pilot risk began again. "Of all the targets struck by air in North Vietnam, with a loss of 1,067 aircraft and its air crews, 80 percent of these targets could have been

destroyed by the battleships' sixteen-inch guns without endangering American lives or aircraft (and technology/cryptographic equipment)" (Ralphs 1998, 114).

Main Battery Naval Fire Support Results

Did the sixteen-inch guns provide a unique capability that couldn't be met by other assets? Below are the collective results of comparison studies made between the sixteen-inch guns, the eight-inch guns (cruisers) and the five-inch, fifty-four caliber guns (destroyers). This data is significant because it shows the results of the sixteen-inch gun side by side with the five-inch, fifty-four-caliber gun--the same caliber as is used on the combatants of today's navy.

First, the overall effectiveness of naval gunfire support bombardment at the end of the Vietnam War is displayed using the visual comparison of the results versus mission ratio:

TABLE 5. GUN CALIBER DESTRUCTION COMPARISON

Gun Caliber	Missions	Successful	Limited	Unknown
16"/50	216	45.4%	32.4%	22.2%
8"/55	124	40.3%	40.0%	19.4 %
5"/54	71	47.3 %	21.1%	36.6%

Source: (Reilly 1989, 209)

This table shows that the percentage of "successful" destruction missions was roughly the same for the *New Jersey*, the cruisers, and the USS *Davis* (five-inch, fifty-four caliber). The number of missions rated as "Unknown" was significantly greater for the *Davis* than for the heavier ships, probably a result of the difficulty in assessing the

damage caused by a smaller round. Looking at the numbers of missions fired for destruction against different target types, the comparative effectiveness of these gun systems can be examined. (Reilly 1989, 209-210).

TABLE 6. DISTRIBUTON OF DESTRUCTION MISSIONS BY TYPE

Target Type	16"/50 Missions	8"/55 Missions	5"/54 Missions
Bunkers	96 (48.0%)	67 (55.3%)	21 (30.0%)
Artillery	21 (10.5%)	7 (5.8%)	20 (28.6%)
Areas	36 (18.0%)	19 (15.7%)	16 (22.9%)
Interdiction	12 (6.0%)	17 (14.1%)	5 (7.1%)
Troops	19 (9.5%)	10 (8.3%)	8 (11.4%)
Caves	16 (8.0%	1 (0.8%)	0
Totals	200	121	70

Source: Reilly 1989, 206.

Table 7. EFFECTIVENESS OF GUN PLATFORMS BY TYPE OF TARGET

Target Type	16"/50 mission Successful	8"/55 missions Successful	5"/54 missions Successful
Bunkers	57.3%	47.7%	66.6%
Artillery	42.9%	14.3%	0%
Areas	38.9%	47.4%	68.8%
Interdiction	50.0%	23.5%	60.0%
Troops	47.4%	10.0%	25.0%
Caves	18.8%	100%	0%
All Above	48.0%	39.7%	42.9%

Source: Reilly 1989, 210.

The results seem to support the earlier theory that the caliber was not a significant factor in the determining success of mission when firing against bunkers, interdiction targets, and area targets. The data further indicates that the sixteen-inch battery seemed much more effective than the five-inch and eight-inch against artillery or troops (Reilly 1989, 210).

As can be expected, the number of rounds per mission (successful destruction) decreases in proportion to gun caliber increases. The number of five-inch rounds fired per successful mission was four times the number for sixteen-inch rounds. These expenditures included not only the rounds fired for destruction, but also those used during the spotting of fire to the target. A special five-inch armor piercing (sabot) round was utilized during some of the missions, resulting in a twenty-two percent increase in penetration capacity that undoubtedly improved mission success. Although this round is not part of the current load for five-inch, fifty-four caliber gun capable ships, this could be returned to the fleet to improve penetration capacity of five-inch gun systems (Reilly 1989, 207-213).

Another critical factor in examining the success of NGFS systems is the examination of the *New Jersey*'s effectiveness results by line period. A line period is the duration of time the ship is "on the line" "ready for call for fire." This period could last for days or months, depending upon the assignment.

Table 8. USS NEW JERSEY MISSION RESULTS
BY LINE PERIOD

Line Period	Successful	Limited	Unknown
1	41.7%	31.7%	26.6%
2	60.8%	24.5%	13.7%
3	37.8%	40.0%	22.2%

Source: Reilly1989, 211.

These results are mixed. It may seem reasonable to expect the results to improve as the crew's tactical proficiency on station increases; the systems settle out; and upper-echelon commanders gain understanding on proper battleship employment. Improvements in spotting coordination procedures would also support the increased success between line period one and two. The drop in success for line period three didn't have a ready explanation. Studies spurred by these results made a determination that would not be addressed until much later, after the tragic *Iowa* explosion. The later line periods reported increased "spurious" or wild shots, where no significant explanation could be found. These later studies identified that the powders used in the sixteen-inch guns were the same powder bags originally packed during World War II. Depending on storage and environment, these powders could burn at vastly different rates, resulting in changes in the initial velocity (IV) of the projectiles. Following the *Iowa* explosion in April 1990, Naval Sea Systems Command, upon the advice of Naval Ordnance Station, Indian Head, Maryland, ordered all bags to be opened and the powder grains to be blended. This resulted in a significant improvement in IV calculation for projectiles fired during the Gulf War.

The *New Jersey*'s NGFS performance in Vietnam can be summarized through the following findings by the CINCPAC Analysis Staff:

> major caliber gunfire is a remarkably efficient method of destroying assigned and spotted targets. Spotters reported that 50 percent of the missions resulted in success. (Reilly 1989, 199)
>
> *New Jersey* showed operational flexibility in that her success rate and projectile usage were essentially independent of target, and range to target. These numerics averaged out to approximately a 50 percent success rate and 16 rounds per mission. The smaller ships were more sensitive to target and range parameters, (e.g., the projectile usage for the 5"54 ship against area targets averaged over 94 rounds per target, but was only 44 rounds per target against bunkers. The 5"/54 was decidedly unsuccessful against artillery). (Reilly 1989, 199)
>
> The long range capability of *New Jersey*'s main battery was used to a greater extent than similar batteries in Korea. In Korea only 20 percent of the 16" missions were outside the range of an 8" cruiser. During Vietnam, *New Jersey* fired more than half her missions outside the range of any other naval gun. This is to be compared with the 8"/55 which fired only 12.1 percent of their missions outside the range of a 5"/54. (Reilly 1989, 199)

Psychological Capacity

Beyond the measurable material effect of battleships on the landscape of war, there was the deep influence the *New Jersey* had on both the enemy and American serviceman down range. How can this be measured? Maybe the gauge is the fact that ground servicemen repeatedly spread tales of the "big guns" in reverent hushed tones. The intricacies of hit-miss success ratios don't bother them. They look to the ground-pounders' measure--success in targets destroyed and American lives saved.

"After departing II Corps, *New Jersey* was presented with a Chinese made machine gun, captured at the battle of Kinh Mon, on behalf of the officers and men of the First Battalion, Sixty-first Infantry and First Brigade, Fifth Infantry in appreciation for the battleship's preparation fire just before the battle." *Kinh Mon:* "Long a Communist

stronghold, the Army had made two previous attempts to sweep it. The first try resulted in 30 U.S. killed and 60 enemy dead. The 2nd attempt, following a B-52 strike, resulted in 61 U.S. dead versus 0 enemy. Then the *New Jersey* reported on-station, 'softening' the area for the third try. Results: 7 U.S. dead, and 301 confirmed enemy killed" (Reilly 1989, 193).

SSGT Robert Gauthier, summed up the marines'/soldiers' feelings for the *New Jersey* during an interview over the ship's TV system:

> You are doing more to improve the morale of the men on the beach than anything else in the war. Every time we go on patrol, someone says, "The big one is out there. Nobody better mess with us or she'll get them." You are saving lives out here...American lives. And we thank you. (Reilly 1989, 193)

Gauthier told how he had been leading a platoon in the area where the *New Jersey* was firing in support of the Third MARDIV.

> We were ordered to pull back about 200 yards so that somebody, we didn't know who at the time, could start shooting at some Communist bunkers and emplacements that had been giving us a lot of trouble. When we finally moved back about 500 yards, we heard what at first sounded like a subway train moving through a tunnel—a big rushing noise—then BANG! Later on, when we went back into the area, there was nothing...just nothing. It was like something had come along with a big eraser and wiped everything clean. And they had been big, heavily fortified bunkers, targets our own artillery couldn't touch. (Reilly 1989, 193)

At about the same time a young Marine's mother wrote the editor of a New York newspaper a letter that echoed the "Marine on the ground's" sentiment:

> ...I received a letter from my son, a marine fighting in Vietnam. He closed his letter this way: "The *New Jersey* arrived here last week, and man, is she playing hell with Charlie! She sits out there about seven miles, big and beautiful, and when she lets go with her sixteen-inch guns, Charlie knows he is in for big trouble. I hope she stays out there for 135 more days. That is my time to come home, Mom, so just pray for me that I make it."...To all of us here in America surrounded by all the comforts and luxuries that our country has to offer, we take a lot for granted. But to our boys so far from home, this battleship stands for

> freedom, security, and the renewal of faith in the fact that there are still many Americans who haven't forgotten that they are there. (Reilly 1989, 193-194)

While obviously improving the morale of U.S. troops immeasurably, the battleships were also having their psychological impact on the enemy.

> One U.S. aviator stated, "The Communist troops certainly don't like to come out when *New Jersey* is firing. One of our biggest problems flying into a Red infested area is the AA firing we take. But after *New Jersey* got on station over here and started shooting, she held ground-fire to a minimum. As long as you are in the area and firing, the Communists just hole up with their flak machines and AA weapons. This gives us greater freedom to pick out the choice targets." (Reilly 1989, 194)

> Another marine ground spotter reported, "Each round has a tremendous psychological effect on Communist troops. Air spotters have told me they have seen Communist gun crews get scared and run away from their guns when the battleship begins firing. The Chieu Hoi (Viet Cong defectors) say that even if the round doesn't hit close to them, it makes them think they're going to die right there." (Reilly 1989, 195)

"In 1969, the North Vietnamese charged that the presence of the *New Jersey*, in Vietnamese waters, was hindering the Paris Peace Talks and demanded that the U.S. military remove her from Vietnamese waters" (Ralphs 1998, 113). Why? Probably because the Vietnamese could do nothing to silence her deadly guns. Senator John Warner (R – VA, then, Former Assistant Secretary of the Navy) stated that "he was ordered by the White House to deactivate the USS *New Jersey*, at the request of the North Vietnamese Government, as a condition for negotiating at the Paris Peace Talks. We had at least four Aircraft Carriers prosecuting the war and only one battleship--yet it was the battleship that they objected to" (Ralphs 1998, 113).

Vietnam - Conclusion

General Creighton Abrams (Commander, U.S. Forces Vietnam) stated that "*the B-52 bomber and the* battleships *(both considered "obsolete") were the two most cost effective weapons systems used there*" (Ralphs 1998, 8).

Main Battery NSFS

The battleship filled a need in Vietnam that could not be met with any other weapon, providing big gun support for troops within 20 miles of the coast. Her sixteen-inch guns reached miles inland shattering concealed enemy targets, bridges, guns, troop concentrations. Protected by heavy armor and mounting twenty five-inch rapid firing guns, she steamed close to the coast, smothering hostile shore batteries. Keeping the enemy off-step, she swiftly shifted firing positions at speeds up to thirty-three knots. She struck the enemy continuously, day or night, in any weather, at any time of the year, and did this without sacrificing the life of bomber pilots or costly jet aircraft (Stillwell 1986, 39). Flexible in offensive ability, the battleship adapted from the traditional saturation type bombardment provided for amphibious operations of World War II and Korea, to supplement the role of artillery and air bombardment. Fire for destruction or harassment were the objectives of essentially all fire missions.

Survivability, Power Projection, National Presence, Morale Building, Psychological Operations, and Command and Control

Although NGFS was by far the most obvious capability demonstrated, *New Jersey* provided invaluable "national presence" steaming within sight of the North Vietnamese land batteries. Her "power projection" capability was closely related to the inherent

"psychological impact" the *New Jersey* had on both building friendly morale, and demoralizing the enemy. Never struck by enemy aircraft or artillery during Vietnam, the only footnote regarding "survivability" of battleships relates back to "survivability being the primary reason the Secretary of Defense selected the battleship over another eight-inch gun cruiser." For this same reason, the *New Jersey* was a favorite of Task Force and Task Group Commanders, serving as flagship for assorted Admiral staffs.

Beirut, Lebanon

To be most effective in her "presence" role, the *New Jersey* had to operate close to the beach and remain ready to shoot at any time. That called for constant alertness. The *New Jersey*'s SH-2 helicopter, which was assigned to the ship to provide over-the-horizon-targeting information for her anti-ship missiles, had quite a different role off Lebanon. Because the *New Jersey* had the role of managing the surface picture (tracking all ship/boat contacts) off Beirut, the helo was flying continuously on surveillance patrols to keep track of the many vessels of different nationalities, in the area.

The whole purpose of the sea patrols by the ships was to protect the Marines in their vulnerable positions ashore. The destroyers were there to protect the Marines with their rapid call-for-fire capability, and the battleship was there to augment and protect the destroyers as well.

> Captain Pete Deutermann of the USS *Tattnall* said that such a role called for the *New Jersey* to be visible from the shore: *"The "presence" mission—it was important to be big and ugly out there, and the closer you got, the bigger and uglier you were.* (Stillwell 1986, 267-268)

Under strict rule of engagement (ROE), the offshore forces were authorized to supply only retaliatory fire. Deutermann was convinced that it was the presence of the

New Jersey, which kept the Syrian gunners on the beach from shooting at the destroyers. "While the Syrians did fire on the F-14 reconnaissance aircraft, he surmises that they recognized that it would be an obvious step of escalation to shoot at the ships and could well bring sixteen-inch projectiles thundering down on their heads" (Stillwell 1986, 267-268).

The situation for the peacekeeping force changed significantly on 7 February 1984 when President Reagan announced in Washington that the United States was going to withdraw the bulk of the Marines from their position on shore and re-deploy them to the ships of the amphibious force off the coast of Lebanon. As a consequence of the reduced force, there would be greater reliance in the future on air strikes and naval gunfire. Up to, and including the day of the announcement, the *New Jersey* had fired thirty-two five-inch rounds on 15 January, and seven more on the 7th of February. On the 8th, the *New Jersey* was authorized to shoot at Druze and Syrian gun positions that were shelling Beirut. The targets included artillery, antitank artillery, anti-aircraft emplacements, and command bunkers. Because the day was overcast, and included anti-air emplacements, aerial spotting was not feasible, and the ship counted on volume of fire to complete the mission (Stillwell 1986, 269).

Gulf War

NGFS

During the Gulf War, of the eighty-some U.S. Navy combatants and the approximately thirty coalition vessels which claim NGFS as a primary mission area, only the two battleships could provide our ground forces with surface fire support. During

Operation Desert Storm, battleship NGFS missions were generated in three ways: pre-arranged fires, self-determined targets of opportunity, and fires called for by ground forces ("call for fire" missions).

Before 15 February, NGFS missions concentrated on command, control, and communications (C3) facilities; radar sites; and electronic warfare sites. Once the ground offensive began, the focus shifted to artillery positions, mortar batteries, ammunition storage facilities, logistics sites, Silkworm anti-ship cruise-missile batteries, and troops-in-the-open. The battleships fired 1,102 sixteen-inch rounds in eighty-three NGFS missions against targets such as artillery batteries, small boats (used in mining operations) in ports, anti-aircraft sites, bunkers, storage sites, command posts, and tanks. Total ordnance delivered was the equivalent of 542 A-6 missions. The battleships used the newly acquired RPVs for surveillance, identification, targeting, spotting, and BDA of potential targets. On several occasions, the *Wisconsin* opened the engagement with a single spotting round, which landed extremely close to the target. The RPVs were credited with greatly improving the sixteen-inch guns' effectiveness. Spotting and BDA were provided in real time, allowing rapid revisit of targets still in operation. Two-thirds of the missions, almost ninety percent of all shells fired, received spotting from the RPV, a historical first. The average range of the NGFS missions was approximately twenty-two miles, with all but sixteen missions having ranges exceeding eighteen miles (DOD 1992, 119-127).

A USMC OV-10 observation aircraft spotted an Iraqi artillery post in southern Kuwait that had been harassing Coalition troops in Saudi Arabia, and relayed the coordinates to the USS *Wisconsin* which silenced the enemy emplacement with eleven

sixteen-inch shells. The emplacement was hit at an estimated range of nineteen miles. After the shelling, the pilot of the OV-10 reported back, "Artillery destroyed," emphasizing how the target, "appeared to have been erased" (DOD 1992, 132).

In the final days of the war, on Sunday March 1st, an Iraqi Republican Guard Brigade located on Faylaka Island was over-flown by the USS *Wisconsin*'s RPV. Through the monitors located back aboard ship observers could see hundreds of Iraqi soldiers waving white flags and t-shirts, anything skyward toward the ship's RPV circling above. This marked the first-ever surrender of enemy troops to an unmanned aircraft. The *Wisconsin* continued to monitor the troops while calling for waiting Marines to move in on helicopters to formalize the surrender.

Admiral Stanley Arthur (Commander, U.S. Naval Forces during Desert Storm) stated, "battleships proved to be extremely valuable during Desert Storm. Without the battleships there would have been no NGFS" (Stillwell 1996, 321).

STRIKE, ASUWC and LOGISTICS

On 17 January 91, the USS *Wisconsin,* acting as *Tomahawk* strike warfare commander for the Persian Gulf, directed the sequence of *Tomahawk* launches that initiated the opening of hostilities in the Gulf War. The USS *Paul F. Foster* (DD 964) fired the first *Tomahawk* missile from the Persian Gulf at 0140:20. Five other ships in the Persian Gulf Strike Force quickly followed her shot. The *Wisconsin*'s eight missiles were included in the total of forty-seven *Tomahawk*s fired in the initial volley. During the next two days the *Wisconsin* fired a total of twenty-four *Tomahawk* land attack missiles, while continuing to coordinate the successful launch of 213 of 214 assigned

Persian Gulf *Tomahawk* strike missions. The *Missouri* fired a total of twenty-eight *Tomahawk* missiles.

In her role as GP (Strike Coordinator), the *Wisconsin* provided coordination of the Gulf's *Over the Horizon Targeting* data-base, critical in ensuring *Tomahawk* missiles would not inadvertently impact shipping. Another function of the Strike Coordinator was to ensure that all "shooters" were in receipt of the most up-to-date electronic mission files, a job that proved no small task.

With the Iraqi's use of maritime mining, some consideration was given to determining the whereabouts of the battleship anti-mine paravanes. They had been designed during World War II to enable the battleship to provide amphibious ships and escorts an added measure of anti-mine protection in a zone swept by the sweepers. These paravane stream guides, (wire cabling with explosive cutters on each side of the bow) would have enabled the *Wisconsin* or the *Missouri* to provide an added measure of confidence to a two hundred yard swept zone. Because of the short duration of the Gulf War, the decision to search for, or rebuild paravanes for the battleships was not pursued.

The *Wisconsin* also assumed responsibilities as the local *anti-surface warfare coordinator* for the Northern Persian Gulf Surface Action Group. When the focus of operations shifted to the aerial bombing campaign, the *Wisconsin* served as a vital *logistic and personnel transportation hub* for the central Gulf. By receiving passengers, mail and cargo (PMC) bound for all ships in the northern Persian Gulf from shore-based logistics facilities; the *Wisconsin* greatly reduced the burden on the logistics support infrastructure. *Wisconsin* transferred over 40,000 lbs. of mail, one hundred and forty personnel, and twenty thousand pounds of cargo.

During the final days of the war close to the coast of Kuwait, Commodore Peter Buckeley, the Destroyer Squadron Commander in charge of Task Group 151.11 (CTG 151.11) embarked on the *Missouri*. He later stated that he had led with the battleships because he was more concerned by the threat from mines than enemy missiles. He had concluded that the *Missouri* could far better withstand a mine hit than could an Aegis cruiser; the damage to the thin-skinned USS *Princeton* had already demonstrated the problem in that regard (Stillwell 1996, 325).

Capabilities Conclusion

In review, the battleships were designed for speed, maneuverability, offensive and defensive firepower, anti-aircraft protection, reconnaissance (aircraft), logistics support, and survivability. During maritime operations in World War II, Korea, Vietnam, Lebanon, and the Arabian Gulf these capabilities were demonstrated to varying success. The battleships' speed and maneuverability are still impressive for a warship of her size and the survivability is unequalled in past or present design. The sixteen-inch guns' offensive and defensive firepower provides accurate high-caliber fire against surface ships and shore targets. Flexible, the battleships adapt to any environment, augmenting artillery and combat air support in areas of little or no maritime and air threat. As a logistics platform, the battleship is largely self-sufficient, able to support the units of her surface action group, as well as provide creature comforts for the crews. As technology has replaced the spotter aircraft with a helicopter flight deck and the remote piloted vehicles, the organic ability to conduct intelligence gathering, reconnaissance, target

selection, spotting, and battle damage assessment without risk of life is just being realized.

The kamikazes' "manned cruise missiles" heralded the end of the Iowas as AAW defense picket ships. As advances in technology took the logical step to unmanned cruise missiles, the battleships AAW capability was further negated. In order to provide a measure of protection, the upgraded battleships required the installation of four CIWS mounts and four stinger missile batteries.

Other technological upgrades enhanced the battleship's offensive capability, adding *Tomahawk* (Land and Anti-ship) cruise missiles, as well as Harpoon anti-ship missiles. Air and surface search radar were upgraded to include 1980's technology, and a state of the art "electronic signal" gathering suite was installed (SLQ-32V3 and WRL-1H) to enhance signal intelligence gathering. Communications systems were upgraded, to support a capability equal to two and one-half Aegis Cruisers. Intelligence analysis and processing centers were modernized to include all the newest equipment and accesses. Precision navigation systems ensured positional accuracy while an upgraded meteorological center provided constant weather updates.

System improvements increased the accuracy of the sixteen-inch guns: velocimeter were installed to assist in the ballistic calculation, powders were blended to improve consistency, and the remote piloted vehicle provided an organic fire-control spotting capability.

Operational performance of the battleships also demonstrated other implied capabilities of the battleship. The "psychological impact" of the Iowas was identified in every operation they participated in. The physical presence of this asset has the ability to

improve friendly morale while demoralizing the enemy. The sheer size of the ship, the guns, the projectiles, and the destruction coupled with its seeming invincibility demonstrated American strength, resolve, and commitment. As a power projection tool, its visible weapons (unlike the VLS of cruisers and destroyers) made a statement. Theodore Roosevelt referred to battleships as the "Big Stick" of his diplomatic strategy, and today, whether used in peaceful or military engagement, that part of the battleship's presence is still felt.

Not originally designed as a flagship, the battleship has been selected numerous times to fulfill this role. The communications suite, ancillary support electronics, information access, and availability of space provide an ideal environment for Command and Control functions.

"The Needs of the Navy"

Every sailor and Marine knows that life-effecting decisions are made which will have a direct influence on them under the guise of, "the needs of the Navy." Whether in the decision to commit Marines to task, deploy a ship, or to appropriate or cut funding to a budget, this common phrase is used as justification. If the battleship is to have any future utility, it must be prepared to fill one of these critical needs. What does the Navy need in the future? To answer this, various sources were considered. The National Security Strategy "pursues a forward-looking national security strategy attuned to the realities of our era," and has as its core objectives (Johnson 1998, i).

1. To enhance our security.
2. To bolster America's economic prosperity.

3. To promote democracy abroad.

Although it would be easy to argue that the battleship undoubtedly enhances our security and promotes democracy abroad through it's power projection, presence, and obvious capability, it is harder to explain its effect on America's economic prosperity. The National Military Strategy offers the explanation that through peace and enforced stability, an environment is created that fosters American economic prosperity. Using these criteria, any ship in the Navy satisfies these objectives, so we need to look further. Either through designed, demonstrated operational, implied, or improved capability, the battleship must prove itself unique.

The National Military Strategy lists a series of missions that our Joint Forces need to have the ability to conduct. If this is a blueprint of what our instruments of war need to support, then the battleship capabilities must significantly influence the following (Johnson 1998, i):

1. Homeland Defense
2. Defeat Adversaries in a Two MTW
3. Respond Across a Spectrum of Crisis
4. Conduct/Sustain Multiple Smaller Scale Contingencies (SSC)
5. Strategic Deterrence
6. Decisive Operations
7. Forcible Entry
8. Special Operations
9. Counter Weapons of Mass Destruction (WMD)
10. Focused Logistics

11. Information Operations

As Appendix A shows, it becomes easier to differentiate and assign battleship capabilities into mission areas, but these missions still are very general. To get closer to the twenty-first century vision for the Navy, this thesis examines the 1998 Vision, Presence, Power-A Program Guide to the U.S. Navy. This document provides "a comprehensive overview of programs that are critical elements of the Navy's transformation," to meet twenty-first century needs. The Quadrennial Defense Review (QDR) and the National Defense Panel (NDP) have confirmed this strategic vision and the transformational strategy, which will lead to a more streamlined, reengineered, and modernized Navy. Speaking about the arena of Network-Centric Warfare, with its foundation in the information-technology revolution, I wonder whether this document will provide challenge to the battleship's future?

"Evolving threats and relationships with allies, friends, and adversaries will place a premium on the (1) Mobility , (2) Global reach, (3) Self-sufficiency, (4) Sustainability, and (5) Multi-mission firepower of the nation's naval forces, epitomized by our aircraft carrier battle groups and amphibious ready groups" (Johnson 1998, I-ii). We must provide the Navy of tomorrow with the "tools they need--to accomplish the missions and tasks of the future. We must set new standards of operational primacy at sea, in the chaotic littorals of the world, and throughout the vast reaches of naval power, building a strong, balanced Navy that will prevail today, tomorrow, and for decades to come." (Johnson 1998, i) These statements summarize the Navy's vision for the future. While recognizing that technological innovation is the answer to many questions on long range capability, it doesn't help us "today, tomorrow," and possibly for a decade to come.

We must be prepared to equip our Navy and Marine Corps to perform these missions now.

Like the carrier battle group and amphibious ready group, the battleship epitomizes mobility, global reach, self-sufficiency, sustainability, and multi-mission firepower. In addition, it demonstrates lethality, purpose, presence, power and survivability unmatched by any platform other than possibly the aircraft carrier. Even the carrier seems vulnerable when reviewing all-weather sustainability, survivability, and mobility within the littoral environment. A battleship SAG's mobility in the littorals is not constrained by purpose--while a carrier SAG must be able to sustain carrier flight operations that severely impact escort maneuver in littoral constrained environments.

As mentioned before in chapter 2, the force-structure outcomes the Navy is committed to sustaining comprise (U.S. Navy 1998, 16):

- 12 aircraft carrier battle groups—11 active CVs, and one reserve/training CV.
- 10 active and 1 reserve carrier air wings (CVW)
- 12 amphibious ready groups (ARG)
- 50 nuclear-powered attack submarines
- 14 nuclear-powered ballistic missile submarines
- 116 surface warships—112 in the active Fleet and four in the Naval Reserve Fleet.

During amphibious operations, and missions of forced entry from the littorals, where will the support for the ARG be provided from? With the severe reduction in force, a CVBG can neither be spared (risked) to provide direct support, nor can it fulfill sustained 24-hour operations, a requirement not unusual in forced entry, which could easily last a week or longer. How does the Navy plan on meeting this requirement?

> The Navy admits that it currently has no credible surface fire support capabilities to support Forced-entry from the sea and inland operations by Marine Corps and Army forces. (GAO 1997, 01)

Current Capability and New Initiatives

During WW II, the Nazis developed and fired the "Arrow" projectile from a 12.2" smoothbore variant of the K5E railroad gun. It weighed 300 lbs. and had a maximum range of over one hundred nautical miles. This was 1940's technology! During the 1960's, Gerald Bull's SRC organization and Naval Ordnance Station Indian Head successfully developed and fired a 745 pound sixteen-inch, eleven inch sabot projectile from gun # 275 (an ex U.S.S. *Iowa* Gun Tube) to a distance over forty nautical miles (NM). Using the test data, it proved that this projectile had a max range of over fifty nautical miles. All of these accomplishments were achieved on a shoestring budget and manufactured in laboratory conditions similar to a backyard garage (Ralphs 1998, 03).

In the 1980's, the Advanced Gun Weapon System Technology Program developed a projectile for the 16" gun. It was a 650 lb. projectile that had a max range of one hundred nautical miles. It would use GPS (just like the ERGM munitions), but would be cheaper, exponentially more lethal, therefore, more cost effective to produce (Ralphs 1998, 03). Whereas the ERGM is an entirely, totally new weapon system; the battleship initiative would create a new projectile for an existing gun requiring no modifications. Less expensive programs exist for extending the range of the current projectiles:

Table16. 16 INCH PROJECTILE MODIFICATION RESULTS

Projectile Weight (lbs.)	Muzzle Velocity (ft/sec)	Range Extension Technique	Maximum Range (Miles)	Overall Improvement In Range
1,900	2,690	None (Baseline)	23.64	N/A
1,900	2,900	Supercharge	27.62	16.9 percent
2,240	2,825	Supercharge Supercharge w/Base Bleed	29.18 35.01	23.4 percent 48.1 percent
1,300 lb./16"	3,550	Supercharge w/ Base Bleed Boat Tail	36.30	60.38 percent
1,350/13.65"	3,350	Improved Ballistic Shape (Sabot Discarding)	38.90	64.7 percent

Source: Ralph 1998, 04.

Other programs existing to improve the lethality of the Battleship include removing the Armored Box Launcher (ABL) *Tomahawk* missiles with a Vertical Launch System (VLS). This would increase the number of *Tomahawk* cruise missiles from thirty-two to between ninety-six or as much as one hundred and twenty-eight. This, combined with the ability to increase its current sixteen *Harpoon* missile canisters to thirty-two SLAM-*Harpoon*, will significantly increase the battleships lethality.

The other significant improvement program is designed to increase the ships' defenses against air and missile attack. While a determined enemy could bring enough missiles to bear on a battleship to sink it, this is a danger all ships face, while a battleship is provably more survivable. To improve this, plans exist to remove the two forward MK-38 turrets (five-inch guns, starboard and port) and installing VLS NATO Sea Sparrows. This is of significant improvement in defense against Silkworm/Seersucker and other anti-ship missiles out to eight NM.

Former Secretary of the Navy Garrett emphasized: "the battleship is an extremely capable platform as it relates to power projection, deterrence and forward presence. Without battleships, we lose the capacity for NGFS that you derive from the sixteen-inch guns" (Starr 1990, 1252). "When it comes to supporting troops on the beach, engaged in close combat, the need for naval surface fires support (NSFS) is 'essential'. The Chairman, Joint Chiefs of Staff defines '*essential*' as that which if not present or successfully accomplished will result in mission failure" (Ralphs 1998, 2).

Today's U.S. Warfighting doctrine is *Joint*. The defense budgeting process, following the introduction of legislation by Senators Gramm and Rudman, requires service budgets to be less parochial. The services look to justify expenditures in accordance with mission areas of responsibility, and promised capabilities. Although listing "surface fire support capabilities in support of deployed land forces (Marines and Army)" as one of the areas supporting their annual budget, by its own admission, the Navy is not prepared to fulfill this mission. Admiral Boorda, former CNO, advocated an "Arsenal Ship" concept that would utilize *Tomahawk* missiles, and ATACMS to provide "necessary support for the soldiers and marines on the beach." Because of its predicted stand-off range, and its availability as a "theater ballistic missile defense ammunition locker", until late 1998, this platform seemed the perfect replacement for the battleship. In fact, the initial design discussions in early 1991 seemed to justify the decommissioning of the remaining battleships. In 1995, Boorda had actually predicted the first arsenal ship might be fielded by the year 2000 (Boorda 1995, 1-5). This program, as well as the extended range guided munitions (ERGM) were to become the Navy's current contribution to Jointness. According to an 27 October 1997 article in the Baltimore Sun,

the Navy indicated that "for all practical purposes, the Arsenal Ships is dead due to lack of funding" (Stearman 1998, 4). With the death of Arsenal Ship, now, half of the proposed concept for providing NSFS to Operational Maneuver From The Sea (OMFTS) is dead. The GAO reports:

> Since 1992, when it retired the last of its battleships, the Navy's surface fire support capabilities have been limited to five-inch/54 caliber guns and munitions that lack adequate range, accuracy, and lethality. Targeting and fire control are still done manually, and the Navy acknowledges that the communications links between fire support ships and their customers are inadequate. A growing threat from sea-skimming anti-ship missiles is forcing fire support ships to operate at ever increasing ranges from shore, further limiting the utility of existing guns. (GAO 1997, 01)

Furthermore, as the U.S. Navy has reduced its fleet to a force of around 300 ships, it has sought to meet these essential mission requirements by making its ships multi-functional. With this increase in function, there has been seen a loss in mission specialization, and an incremental increase in cost per platform. Such cost has affected leadership ability to risk placing one of these ships in harms way, and severely limited the Navy's ability to provide this necessary joint support. In the summer of 1996 a Navy Commander from the office of N86, in the Pentagon analyzing NSFS requirements for OMFTS made the following comments regarding the survivability and the ability of the DDG to perform the NSFS mission while being shot at:

> *If a NAVFOR thought that if he was in jeopardy of losing one of his $1Billion DDGs, he would remove it from the area of operation.* (Ralphs 1998, 4)

With that statement, this Commander had just identified a dangerous weakness in our Navy's commitment to the soldiers and Marines on the beach. What is the value of the lives of the Marines? As the cost of ships increases, is this value exceeded? How can this be justified?

Instead, the U.S. Navy has chosen to support an infrastructure where the teeth of the close fire support mission remains the aircraft carrier's aircraft supported by NSFS (five-inch, fifty-four caliber guns) from surface combatants *if available* (Ralphs 1998, 9). Due to the vulnerability and exorbitant costs of the Navy's "modern" surface combatants, today's naval doctrine appears to be one of combat avoidance (the exception being the carrier's aircraft).

In order to illustrate how inadequate this NSFS concept is; compare the numbers and caliber of artillery assets assigned to a Marine Corps Division as part of their Military Table of Organization & Equipment (MTO&E). Marine Corps Divisions are assigned an Artillery Regiment equipped with fifty-four tubes of 155 mm (6.1") when equipped to full strength. U.S. Army armored and mechanized divisions are assigned a division artillery (DIVARTY). It is composed of seventy-two tubes of 155 mm and eighteen Multiple Launch Rocket Systems (MLRS--with twelve missiles each); for 216 tubes of MLRS; for a combined tube count of 288 gun/missile tubes 155 mm or larger. The armored and mechanized divisions receive further support from two field artillery brigades from Corps providing additional support up to 576 tubes of artillery (of which the Division could expect about 288 tubes or One Brigade).

The question is this, "If the U.S.M.C. and Army Divisions are organized with this much organic artillery in order to accomplish their combat mission; then why, for a mission such as an Amphibious Assault or Denied Entry, (which is exponentially more difficult due to fortifications, bunkers, pillboxes, etc.) is there less fire support" (Ralphs 1998, 3)?

The Navy says that they will provide the necessary fire support to the maneuver units via close air support (CAS) and attack helicopters. Marine Corps and Army doctrine employs CAS and attack helicopters as elements, which ***augment*** artillery. Air-Land Battle doctrine does not call for the employment of CAS and attack helicopters as a ***replacement*** for artillery. Artillery (NSFS) is called the "King Of Battle" for many reasons, and history has severely punished those who either failed to learn or ignored these "Tenants of War."

There are several reasons why CAS and helicopters cannot replace artillery for the close fire support mission:

1. Long Mission Lead Time--they take too long to get there (mission planning, flight time, etc...)

2. Limited Ordnance Payload--they can't carry enough.

3. Short Duration of Influence-- they can't "dwell" or "loiter" for any appreciable length of time.

4. Extreme Platform Vulnerability--Planes and Helicopters are extremely vulnerable to enemy weapons and the effects of Weather (wind, snow, fog, ice--all of which ground aircraft)

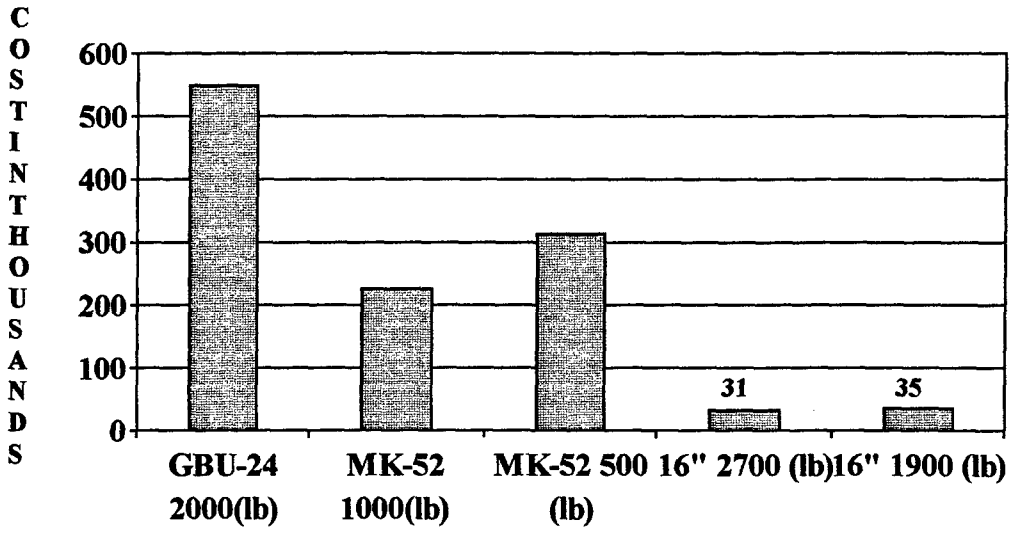
In cases where artillery is adequate, NGFS is still of great psychological importance, not only to the friendly forces, but also to the enemy. The ability to strike the enemy from so many different angles makes NGFS especially effective. The fact that naval gunfire could hit deep inland and in the enemy rear areas makes it a constant threat and plays much on an enemy's nerves. The flat trajectory and high muzzle velocity are excellent for destroying bunker type targets, which can be made relatively immune to the

high angle artillery fire (Reilly 1989, 184). In many cases, it has proven possible to fire on the reverse slopes of the enemy MLR by using naval fires from beyond the FEBA. The sixteen-inch gun has historically been capable of destroying any target it could reach (Reilly 1989, 184). In addition, naval gunfire illumination is superior to artillery and mortar illumination (Reilly, 1989, 184).

Where CAS is available, NGFS serves to release the available air to more critical sectors of the front. "During Korea and Vietnam, sixteen-inch rounds were fired as close as 300 yards to friendly units, which is as close or closer then air could have supported" (Reilly 1989, 184). Economically speaking a few rounds of sixteen-inch naval gunfire could achieve the same or greater destruction as a combat-loaded AD from a carrier without endangering the aircraft and crew.

While a carrier strike aircraft sortie must be loaded on the carrier with the specific mix of ordnance, it cannot vary that load-out once it has launched--the battleship has the capability of simply loading another round in the barrel. The pilot must strike his target with precision and accuracy while avoiding target defenses that are trying to shoot him. If he misses the target with the ordnance he has, then another sortie must be generated and flown for this target. The battleship doesn't have to deal with anti-air measures above the target, with the exception of the RPV, which has a very small cross section and isn't manned. If the battleship misses one, two or three times, it simply adjusts fire until it hits the target. The costs associated with training the aircrew, the flight deck crew, launching the aircraft, the ordnance, and various other factors seem significant when compared with the simple process of adjusting the battleship's sixteen-inch gunfire. Below, the chart looks at some examples of the costs.

Table 9. COST PER TON (AIRCRAFT VS. GUN DELIVERED)



Units in Close Combat need **full-time**, dedicated, responsive, and lethal fire support--not **part-time**. The Navy and the Marine Corps say they won't conduct Denied Entry type operations, believing they can attack a less defended place along the Littoral Battlefield. The U.S. Army says that it does not have a requirement to execute Amphibious Operations. The Army and the rest of the U.S. Military would be well advised to take heed the proverbs of the great Sun Tzu who said, "One cannot always avoid a fight... and one cannot always choose his battlefield" (Ralphs 1998, 9). In Korea, September 1950, the U.S Army participated with the Seventh Division and the Thirty-second Infantry Regiment in a joint amphibious invasion of Inchon with the 1st Marine Division. We still are focused on Korea as a potential Major Regional Conflict (MRC).

In response to the GAO report, the Navy argued that it plans to address its surface fire support capability deficiencies in two phases, a near-term solution, and a long-term solution. The near term solution was to include: (1) The modified version of the five-inch gun currently used on surface combatant ships, (2) An extended range guided five-inch munitions, and (3) A shipboard surface fire support warfare control system consisting of computer resources and communications interfaces designed to automate battle management functions (GAO 1997, 01). In the long-term phase, the Navy plans to develop a 155-millimeter vertical gun for advanced ships (VGAS) with an extended range guided munitions and adapt the Army Tactical Missile System and/or the Navy Standard Missile for land-attack missions.

Although development of the modified five-inch gun and the extended-range guided munitions is currently on track, technical issues may delay achievement of operational capabilities scheduled for a FY 2001 completions date. The full capabilities of the near-term program will not be available until the naval surface fires support warfare control system is defined and funded. As of November 1997, this had not been accomplished.

The ERGM program is a $2.1 Billion program to design, test, and field a new long-range five-inch gun which can deliver nineteen pounds of explosives at ranges out to sixty-three nautical miles, using GPS guidance, which cannot even kill a single tank! The program calls for fitting one gun to twenty-six (new construction) Arleigh Burke class destroyers (DDG). Congress has approved funding for the fitting of fourteen DDGs with the extended range guided munitions (ERGM) weapon system. In early 1998, the first complete five-inch, sixty-two caliber MK 45 Mod 4 Naval Gun was delivered to US

Naval Surface Warfare Center (NSWC), Dahlgren, VA. This prototype incorporates strengthened structural components, a lengthened gun barrel, and newly redesigned housing, breechblock, slide and recoil components to accommodate increased chamber pressure and greater recoil impulse required to fire the EX171 Extended Range Guided Munitions (ERGM) up to sixty-three nautical miles. It also includes a new gun control system. Upon completion of testing at Dahlgren, delivery of a Mk 45 Mod 4 per-production gun system is scheduled for delivery in early 2000 for installation on DDG 81 or DDG 82 and sea-based tests. The ERGM sustained rate of fire is ten rounds per minute. Max load for a DDG is two hundred-fifty rounds. The developmental projectile weight varies from one hundred to one hundred-ten pounds each. This system is inadequate due to the fact that amphibious operations usually take days, possibly weeks. A system that expends its load out in twenty-five minutes fails to provide the necessary support.

The gun and munitions can be deployed without the warfare control system, but unless the system is developed, the capabilities of the ERGM system cannot be fully integrated with other weapons. The warfare control system is still being defined, and only draft operational requirements have been identified. The system is to be incorporated into the Advanced *Tomahawk* Weapons Control System, and is eventually expected to be integrated with the Aegis Combat system. Because the warfare control system will not be available for some time, the Navy plans to adapt the Army's Automated Deep Operations Coordination System software to perform automated naval surface fire support mission planning and control functions as an interim solution.

The other problem for the ERGM program lies with funding. Development of the five-inch gun and extended-range guided munitions is currently funded, however, funds have only been identified to field the gun systems on fourteen of the twenty-six new DDG-51-class destroyers.

With the loss of the Arsenal Ship Program, the Navy has hung their hat completely on the new ERGM program to fulfill the OMFTS concept. As part of a combined package, a successful arsenal ship concept in addition to the ERGM system, may have justified short-term fulfillment of the naval surface fires support mission. By itself, the ERGM fails to satisfy the validated requirements for NSFS as defined by LTG Van Riper in his 03 December 1996 memo to the Chief of Naval Operations (CNO). Listed below are some of the required performance criteria where the ERGM/DDG combination fails. These are some of the major shortfalls – there are others (Van Riper 1996, 2-3):

> 1. Execution Responsiveness. A time span measured from when the call for fire is received at the naval gunfire support ship (Fire Direction Center – FDC) until projectiles detonate at the target. Time of flight is a critical issue when providing close-supporting fires to maneuver elements engaged in close combat. ...The requirement for artillery execution responsiveness is 2 ½ minutes (receipt of call for fire to rounds on target). At max range, ERGM has a flight time of 7-8 minutes. The ERGM's time of flight fails to meet NSFS requirements (Van Riper 1996, 6).
>
> 2. Destruction Fires. The ERGM holds 72 XM-80 sub-munitions. The XM-80 cannot kill a tank. Therefore, it cannot meet the requirement for fires delivered for the sole purpose of destroying the target's combat effectiveness. The Army and Marine Corps artillery community recognize 30 percent casualties or material damage renders a target combat ineffective. If the ERGM is to be configured to impact without dispersal of sub-munitions, then it is not considered effective anti-armor ordnance due to the requirement to directly hit the target in order to have a successful target kill (Ralphs 1995, 2).
>
> 3. Neutralization Fires. The ERGM cannot meet the requirements for Neutralization Fires either, since ten percent of the targets must be destroyed / rendered combat ineffective (Ralphs 1995, 2).

4. Sustained /Subsequent Operations Ashore. With an on-board capability of storing only 250 rounds of ERGM ammunition, the DDG platform is neither sustainable, nor, capable of providing subsequent and or extended operational support. This figure is made even smaller when taking into account the Navy requirement to keep a certain percentage on-hand for "self-defense" (Ralphs 1998, 7).

5. Volume. With one gun per DDG, with a sustained rate of fire of 10 rounds a minute and a , the single ERGM gun cannot achieve the performance level for volume (ex. 54 rounds 155mm a/min = Volume) (Ralphs 1998, 7).

6. High Explosive Projectiles. LTG Van Riper wrote "Precision/terminally guided munitions are needed, *but not to the exclusion of inexpensive, volume fire munitions.* ERGM, ATACMS / N-TACMS all employ sub-munitions to destroy armored targets. In an operation where a force is trying to fight its way off the beach, it makes absolutely no sense to litter the battlefield with ammunition, which has a significant, documented, dud rate. After the Gulf War, the biggest threat to Allied personnel was the real possibility of being killed by an Allied, unexploded, sub-munitions (Ralphs 1998, 2).

Although the Marine Corps have endorsed the near-term phase, it has outlined additional requirements that the modified five-inch gun and ERGM will not provide. These include many of the shortfalls listed above, but also include desires for increased range (beyond the sixty-three miles of the ERGM), larger payload for increased lethality, and supporting command and control systems that will ensure safe integration of fire support provided by a variety of sea-, air-, and land based weapons. The Army, although also a potential customer of NSFS, has not developed specific requirements.

The long-term phase of the naval surface fires support program is intended to comply with the Navy's cost and operational effectiveness analysis recommendation and to address Marine Corps requirements that will not be met by the modified five-inch gun and ERGM development program. The biggest problem facing this phase of NSFS is in the defining of requirements. It is still in progress.

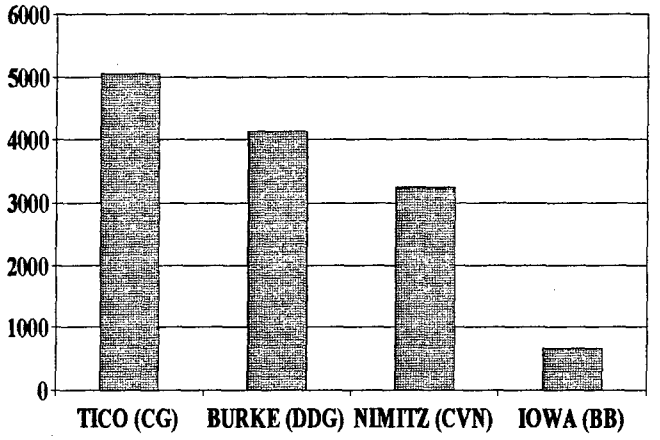
As reported in 1995, the Navy's cost and operational effectiveness analysis recommended the development of the 155mm gun, in combination with missiles, as the

best solution for meeting NSFS requirements. To the end, the long term phase is intended to address those recommendations as well as those requirements recently established by the Marine Corps, the Navy's primary surface fire support customer.

As described by Navy officials, key elements of the long-term phase would include developing a 155mm-gun system, and adapting the Army Tactical Missile System and/or the Navy Standard Missile for the land-attack missions. By fiscal year 2003, the missile variants are planned to achieve initial operational capability and a vertical gun is to be demonstrated. The Navy plans to equip the future class of surface combatants (dubbed DD-21) with the vertical guns beginning about the year 2008. It is expected to incorporate technology already developed for the ERGM. Because of project delays, and lack of definition, the long-term phase is in jeopardy of slipping behind schedule.

The primary weapon system proposed for the long-term phase is 155mm VGAS--a vertically mounted gun that will be mounted on the proposed DD-21. The VGAS will not see service until at least 2010, and will not be in sufficient numbers until 2015. If the VGAS performs as advertised it might indeed replace the need for the battleships in active service. But this entails a wait of at least sixteen years (Derdall 1999, 3). Recently, concerns have been raised about whether the system will perform as envisioned. In the March 98 edition of *Surface Warfare*, Captain Richard L. Wright identifies the possibility of a "trainable or elevatable conventional gun as a lower risk alternative to the vertical configuration" for DD-21. The Navy is now talking about "old technology" for the "Advanced Land Attack Combatant for the twenty-first century" (Wright 1998, 34).

TABLE 10. COST PER SHIP TON/YEAR



* O & M Costs less Crew Costs, divided by Optimum Battle Displacement Tons

Source: Ralphs 1998, 2.

Table 10 provides a comparison of ship costs per ship ton per year. Battleships are the only existing platform, (now and the foreseeable future), which can fulfill every facet of the Marines' naval surface fires support requirements. This includes the unfulfilled requirements for range. The *Iowa* and the*Wisconsin* will take at least nine months to reactivate. They will spend at least six months in the yard, and a minimum of three months at sea on a shake down cruise training the crew to a required minimum level of proficiency.

Both have hull and propulsion lives in excess of twenty years before any major work needs to be done to them. The *Iowa's* number two turret has for the most part been repaired and all parts needed to complete the repair and bring the turret one hundred-percent online are stored inside the turret (estimated cost four to six million dollars) (Ralphs 1998, 3). This would provide two ships that can support any fights the USN and USMC may find themselves in, plus provide a showing of the flag and U.S. power that is

beyond the capability of any ships today (with the possible exception of the aircraft carrier).

> Battleships have the following capabilities: major-caliber, long-range, relatively inexpensive weapons; rapid and sustained all-weather response; relatively invulnerable to countermeasures; and can either out-range counter-battery fire or accept counter-battery fire and continue to fight. The requirement for these capabilities will not go away....the surface warfare successors to the battleship should be under serious, active, funded development now for employment into the next century. (Nichols 1991, 75)

Instead, we are gambling on visions, hopes and expectations. The Navy does not have the right to risk the lives of our sister services on thin promises, insufficient capability, and envisioned future systems. While fine on paper, a phased plan that provides only limited capability in the short term, and "envisions meeting these requirements" in the decade after next! To further quote Sun Tzu, "It is wise to prepare...for your enemy's time is not your own" (Nichols 1991, 75). Maybe an old proverb might shed even more light, "A bird in the hand is worth two in a bush." The U.S. can't predict when her forces will next see conflict and when the need for long range NSFS will be required. The only thing that is certain is that the enemy won't try to make it convenient. (Nichols 1991, 75).

Battleship 16 Inch Gun Munitions are the Most Lethal and Versatile

The Navy's emphasis on littoral operations since the dissolution of the Soviet Union and subsequent atrophy of its fleet has increased the value of the battleships immeasurably, both for survivability and the fire support they can contribute to land operations. As was demonstrated in the Arabian Gulf, the battleships were the only ships capable of providing long or short range NSFS. Comparing the 16 inch guns against the

other predicted systems, we see the lethality and increased versatility that the battleship has over have the most effective munitions and can attack the entire spectrum of conventional targets, from personnel to tanks to concrete bunkers.

TABLE 12. GUN SYSTEM COMPARISON TABLES

Gun Caliber	Nominal Projectile Weight (lbs)	Weight of HE (lbs)	Average Fragmentation Area (sq yds)	Relative Effectiveness
5" MK-38	55	7.2	4,140	1.0
155mm M107	95	15.0	8,625	2.04
5" ERGM	110	19.0	10,925	2.63
16"	1,900	153.8	45,200	10.90

Source: Ralphs 1998, 7.

TABLE 13. CONCRETE* PENETRATION PERFORMANCE

Projectile	Range (yards)	Obliquity (feet)	
		0□	30□
5" Mk-38	10,000	1.0	0.5
16" 2,700 lb. AP	10,000	□□□□	20.5
16" 1900 lb. HC	10,000	□□□□	13.0

- **5000psi rebar concrete**

Source: Ralphs 1998, 7.

TABLE 14. HE/PD ROUNDS NEEDED FOR DESTRUCTION

Target Type	5" Guns	16" Guns
Runways (per 300m square)	36	1
Unarmored Vehicles (100 x 100 m)	60	1
Light Structures (100 x 100 m)	13	1
Medium Structures (100 x 100 m)	20	2
Reinforced Structures (100 x 100 m)	30	3

Source: Ralphs 1998, 7.

TABLE 15. ROUNDS NEEDED TO PRODUCE 30 PERCENT CASUALTIES AGAINST MEDIUM HARD TARGETS

Range	5"/54	16" HE/PD	16" HE/CVT	16" ICM DP
13,000m	125	60	12	2
21,000m	150	70	18	3

Source: Ralphs 1998, 7.

The numbers speak volumes as to the battleships superior effectiveness over any weapon system, current or planned to serve as the best system with which to perform the NSFS mission for OMFTS.

Cost Comparison

ERGM

The Navy has developed one prototype gun and 570 extended-gun munitions. The Naval Center for Cost Analysis has estimated the research and development cost to produce the prototype gun and 570 munitions at about $179 million. The estimated cost of the near-term phase depends upon the number of modified five-inch guns and munitions eventually procured. The costs of procuring twenty-seven modified guns (to include one training gun) is about 366 million (average unit cost of $12.35 million) and 8000 extended range guided munitions is about $359 million. Paying for installing the gun system on follow on ships must be paid by either the Navy's ship construction program (during construction) or other Navy procurement funds (post-construction) at approximately twice the cost. Total Operational and support costs for twenty years are estimated to be an additional $444 million. Final cost for the initial operational fielding of the ERGM is approximately 2.1 billion dollars. The original plan was for the Navy to

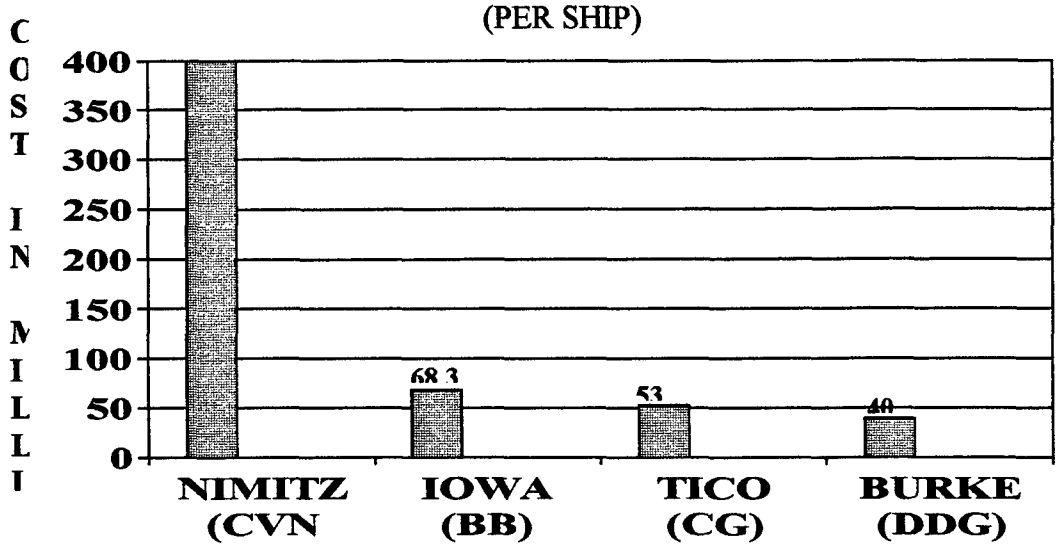
back-fit selected existing ships, but funding problems may force it to limit installation of the modified gun to new ships. If a decision is reached to back-fit the modified gun onto an additional sixty-one ships, according to a Navy official responsible for program resources, an additional $862 million over a three-year period will be needed for ship modification and integration. The added cost of procuring extended range guided munitions for these sixty-one ships could be about $2.6 billion, depending on the price of the ammunition at the time of procurement. Why does the Navy prefer to spend $2.1 billion on a high tech program to develop twenty-eight (twenty-six ships plus the experimental gun and the training gun), long-range, minor caliber guns when that same money could bring back two Iowas (eighteen, sixteen-inch guns & twenty-four, five-inch guns) for at least ten years, and mass produce and field an exponentially more effective long range projectile for the major caliber sixteen-inch gun.

The Carrier

The purchase of an aircraft carrier costs an estimated $4.2 billion new, or $2 billion to overhaul and refuel the reactor of an existing carrier. Naval aviation exists for the primary roles of maintaining maritime air superiority, CVBG defense, and power projection missions. It requires an enormous investment in aircraft, personnel, and seagoing airfields. Proficiency of naval aviation is dependent upon almost continual flying and this costs a fortune. It consumes prodigious quantities of fuel, batters the aircraft, uses warehouses of spare parts, and requires manpower of a grand scale compared to any other naval vessel. Since 1991, the U.S. Navy has lost between thirty to

forty F-14 fighter aircraft valued at over $1 Billion, enough to pay for ten Iowa class battleships for one year (Stearman 1994, 4).

TABLE 17. ANNUAL O&M COSTS
(PER SHIP)



Source: Ralphs 1998, 5.

The Battleship

The battleship is superior to any other surface combatant for performing the NSFS mission for OMFTS. It can perform more missions and is cheaper than the one billion dollars per copy DDG. When the U.S. wants to display a *show of force*, the Iowa class battleships can sail up to the coast and be seen. A carrier conducts its show of force from 50-100 miles off a foreign coast. They can be used in the strategic role as well, much in the same way as Secretary of the Navy, Teddy Roosevelt did--Gunboat/Battleship Diplomacy. Winston Churchill once said, "Warships are the best ambassadors." Within the twenty-three to twenty-seven mile, sixteen-inch gun ranges (which could be extended

with improved ordnance), one battleship can in one hour, accurately lay down supporting fire equivalent to that from several carriers or approximately twenty-five B-2 sorties--without risking the loss of pilots or aircraft. Of all our ships, only the massively protected battleship can risk getting close to a potentially hostile surface shore for a dramatic psychological impact in a peacekeeping show of force. Reactivating one battleship takes about nine months and costs less than $150 million (a new Arleigh Burke class destroyer costs nearly one billion dollars) and requires one-fourth of the crew of a carrier (with airwing) and has about one-sixth the operating costs. Within the range of the battleships big guns, they do more with less! Battleships cost less to operate than carriers; battleships can deliver more tons of ordnance than carriers; battleships deliver the ordnance faster; battleships deliver the ordnance cheaper; and use of the battleship frees the carrier to perform other missions. In these times of "doing more with less", the battleship is clearly a class of ship that today's U.S. military needs to augment the carrier battle group!

Norman Polmar's belief that there are too few battleships for them to really make a difference begs the question, "What is enough?" The age old argument that your chances of winning the lottery increase exponentially when you go from having no ticket to having one is not lost here. Having two battleships provides a set of capabilities that complement our other capital ship, the aircraft carrier. The Navy will only have ten carriers available at any one time--is this enough? The added benefit that battleships were designed to be able to use the Panama Canal is a force multiplier, adding to their flexible utility in crisis response.

To the 'too late' argument, Mr. Polmar is not far from the mark. If the Navy continues to drag out the issue, the infrastructure that provides the repair parts and the experience base will have disappeared. Fortunately, there are still a good number of sailors in the fleet with battleship experience. It has only been eight years since the last Iowa was mothballed. The period between *New Jersey's* decommissioning in 1969 until its return in 1982 was a longer period. The training and experience level in the fleet today is greater than it was when the Iowas last returned because all four Iowas were in service, and their service spanned nine years vice the three years *New Jersey* was active during Vietnam.

As Norman Polmar pointed out, battleships are still expensive because of a manpower intensive crew and fuel usage. The numbers actually show that the battleship's cost when compared to smaller less capable assets seems extravagant, but when compared with the costs associated with another capital ship, the aircraft carrier, the costs are favorable. Going the step further, initiatives exist that suggest removal of the outer two propellers during peacetime and placing almost one-half of the engineering plant in a lay-up status. This would reduce engineering manning requirements by between thirty and forty percent while only limiting the ship's speed to twenty-seven or twenty-eight knots. Additionally, lay-up of two of the four propulsion plants would save on fuel usage.

Other initiatives propose reducing gunnery manning to a level to fully man one of the three sixteen-inch turrets, and two of the six, five-inch mounts. The belief being that of the seventy-eight men needed to fully operate a turret, most are simply brute labor force used to pass powders and move bullets. Further, only about fifteen to twenty are

needed to properly maintain each turret. During training, the turret used for firing would be alternated allowing for all turrets to be exercised. A similar situation would play for the five-inch guns. During peacetime, this amounts to a reduction of about three hundred individuals (or one-fifth of the crew), and during wartime these vacancies are filled by Navy Reservists who will continue to drill with the ship. Because of the primarily physical nature of these vacancies, training would not be a restrictive issue.

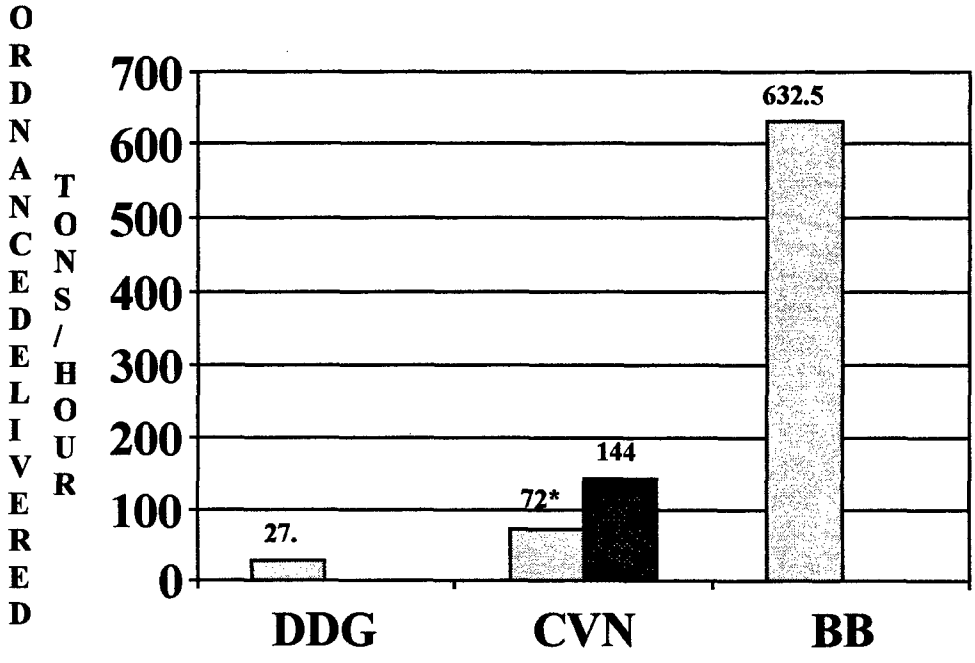
Associated with both these proposals would be a similar reduction in the need for logistical support personnel (barbers, cooks, berthing cleaners, etc.). And these examples don't even address the proposed removal of five-inch mounts or the automation of further systems. In 1986, Congress appropriated $469 million for the USS *Wisconsin*'s reactivation. This cost was the highest of the four due to requirements to complete repairs to damage caused by a fire that destroyed much of the electrical wiring for the forward part of the ship (*Aerospace Intelligence* (AI) 1986, v. 014 no 004, 2.

According to a memo dated 20 March 1996, from N43 (Supportability, Maintenance and Mobilization Division) battleships would cost approximately $110 million each to reactivate. BB-61, the *Iowa*, would cost an additional eight million dollars above and beyond in order to complete the repairs to turret two. This cost is for labor only. All parts were paid for and left uninstalled prior to her deactivation. Operational and Maintenance costs (O&M) are approximately fifty to sixty million dollars annually. The initial F/A-18 E/F purchase cost buys a battleship. Which is a more effective expenditure?

Major caliber naval guns are much more economical and effective in naval surface fire support, strike, and anti-surface warfare (ASUW). After all, it took the air

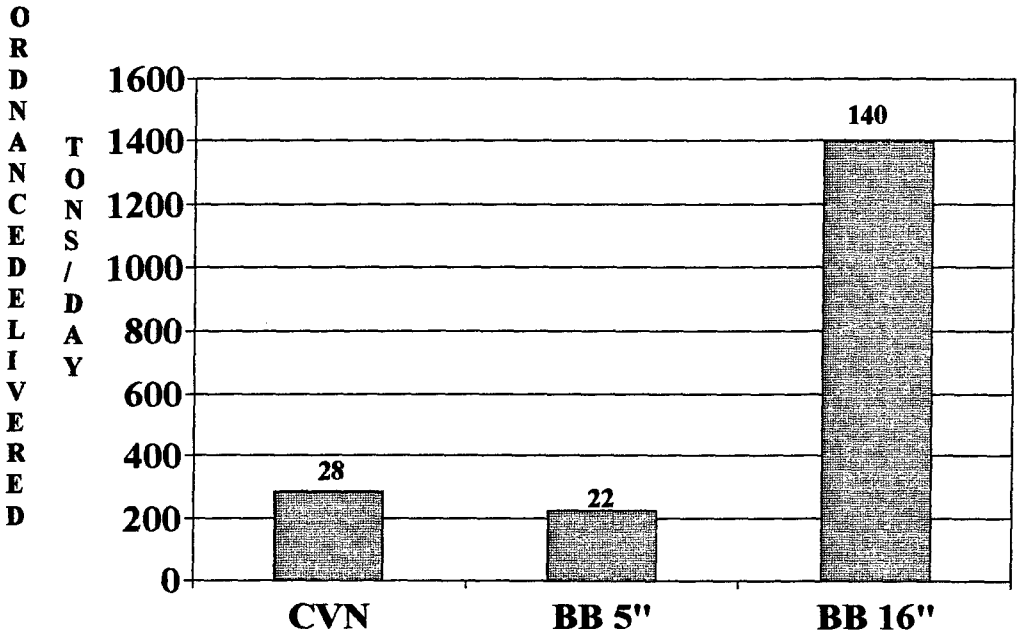
striking power of the entire task force fifty-eight (hundreds of aircraft) to sink the Japanese battleship *Yamato.* But, it only took the Fast Battleship U.S.S. *Washington* (BB-56), seventy-five rounds of sixteen inch and less than six minutes to put the Japanese Fast Battleship HIJMS *Kirishima* in a sinking condition.

TABLE 18. AIRCRAFT VS. BATTLESHIP



Source: Ralphs 1998, 6.

TABLE 19. AIRCRAFT VERSUS BATTLESHIPS



DDG: ERGM sustained rate of fire is 10 rounds a min. Max load 250 rounds, 25 minutes of firing and the ship is out of ammo. Developmental projectiles vary from 100-110 lbs.
*One mission, 36 aircraft with 4,000 lbs. load – standard – Combat Radius = 300 miles
□ □ One mission, 36 aircraft with 8,000 lbs. load □ possible □ Combat Radius = 150 miles
(x)One round ever 60 seconds, 50 percent 1,900 lb. & 50 percent 2,700 lb. AP = 540 rounds = 632.5 tons.
Two Alpha Strikes a day, max payload configuration.
1,220 rounds 16" (50 percent 1,900 lb./ 50 percent 2,700 lb. AP)
10,000 rounds 5" 55 lbs. each = 550,000 lbs.

Source: Ralphs 1998, 6.

When an aircraft carrier is tasked to perform the mission a battleship is capable of performing, its actions expose pilots to the risk of capture--which in crisis response actions can cripple an American response. Lost pilots have an additional effect: rescue

attempts can shut down all fires for miles around. During the 1972 Easter offensive in Vietnam, all fires from air, artillery and naval gunfire were shut down over the entire battlefield in order to protect one downed pilot. Furthermore, battleships do not expose sensitive aircraft technologies to compromise as airstrikes do. Even a badly crashed aircraft will yield valuable intelligence data, and sometimes aircraft impact with relatively little destruction. With older systems the risk would be acceptable, but what about a B-1 or B-2? Because of its inherent on-station capability, battleships have persistence that TACAIR does not. It is available twenty-four hours a day and able to fire for prolonged periods--with an immediate re-attack capability. TACAIR must expose itself to danger while hitting the target, and then must return to base without much flexibility for re-attack.

Air offenses cost many aircraft even without the carrier being attacked. In both Korea and Vietnam aircraft losses were heavy--and expensive. If gunfire attacks made by battleships in Korea had been made by aircraft, the U.S. would have lost, by rough calculation, another one hundred and forty aircraft. (USN 1996, 12-15)

Compared with the carrier, weapons range limitations are of course a limitation of SAGs with current munitions. The sixteen inch guns are limited to twenty-three to twenty-four miles and the *Tomahawks*, while having a thousand nautical miles or greater, are relatively few (thirty-two). Nevertheless, much of the world's population and half of the world's manmade assets lie within range of the battleship's guns, and even more are within *Tomahawk* range.

In theory, accuracy is another limitation of the battleship, because aircraft bombing with precision munitions is considered to be a more precise tool than battleship

shelling. In fact, history is unclear on this point. As Programs, Assessments, and Evaluations (PA&E) is well aware, accuracy of precision munitions in combat has proven to be much less than in the lab or on the development range. The Air Force bombing of Libya also had little military, as opposed to political, result. In the strike on Ghadaffi's HQ very few aircraft scored hits...some bombs missing by miles. In comparison, battleship accuracy--after eight years of training and with modern upgrades--performed quite well in the Arabian Gulf. Battleships can now hit targets at long ranges with excellent accuracy and without the risk of wild rounds.

In 1995, the Navy attempted to strike all four battleships from the naval registry. The Congressionally mandated requirement to maintain the *Wisconsin* and the *Iowa* in mothballs is prudent to say the least. Today, the battleships cost about one hundred thousand dollars per year to maintain on inactive status. For the cost of two Lieutenant Commanders' annual salaries, we can keep this valuable asset available.

CHAPTER 5

CONCLUSION

History has proven the battleships to be extremely versatile ships with unique capabilities. Although sharing many of the same or similar capabilities provided by other systems and other ships, there are some proven differences, as well as abilities, that are not met by current inventory. These include (1) Naval gunfire support, (2) Survivability, (3) Power projection, (4) Logistics support, (5) Maintenance and repair support, (6) Command and control, and (7) Psychological influence.

Within the range of the battleship's big guns, the battleship demonstrates a clear advantage in ability to deliver greater amounts of ordnance versus time, during all weather conditions--all this done without unnecessarily risking the lives of pilots and aircraft technology. Even the aircraft carrier cannot surpass the battleship surface fires support performance within the battleships sphere of influence. Population distribution demographics show that a majority of the population currently resides in the littoral regions and that this trend is expected to continue (Global Population Distrobution Database 1998, 13). Recognizing this fact, battleships will continue to have viability as a NGFS platform until suitably replaced.

Doctrine for the United States military recognizes the importance of fires to support close and deep operations ashore in the future. Both the U.S. Army and Marine Corps incorporate Navy surface fires to support operations in both the littorals and deep shore (eight nautical miles to one-hundred nautical miles) areas. Congressionally mandated studies have emphasized the importance of projecting large

ordnance to support Marine amphibious operations, sixty to seventy miles inland. The Navy is fiscally and professionally responsible to provide the fires necessary to support successful amphibious forced entries, raids, and landings, but currently lacks the capability to adequately provide these services. Originally the Navy attempted to look to rockets, missiles, and smart bombs from carrier aviation to fulfill this mission, but they now acknowledge the Marines need for long range directed gunfire.

Senator McCain stated, "Missiles are not a substitute for the kind of impact well-directed artillery fire can have on a battlefield. The psychological role of battleships in dissuading hostile regimes from acting against U.S. interests is an intangible that is under-appreciated. This issue has great importance to U.S. foreign policy and to the ground soldiers whose lives may depend on timely support on timely support from large guns offshore." (McCain 1997, 01)

With current amphibious doctrine calling for fire support beyond the twenty-two mile range of the battleship, other options are available as well. Research and development have already been conducted to provide the battleships sixteen-inch guns with specialized sabot rounds and rocket assisted rounds that extend range capability out beyond one-hundred miles. This technology is ready now!

Over the past nine years, since the battleships were retired, various initiatives have been put forward to develop replacements for the battleships' NGFS capability. So far, none of the solutions have proven a match for the capabilities of the battleship in the NGFS role. The eight-inch gun system, the arsenal ship, and other projects have been scrapped without successful employment in the fleet. Although the extended-range guided munitions (ERGM) program and the vertical-gun system designed for placement

on the twenty-first century future destroyer, show promise, both programs have their drawbacks. Specifically, the ERGM, while fulfilling the range requirements set forth in modern amphibious doctrine, fails to meet the destructive requirements and sustainability of fire criteria. Far from a finished product, the vertical gun system has been experiencing design problems and details about final projected capabilities are still being finalized. ERGM will not be distributed throughout the fleet until 2008 while the VGAS system will not arrive until 2015.

While a determined enemy may be able to bring enough cruise missiles to bear against a battleship to sink one, it has been proven that the Iowa class battleships are among the fastest, most well protected and lethal ships ever to sail the seas. Tactically, battleships would not be employed in an area that hasn't been already prepared with Tomahawk or aircraft strikes, and it would always have escorts for added protection. With third world nations increased possession of Silkworm missiles and Chinese Houdong fast attack boats with C-802 missiles, only battleships can now safely risk providing a naval show-of-force presence in many theaters. Although, because of its construction, the battleship inherently has a greater capability of survival than other modern combatants. The external vulnerability of the carrier to mission degrading damage is much greater than that of the battleship, therefore restricting its use in a power projection role in a hostile littoral environment. "The Navy, since 1941, has lost 11 aircraft carriers, yet, during this same time frame, not one American battleship has been lost at sea against the enemy (18 saw action during World War II). No American battleship has ever been driven from the sea" (Ralphs 1998, 8).

As identified throughout chapter 4, the battleship also is a valuable instrument for power projection, logistics support, maintenance and repair support, command and control, and psychological influence. Together with the NGFS and survivability, the battleship's superior littoral capabilities complement the carrier's capabilities, freeing carrier aviation assets to perform close air support and strike missions. Beyond the range of the big guns, the carrier air must carry the fight to the enemy, but pilot lives need not be unnecessarily risked in the littorals. While unable to perform the full amphibious support mission alone, the battleship combined with the carrier makes the strongest possible battlegroup the world has ever seen.

The post Cold War environment is not the peaceful utopian society many liberals would like to believe. The United States is increasingly finding itself involved in small scale military actions. The U.S. *National Security Strategy for a New Century*, *National Military Strategy*, and the *Navy's Vision-Presence-Power* all project increased involvement of the military as an instrument of power in engagement operations throughout the globe. Looking beyond the two major theater war concept, the U.S. military can expect itself to participating in numerous small scale conflicts, humanitarian operations, peace-keeping operations, peace-making operations, among a myriad of other non-traditional military missions. With this in mind, the battleship has proven utility into the twenty-first century, until more modern systems can be developed that adequately fulfill its mission. The Navy is missing a valuable strategic and tactical tool. The Marines and soldiers on the beach don't have the luxury of waiting until a replacement is designed and fielded--they need it immediately! Many numbers have been fielded to show why the battleship is more cost effective, and I'm sure many others could be

developed to refute these numbers. The bottom line is that human lives, those of the soldiers and Marines on the beach and those of the aviators tasked to fly the missions better handled by the battleships, cannot be measured in dollars. If the Navy is serious about littoral warfare and supporting the Marines and soldiers on the beach, the battleship must be returned to active duty. The Iowas will take at least nine months to reactivate. They will spend at least six months in the yard, and a minimum of three months at sea on a shakedown cruise training the crew to a required minimum level of proficiency. During that nine months, the U.S. might be forced into a compromising position or have suffered needless casualties before the Iowa's can engage the enemy. Because the battlefield of the twenty-first century is high tech and fast paced, I recommend the Navy reactivate the Iowa class battleships now so that the ships and their crews will be ready for action when we need them. We cannot afford to wait even one more day!

Follow-on Research Questions

In the research the following questions arose for possible follow on research:

1. How can the Reserve Component of the U.S. Navy be utilized to support reduced battleship manning?

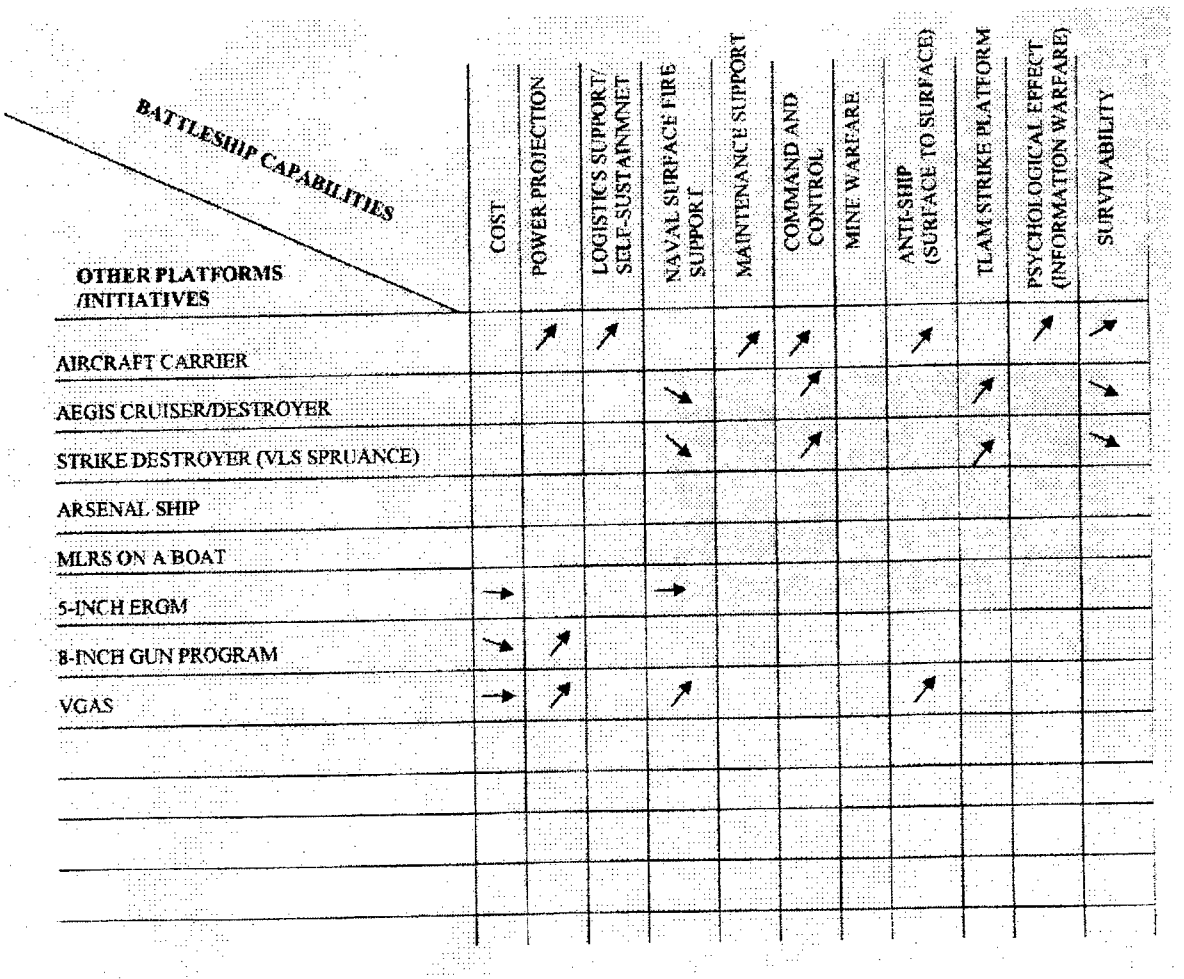
2. What configuration changes, if any, should be made to the battleships in preparation for recommissioning? What new upgrades and systems should be included to ensure compatibility throughout the fleet and with the other services?

3. How could the battleship be used to assist Naval recruiting and retention?

4. Is survivability of critical importance to warship designs of the future? If so, where did the armor go? And why?

APPENDIX A

ASSESSMENT OF CURRENT AND FUTURE U.S. NAVY CAPABILITY TO FULFILL THE BATTLESHIP ROLE



APPENDIX B

THE BATTLESHIPS FULFILLMENT OF JOINT FORCE REQUIREMENTS

JOINT FORCE CAPABILITIES \ BATTLESHIP CAPABILITIES	POWER PROJECTION	LOGISTICS SUPPORT/ SELF-SUST/ADMINNET	NAVAL SURFACE FIRE SUPPORT	MAINTENANCE SUPPORT	COMMAND AND CONTROL	MINE WARFARE	ANTI-SHIP (SURFACE TO SURFACE)	TLAM STRIKE PLATFORM	PSYCHOLOGICAL EFFECT (INFORMATION WARFARE)	SURVIVABILITY
HOMELAND DEFENSE	↗				↗		↗		↗	
DEFEAT ADVERSARIES IN TWO MTW	↗	↗	↗	↗	↗		↗	↗	↗	↗
RESPOND ACROSS SPECTRUM OF CRISES	↗	↗	↗	↗	↗		↗	↗	↗	↗
CONDUCT/SUSTAIN MULTIPLE SSC	↗	↗	↗	↗	↗		↗	↗		↗
STRATEGIC DETERENCE	↗		↗					↗	↗	↗
DECISIVE OPERATIONS	↗		↗		↗	↗				↗
FORCIBLE ENTRY	↗		↗	↗	↗	↗		↗		↗
SPECIAL OPERATIONS	↗	↗			↗		↗	↗	↗	↗
FORCE PROTECTION	↗		↗	↗	↗	↗	↗			↗
COUNTER WMD			↗					↗		
FOCUSED LOGISTICS		↗		↗	↗					
INFO OPERATIONS	↗				↗			↗	↗	

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