

STATEMENT OF
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HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON PROJECTION FORCES
HEARING ON
U.S. SHIPBUILDING INDUSTRIAL BASE
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Chairman Bartlett, Representative Taylor, distinguished members of the subcommittee, thank you for the opportunity to appear before you to discuss my views on the current state of the shipbuilding industrial base in the United States and how it supports the National Defense Strategy. As requested, my testimony will focus on my views of the following:

- the current state of the shipbuilding industrial base in the United States and how it supports the National Defense Strategy;
- the impact of the CNO's proposed 313 ship naval force on the shipbuilding industrial base and;
- what the U.S. Congress and/or U.S. Navy should do in the future to strengthen the shipbuilding industry and facilitate its continuous improvement.

Introduction:

My name is Mark Montroll. I am a professor at the National Defense University's Industrial College of the Armed Forces. Before joining the faculty at the Industrial College, I was the Director of Innovative Technology Initiatives in the Signatures Directorate at the Naval Surface Warfare Center's Carderock Division. Previous to that assignment, I served as the Branch Head for Signatures in the Seawolf Submarine Program Office at the Naval Sea System's Command. I began my career as a civilian with the Navy in 1981 as an acoustics engineer working for the David Taylor Naval Ship Research and Development Center. I hold a PhD in Acoustics and a Master's degree in Electrical Engineering from the Catholic University of America as well as a Bachelor's degree in Engineering and Applied Sciences from the University of Rochester.

I have served as the director of the Shipbuilding Industry Study class at the Industrial College of the Armed Forces for the past eight years. Each year, the students in the class are tasked to study the industry and its interaction with the government, assess its current condition, and evaluate its ability to support current and future National Security Strategy requirements. Each year, at the conclusion of their studies, the students are asked to articulate their findings and to develop a set of strategic-level, actionable policy recommendations the government can adapt to ensure the shipbuilding industry will continuously support our National Security Strategy. My views on the shipbuilding industrial base in the United States are shaped by my work experiences and analyses, as well as by the observations and analyses of the military and civilian students in the Shipbuilding Industry Study classes that I have worked with.

To support their studies, the students and faculty meet with senior government and shipbuilding industry executives as well as senior representatives of organizations associated with the industry such as suppliers, associations, unions, classification societies and ship owners and operators. We also visit numerous shipyards and associated industrial facilities in the United States and overseas. This has given me an opportunity to study the industry and observe trends that have developed over time and shipbuilding processes practiced throughout the world.

The views, opinions and recommendations that I will express in this testimony are my personal views, opinions and recommendations and do not necessarily reflect those of my students, the Industrial College of the Armed Forces, the National Defense University, the Department of Defense or any other person, organization or agency.

The Current State of the Shipbuilding Industrial Base in the United States and how it supports the National Defense Strategy:

The U.S. shipbuilding industrial base, consisting of private sector corporations, non-profit organizations and public sector facilities and institutions, directly supports the National Security and National Military Strategies by developing, designing, building and maintaining the most capable, reliable and mission-flexible combatant ships and auxiliary ships in the world.

The U.S. shipbuilding industrial base also directly contributes to the economic viability of the country by developing, designing, building and maintaining commercial ships to serve in the Jones Act trade, passenger and auto ferry service within the United States and specialized vessels to support other government agencies such as the National Oceanographic and Atmospheric Administration.

In spite of all of the recent successes and achievements within the U.S. shipbuilding industry, I believe this industry is at a crossroads. For the first time in the eight years I have been teaching the Shipbuilding Industry Study class, the students in the class that graduated in June of 2005 sounded the alarm. They declared: "...the US shipbuilding industry is in crisis and national security will be in jeopardy if the shipbuilding industry is allowed to founder." In the short term, the industry is fully capable of serving the needs of its customers, both private and public. The long-term viability of this industry, however, appears to be in peril.

There are a number of complex and interrelated factors that, taken together, cause me to worry about the long-term viability of this industry. The fundamental issue is that ships built in the United States tend to cost significantly more than equivalent ships built overseas.

As a direct result of these higher prices, relatively fewer ships are built in the United States compared with the total number of ships built in the world. Because of this, the supplier base that supplies the stock materials, marine systems and fabricated components, is smaller, farther away from the shipyard and less efficient than the supplier base in countries with a more robust shipbuilding industry. This causes U.S. shipyards to pay higher prices for the materials, marine systems and fabricated parts it uses to build its ships.

In addition, since the shipyard engineers and production workforce are designing and building fewer ships, the productivity increases and resulting construction cost decreases gained through repetition and lessons-learned from past efforts are smaller than those of their global competitors. With fewer ships being built, the business incentive to invest in infrastructure and automation that could increase productivity and reduce costs are not as compelling as in other countries. Other countries can amortize their investments over a larger number of ship orders. With less automation and infrastructure improvements in U.S.

shipyards, production practices tend to be more labor intensive. As a result, the production workforce, whose individual productivity and pay may be on par with world-class practices, is not able to compensate in productivity for the diminished infrastructure relative to the world-class shipyards. All of these factors taken together cause the price of ships built in the United States to be higher than comparable ships built overseas. As you can see, we have now gone in a complete circle and the cycle of increasing costs continues.

The U.S. Navy is the largest customer of ships in the United States. Systemic instability in its new ship requirements, and overcapacity in the engineering and production capacity of the shipyards relative to the Navy's articulated requirements, has subjected the U.S. shipbuilders to increasing business risk. High numbers of engineering change orders from the Navy and reliance on a highly specialized production workforce within the U.S. industry increases this risk. Higher business risks exacerbate the industry's cycle of increasing costs and ultimately is the cause of my concern for the long-term viability of the U.S. shipbuilding industrial base.

This cycle is reversible, but it is not clear that market forces alone are sufficient to keep the industry viable. The federal government, in its capacity as the largest customer of U.S. built ships, and in its capacity to promulgate and enforce laws and regulations governing transportation with the United States, has significant influence on the long-term viability of this industry.

I find it useful to examine the industry in conjunction with a set of business management theories developed by Harvard Business School Professor Clayton M. Christensen. I use his Creative Innovation Theory; Resources, Processes and Values Theory; Value Chain Evolution Theory; and his Schools of Experience Theory to evaluate the current state of the industry and develop recommendations to facilitate its continuous improvement and enhance its ability to support our National Military Strategy.

The U.S. shipbuilding industrial base should be a vibrant, competitive industry setting the standards for world-class business and production practices. The industry should be achieving steep learning curves during ship production runs, and be supported by a robust supplier base and a vibrant constantly improving workforce. Today, however, the industry is faced with an unstable, unreliable shipbuilding plan. The number of ships being built or on order is not enough to sustain the world-class production practices that are most effective in reducing the costs of ships being built.

Following the Resources, Processes and Values Theory, shipyards, by necessity, must establish production processes that allow them to most efficiently build ships in their order book. When only one or two ships are being built at any one time, and, it is unclear when future orders will be forthcoming, best-business practices preclude the yard from ordering multiple ship-sets of steel, pipes, systems and so forth. In addition, following the Value Chain Evolution Theory, each ship is essentially "hand crafted" since the expense to modularize and standardize across only a few ships is unwarranted. The cost-saving value of standardizing and modularizing is significantly reduced when amortized across only a few ships in a production run.

The 2005 OSD Global Shipbuilding Industrial Base Benchmarking Study shows that overall productivity has increased over the past five years in the U.S. While this is great news, the study also shows that in many areas, the variability in productivity across all of the shipyards is large. Business management theories would predict this. Shipyards with a predictable business base can estimate their risk and develop the business case to invest in practices that would improve their productivity. They can adapt world-class best business practices. Shipyards that perceive their future is at risk have a much more difficult time supporting a business case to invest and continue to employ less efficient processes.

In a free-market environment, a company may have a business incentive to invest risk capital to support corporate strategies of increasing market share or creating new markets. In our monopsony environment where the U.S. Navy is the only customer, shipyards can not increase their market share simply by becoming more productive and less expensive. Many additional factors are included in the Navy's acquisition strategies. This makes it extremely difficult for shipyards to estimate their return on investment and hampers their investment decisions vis a vis productivity and cost reduction.

The challenge for all of us, this committee, Congress, DoD, and industry is to identify a path to reverse the cycle of increasing costs. We need to make ships less expensively so that more ships are built in U.S. Shipyards. Then, the yards should be more willing to make investments to increase their productivity and reduce their costs. As a result, more ships can be ordered creating better stability and predictability in the industry. This in turn will allow the shipbuilding industry to align its infrastructure and optimize its market capacity, while ensuring it is able to continuously meet the national security needs of the nation.

Reversing the cycle is extremely difficult because of four significant factors which are so highly interrelated that a small change in one factor affects all the others, often in unpredictable ways. The best chance we have of reversing this cycle is by dealing with these four factors simultaneously. These factors include: Creating stability in the government's shipbuilding plan; maintaining a sufficient number of ships on order to warrant investing in world-class facilities and adapting world-class best practices; encouraging the presence of a market demand for ships built in the United States that can support a healthy, competitive and vibrant supplier base; and nurturing and invigorating our world-class engineering and production workforce. These are the keys to reversing the cycle and developing a self-sustaining shipbuilding industrial base in the United States capable of affordably supporting our national security and military strategies while contributing to the economic growth of the country.

The impact of the CNO's proposed 313 ship naval force on the shipbuilding industrial base:

The impact of the CNO's proposed 313 ship naval force on the shipbuilding base depends on how it is implemented. If Congress and the Administration accept the Navy's long-range plan for construction of naval vessels, provide the required resources in a stable fashion and allow the Navy to develop acquisition strategies utilizing multi-year

procurements to optimize its yearly spending profile, it will have an immediate stabilizing effect on the industry. It will allow the industry to plan their workload in a predictable manner and provide the business reliability necessary to warrant making investments that increase productivity and reduce costs. It would also provide an incentive for the industry to align their production capacity to the stabilized marketplace. Within a few years, I would expect to see Benchmarking ratings for U.S. shipbuilders continue to increase - meeting and in some cases exceeding world-class standards.

If, however, the environment is such that the Navy cannot implement the plan in a stable fashion over time, it will increase the instability and uncertainty currently plaguing the industry. Shipyards anticipating new orders associated with the plan may keep their engineering and production workforce at a level higher than currently necessary only to find that orders never materialize and investments made to retain and nurture the workforce were unnecessary. Additionally, further instability could create unanticipated production gaps escalating unit costs even more. Finally, the Navy's acquisition strategies for its ships anticipate a close interaction among all the ship classes being designed. When the Navy designs a system for one class of ships, it often utilizes that system in other ship classes as well. Procurement instability in one class of ships therefore causes instabilities in others as well.

Fully funding the CNO's Long-Range Plan for Construction of Naval Vessels for FY07 in a stable fashion while allowing the Navy to develop acquisition strategies utilizing multi-year procurements to optimize its yearly spending profile is the single most significant action Congress can take to reverse the cycle of increasing costs in the U.S. shipbuilding industry.

While this action alone will significantly help control the costs of the Navy's ships, it does not address all of the interrelated factors that should be dealt with simultaneously.

What the U.S. Congress and/or U.S. Navy should do in the future to strengthen the shipbuilding industry and facilitate its continuous improvement:

It is necessary to address all four factors simultaneously, as discussed previously, to strengthen the industry and facilitate its continuous improvement. This is the key to developing a self-sustaining shipbuilding industrial base in the United States capable of affordably supporting our national security and military strategies while contributing to the economic growth of the country.

Fully funding the CNO's Long-Range Plan for Construction of Naval Vessels for FY07 in a stable fashion while allowing the Navy to develop acquisition strategies utilizing multi-year procurements to optimize its yearly spending profile addresses the first factor, and begins to address the second.

Addressing the third and fourth factors requires looking beyond the Navy's requirements. Although the market for ships built in the United States is relatively small today, we have a unique opportunity to revitalize the industry by leveraging the government's shipbuilding construction requirements to enhance the U.S. Maritime Administration's

Short-Sea Shipping Initiative, an initiative to develop a national marine highway system analogous to our interstate highway system.

Professor Christensen's theories suggest that one way to create new markets for innovative products is to address the needs of "non-users." A business "non-user" is someone who does not utilize a product because the cost is so high that a business case cannot be made to support its use. The Navy is developing some extremely innovative ships to meet the Littoral Combat Ship requirements. The Coast Guard is developing some very innovative ships to meet its Deep Water Program requirements. These ships tend to be in the size range that might find utility in the short-sea shipping trade.

Following Professor Christensen's theories, opening up new markets to serve the Short-Sea Shipping trade will create commercial demand for low-overhead business processes as well as low-cost materials and systems. Affordable ships will be necessary to allow short sea shipping to compete with other modes of transportation, such as trucks and railroads, already serving the marketplace. According to the Maritime Administration, the ever growing amounts of cargo carried over highways and railroads is expected to saturate these modes of transportation in the coming years. If clear business cases can be made to support short-sea shipping, theory suggests that in addition to the many start-up companies entering the market, many companies already in the transportation industry will become owners or partners in the newly established industry.

Higher demand for U.S. built commercial ships coupled with the Navy and Coast Guard's requirements would encourage the development of a more robust supplier base and provide more opportunity to design and construct innovative new ships. Under these conditions free-market forces take over. Commercial ships would tend to cost less opening more opportunities to develop business around their use. As the demand for U.S.-built ships increases, the cycle of escalating costs reverses.

The shipbuilding business activity I just described will, of necessity, be at the "low end" of the market relative to the Navy's shipbuilding requirements. However, once the low-end market is stable, it is the natural tendency of businesses to look up-market for their expansion. Over time, the low-overhead processes developed for the low-end market are shared with high-end manufacturers creating a vibrant industrial base capable of meeting the need of a full spectrum of customers.

To realize this vision, I suggest Congress fully support the U.S. Maritime Administration's Short-Sea Shipping Initiative and fully fund their Federal Ship Financing programs.

By applying all of these recommendations simultaneously, we will create a self-sustaining shipbuilding industrial base in the United States capable of affordably supporting our National Security and Defense Strategies while contributing to the economic growth of the country.

Chairman Bartlett, Representative Taylor, distinguished members of the subcommittee, thank you for the opportunity to appear before you to discuss my views on the current state of the shipbuilding industrial base in the United States and how it supports the National Defense Strategy. I look forward to your questions.