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THE HOUSE ARMED SERVICE COMMITTEE
SUBCOMMITTEE ON PROJECTION FORCES

STATEMENT OF

VICE ADMIRAL PAUL E. SULLIVAN, U.S. NAVY
COMMANDER, NAVAL SEA SYSTEMS COMMAND

AND

MS. ALLISON STILLER
DEPUTY ASSISTANT SECRETARY OF THE NAVY FOR SHIP PROGRAMS

AND
REAR ADMIRAL CHARLES HAMILTON, II
PROGRAM EXECUTIVE OFFICER FOR SHIPS

BEFORE THE

SUBCOMMITTEE ON PROJECTION FORCES

OF THE

HOUSE ARMED SERVICES COMMITTEE ON

SHIPBUILDING

APRIL 5, 2006

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Good Morning Chairman Bartlett, Ranking Member Taylor and members of the subcommittee. Thank you for the opportunity to testify about naval shipbuilding industrial base investment and cost issues.

My name is VADM Paul Sullivan, USN. I serve as the Commander of the Naval Sea Systems Command. Accompanying me today is Ms. Allison Stiller, Deputy Assistant Secretary of the Navy for Ship Programs and RADM Charles Hamilton, Program Executive Officer for Ships. We are honored today to discuss the Naval shipbuilding industrial base.

Together with our industry partners, naval shipbuilding has demonstrated marked improvements in productivity during a sustained period of low rate production. However, we still face significant challenges as we design and construct the Navy of the future. To establish perspective, we will first discuss the state of our shipbuilding industrial base. Then we will cover cost drivers and cost trends in our warships and combat systems. We will then provide some highlights from the recent congressionally-directed, OSD-sponsored benchmarking study performed by First Marine International (FMI) comparing U.S. naval shipbuilders to foreign shipbuilders. Next, we will discuss actions our Navy, industry partners, and state and local governments have taken to invest in the shipbuilding industry and provide worker training programs. We will then provide some points of comparison, discussing how foreign shipyards differ from U.S. shipyards and how military ships differ from commercial ships. Finally, we will conclude with recommendations on how Congress can assist the Navy and the shipbuilding industry to lower the costs of naval ships and submarines.

EXECUTIVE SUMMARY

Together with our industry partners, naval shipbuilding has demonstrated marked improvements in productivity during a sustained period of low rate production. However, we still face significant challenges as we design and construct the Navy of the future. As we construct the force of the future, we are mindful of the Navy's 313 Shipbuilding Plan and we are striving to maintain stability within our shipbuilding industrial base.

1. INDUSTRIAL BASE OVERVIEW

Our nation's shipbuilding industrial base has experienced a 40 percent reduction in workload since the end of the Cold War and our industry has adjusted their workforce to meet the Navy's shipbuilding requirements. Both industry and the Navy are concerned with fluctuations in the shipbuilding workload. We need a stable shipbuilding program to ensure minimum sustaining employment levels and retention of critical skills. This is essential if we are to retain a viable U.S. shipbuilding industrial base to meet the Navy's requirements for an affordable and capable force structure.

The near-term construction workload is reflected in the FY2007 President's Budget. In FY2007, the budget requests funding for seven new construction ships: (1) SSN774, (2) DD(X), (1) TAKE, (1) LHA6, and (2) LCS ships. A total of 51 ships are requested across the Future Years Defense Plan (FYDP), averaging 10 ships per year from FY2007-2011. This shipbuilding plan provides for the 313 ship Navy and stability for our industry partners.

The Navy closely monitors the overall and individual sector industrial bases. Status of the shipbuilding industrial base, by sector is as follows:

Surface Combatant Industrial Base:

DD(X) is critical to the continued sustainment of the surface combatant industrial base, at General Dynamics at Bath Iron Works (BIW) and Northrop Grumman Ship Systems (NGSS). BIW's workforce will decrease as the eight DDG51s currently under construction are completed. Workforce reductions, loss of learning, loss of skills, and higher unit costs are of concern as BIW transitions from the end of the DDG51 construction to production of DD(X). NGSS operations were severely impacted by Hurricane Katrina in August 2005. The Pascagoula, Gulfport, and Avondale facilities sustained damage and the workforce has been displaced. An intensive effort to retain and hire skilled tradesmen is underway, and delivery dates will be extended for ships under construction. Rebuilding and rehiring will continue through 2006.

Second Tier Shipbuilding Industrial Base:

The smaller end surface combatant industrial base is robust. The Department of Defense (DoD) plans to offer the second tier of the shipbuilding industry a number of competitive opportunities in the future. There are currently two contracts for Littoral Combat Ships (LCS) with three shipyards producing or poised to produce LCS Flight 0 ships. The Joint High Speed Vessel Program (JHSV) will meet the warfighting requirements from the Army, Marine Corps and the Navy. Five ships (Army and Navy buy) are currently planned in the FYDP, and a greater number is under consideration at this time. Other second tier shipbuilding opportunities exist in the Foreign Military Sales market. The Littoral Combat Ship is being assessed by a number of

allied nations, as are a number of Foreign Military Sales cases with nations to provide patrol vessels, patrol craft, and very small craft.

Aircraft Carrier Industrial Base:
Work is in place to execute the CVN 21 Program of Record. Northrop Grumman Newport News (NGNN) is the sole provider of new construction nuclear powered aircraft carriers. NGNN also performs complex refueling overhauls on NIMITZ Class carriers and builds nuclear powered submarines. Production workload at NGNN will be decreasing slightly in the 2006/2008 timeframe, followed by the need to quickly ramp up for CVN 21 construction. Engineering workload is stable through the end of 2008. The production workforce may have to ramp up starting in 2008, hiring inexperienced labor, which will require more training and supervision. Impacts to the vendor base from the CVN21 delay were mitigated by funding fixed price vendor agreements for critical components.

Nuclear Submarine Industrial Base:
The nuclear submarine industrial base is sustainable, but the continued build rate of one submarine per year has forced many vendors to exit this specialized business. Costs are high for this low rate production, but can be reduced. The most effective way to lower the per-hull cost of the VIRGINIA Class (> $150M/hull) is to get to a more efficient build rate, in order to distribute overhead costs and increase learning efficiencies. The combination of a long ship construction cycle and a shipbuilding rate of one submarine delivered every 2 years at the respective shipbuilders provides a challenge to the shipyards to ensure the continued training and retention of specialized workers. The teamed-production of VIRGINIA, as directed by Congress, maintains submarine construction skills at two shipyards but at a cost. Further per-hull cost reduction is possible through reallocation of work between the shipbuilders. We believe that cost reductions of $25M to $80M per hull are possible if the teaming arrangement is more efficiently executed. The Chief of Naval Operations has challenged the team to reduce the cost per SSN to $2.0B (FY2005$) so that the Navy can increase the build rate affordably.

Submarine Design Engineering Force:
The Navy is especially concerned with the submarine design industrial base. The surface ship design industrial base is relatively stable with DD(X), CVN21, MPF(F), and other design work. However, under the plan of record, submarine critical engineering and designer skill areas will begin to atrophy in 2006. An independent study by the RAND Corporation is underway to investigate the minimum core requirement and to inform the Navy on the cost, benefits, and risks of different options for sustaining nuclear submarine design capabilities. A near-term partial solution to avoid losing these critical skills is to develop technology and to conduct system redesigns as part of cost reduction efforts for the VIRGINIA Class. This effort can ensure that some portions of the submarine design industrial base are maintained until approximately 2012. However, this will not sustain the full-spectrum submarine design and integration skills that are essential for eventual new designs. Upon completion of the RAND study, the Navy will evaluate options for preserving the submarine design industrial base.

Amphibious Ship Industrial Base:
The Navy's amphibious industrial base rests with NGSS. The Navy will meet its near-term requirements with construction of LPD 17 and LHA(R) within the FYDP. The next major

recapitalization will be the replacement of four retiring LHDs and 12 LSDs during the post-FY 2020 period. Additionally, the Navy intends to procure one Maritime Prepositioning Force (Future) (MPF(F)) squadron in this plan. Some of the MPF(F) squadron includes amphibious ships. These ships should provide additional stability in the amphibious industrial base.

Auxiliary Ship Industrial Base

This sector of the industrial base is robust and provides an opportunity for the Navy to compete. At present, General Dynamics NASSCO is producing the TAKE vessels for our Combat Logistics Force. As noted earlier, the Navy intends to procure one MPF(F) squadron. Included in the family of ships are auxiliary vessels including TAKEs, Large Medium Speed Roll-on/Roll-off (LMSRs) ships, and Mobile Landing Platforms (MLPs). Competitive opportunities exist for MLPs and possibly LMSRs.

2. COST OF WARSHIPS

The cost of warships has trended upward in the past decade. Most Navy shipbuilding programs have experienced this pattern of cost growth, including LPD 17, T-AKE, DD(X), LCS, VIRGINIA Class and CVN 77. A combination of factors contributes to this trend: dramatic expansion of warfighting capability on each warship, new technologies, new warship designs, production complexity, market influences on labor and material, increased overhead burdens on a smaller production base, inflation and acquisition inefficiencies all contribute to shipbuilding cost growth. We will examine some of these cost drivers.

Procurement Cost Drivers

The relationship between weight and cost can be deceiving, and it varies by ship type. For warships, steel hull structures may account for 50 percent of the ship's weight, but only 10 percent of the cost. The cost of steel and hull fabrication man-hours per ton is low compared to the relative cost of complex propulsion and weapon systems. By example, weapon systems can range from 20 percent (auxiliary ships) to 50 percent (combatants) of the total ship cost. While Propulsion systems represent only 5-10 percent of the ships' weight, they represent one third of a nuclear-powered ship's total cost, for example.

Therefore, an analysis of ship cost must include complexity, ship density, degree of warfare system integration, and propulsion plant configuration in addition to the labor and material costs.

Labor Costs

The cost of shipbuilding labor continues to outpace general nationwide inflation by 50 percent in the post-Cold War construction period. Labor costs have increased 20 percent between 1999 and 2005 at the major shipyards because shipbuilding labor demand, general cost of living, health care, workmen's compensation and pension costs are all contributing factors. Given the projected competition for skilled labor on the Gulf Coast due to Katrina reconstruction efforts and overall nationwide upward trends in the cost of benefits, this upward movement is expected to continue.

The ability of the shipbuilders to cover overhead costs is problematic. US shipbuilding has declined nearly 40 percent from 1992-2002. This reduced quantity of work at our major

shipyards has resulted in a reduction in direct labor workload over which overhead costs must be spread. While the shipyards have been actively engaged in reducing overhead costs, the reduced labor base inevitably results in increased overhead rates, and contributes to the overall increase in burdened labor costs.

Material Costs

The global steel market has exploded in the past two years. In 2004, prices for steel and raw metals spiked dramatically due to increased worldwide demand. Overall, this steel cost increase has been as much as 40 percent in the last two years. However, this dramatic increase in the cost of steel has only resulted in a 2 percent increase in the total ship cost, demonstrating that the total ship cost is not very sensitive to steel price changes. Independent economic forecasting services predict that steel prices are expected to stabilize in the near future. Additionally, unique component costs for ships have escalated by an average of about 8-9 percent per year for the past eight years. As much as 80 percent of ship components are now produced by sole-source vendors.

Density and Complexity Cost Drivers

It has been shown that denser ships (i.e. higher weight per given volume) are more complex and costlier to design and build. Increased ship density leads to an increase in design, production and engineering hours, thus driving cost upwards. Today's Navy warships reflect this increased density and cost. Surface combatants are typically twice as dense as amphibious ships, and are shown to require twice as many production hours per long ton of weight.

Opportunities for Material/Labor Savings

Over the FYDP (FY2007-2011), approximately two-thirds of the SCN budget is material costs while the remaining one-third is shipbuilder labor and overhead. Focusing on material, there are extraordinary opportunities that exist to increase competition to drive down costs in the near term. Current material sourcing among the two parent shipbuilding corporations (Northrop Grumman and General Dynamics) could be improved to coordinate leveraged material buys within the six shipyards that they own. Economic order quantity savings on material purchases could be realized by inducing regional and multi-product material buys within individual shipyards, within corporations, and across the two parent corporations.

Combat/Weapon System Cost Trends and Mitigation Strategy

Combat and weapons systems related costs are the single largest cost driver in shipbuilding, even if costs of the weapons themselves are excluded. Weapons systems are approximately 40 percent of the total cost of naval warships in the FYDP. Software development; systems engineering, integration, and test; sensors, such as radars; and weapons systems are the major elements of this cost.

In order to reduce weapons systems costs, the Navy is pursuing the fielding of open, modular, and extensible systems. This strategy enables the Rapid Capability Insertion Process (RCIP) and the integration of new technology without costly software changes, helps manage Commercial Off-The-Shelf (COTS) obsolescence, and encourages commonality and reuse. The Open Architecture approach to development allows new business models, reduces manning and

training, test and evaluation efforts, combat system certification efforts, and operating and support infrastructure.

An opportunity for savings is combat systems baseline consolidation. The Navy has 11 combat system baselines in the fleet reflecting the Aegis Combat System, Advanced Combat Direction System (ACDS), and Surface Ship Defense System (SSDS). By 2010, the number of combat systems baselines will increase to 16, reflecting the introduction of AEGIS, SSDS, and LCS Open Architecture Common Environment (OACE) baselines to the fleet while legacy baselines are still employed. Following the submarine example with ARCI/APB, the Navy is examining a modular architecture that will facilitate commonality and reuse in order to keep combat systems current while at the same time dramatically reducing the number of baselines. Ultimately, the Navy's goal beyond the FYDP is to have two combat systems, one for combatants and one for support ships. This will result in optimized cross-class/ platform systems instead of class specific requirements.

This vision will require time and investment dollars to develop, implement, and integrate the new technologies for new platforms, and to ensure interoperability on legacy platforms and systems. The reduced number of unique systems will result in common specifications and modular integrated ship and system designs. This can lead to procurement strategies that will ultimately reduce risk and life cycle cost. The desired effect is a greater number of vendors able to design and build the common modules resulting in increased competition.

Propulsion System Costs

The Navy recognizes the value of reducing material costs by placing a strong emphasis on commonality in ship parts, contracting methods, and architectures to increase economic order quantity savings. With respect to propulsion systems, there are currently eight propulsion systems used by the Fleet. A recent study has shown that it is feasible in the future (well beyond the FYDP) to reduce this quantity to three standard types of machinery with little effect on overall ship performance. To accomplish this requires a national commitment over several decades as we recapitalize our current fleet.

3. CONGRESSIONALLY-DIRECTED BENCHMARKING STUDY

The Navy has reviewed the results of the OSD-sponsored benchmarking study that was conducted by FMI. Of note, this study used a 1999 Navy/ National Shipbuilding Research Program (NSRP) sponsored benchmark study as a point of reference. The study generally reveals good news about the US industry. The report indicates that over the past five years, there has been a significant increase in performance activity and substantial financial investments in facilities, plant, and equipment. It also notes that the Federal Government and some State Governments have provided assistance to improve performance over this period of time. FMI has presented its results to Navy program managers and they have been discussing the results with their industry counterparts to determine how industry intends to use the study results.

The study notes a high "customer" cost factor for US Navy work when compared to commercial and foreign naval customers. The Navy is reviewing foreign navy acquisitions to better

understand the differences in approach, technical scope and the business environments to see where improvements might be possible for future US Navy acquisition programs.

The investment needs of U.S. and overseas shipbuilders differ. According to the report, the top areas U.S. yards need more investment are, in order:

- Design for production
- Production engineering
- Steelwork scheduling
- Outfit scheduling
- Pre-erection planning
- Master planning
- Dimensional accuracy and QC
- Ship design

It is interesting to note the technology development priorities of Japanese shipbuilders, as reported in a 2002 survey of Japanese shipbuilding managers, were, in order:

- Production technology and shortening the construction period (this dominated need is focused on steel production)
- Information systems for design and production
- Hull form and creation of higher customer value
- Energy saving and manpower reduction in shipyard production

Both surveys identified the need for process improvement up front, more than improved facilities.

4. HOW DOES THE NAVY INVEST IN SHIPYARDS?

Government investment in our military shipyards is more comprehensive than some may realize. For example, many state governments provide tax relief to industry in support of minimum sustaining employment levels. Louisiana, Mississippi and Virginia have provided Northrop Grumman shipyards nearly $250 million of capital improvement and training support in the last decade alone. Congress and the Navy have directed over $100 million of funds to the National Shipbuilding Research Program (NSRP) and manufacturing technology (MANTECH) over the same period. In the past three years, Navy and industry have agreed to specific recapitalization contract incentives on VIRGINIA class submarines and the CVN 21 exceeding $130 million. Industry is also investing in their shipyards. Since 1995, the nation's shipyards have averaged over $300 million per year in recapitalization. Finally, since the late 1970s, the cost of providing capital for facility investments has been an allowable cost on government contracts that are not firm fixed price, so shipyards should be reinvesting in facilities. This "Cost of Money" is imputed based on the contractor's net book value of assets multiplied by the prevailing Treasury interest rate.

NSRP / MANTECH

NSRP was created in 1971 by the Maritime Administration (MARAD), under the Merchant Marine Act of 1970. The program transferred to Defense Advanced Research Projects Agency (DARPA) and then the Navy. For the past seven years, annual Navy funding has been the

catalyst, while NSRP organizational constructs have provided the legal safeguards that enable shipyards to collaborate extensively across corporate boundaries. Today, NRSP is a collaboration of 11 major U.S. shipyards. Industry investment through cost share has exceeded Navy funding because large teams share in the initial costs of joint evaluation and experimentation. Each yard has paid the more substantial costs of implementation and capital investment after the risk is reduced. Additionally, projects that would have been carried out by individual yards at a much slower pace and in isolation have been accelerated by the multi-yard effort. In recent years primary investment emphasis has been focused on VIRGINIA Class, DD(X), CVN21 and LCS programs, however, resulting technologies are shared across and beyond these product lines. The Navy MANTECH program provides a mechanism for the development of enabling manufacturing technology, in the form of new equipment and processes, and its implementation on DoD weapon system production lines. MANTECH projects leverage the core competencies of Centers of Excellence (COE's) located throughout the country teamed with industry partners. MANTECH investment levels have ranged between $60 million and $75 million in recent years.

Title XI

Many shipyards have taken advantage of favorable lending rates under the MARAD administered Title XI loan guarantee program. This has facilitated private investment in facility upgrades that benefit both commercial and Navy work. Shipyards that have received benefit from the program that are currently engaged in Navy work include NASSCO and Avondale.

5. FOREIGN VS US SHIPBUILDING

A comparison of U.S. vs. foreign shipbuilding must begin with ownership. The United States' six major shipyards are owned by two defense contractors, Northrop Grumman and General Dynamics. The United Kingdom's military shipyards are owned by BAE Systems.
In South Korea and Japan, naval shipbuilding is done by firms whose shipbuilding viability depends on profitability in international commercial markets. And in China, the shipbuilding industry is state owned.

Navy Work vs. Mixed Navy and Commercial Work

There are several advantages to a navy being just one customer among many. If a shipbuilder can spread fixed costs (including overhead and labor) over a larger base, then everyone's cost is lower. This applies to many operational areas. In particular, high-tempo commercial shipbuilding can support capital-intensive production technologies that would be marginally viable (possibly even infeasible) if they were applied exclusively to low-rate naval construction. However, several recent benchmarks reveal that the cost of naval ships in foreign nations is approximately the same as U.S. warships with the same capability.

For example, Mitsui builds both naval combatants and commercial ships in its Tamano shipyard in Japan, using mostly the same plant and equipment for both product lines. The two product lines share basic construction, but diverge after ship erection. One inclined ways is used for commercial outfitting, another ways for naval outfitting. The commercial ships built at Mitsui are standard series bulk carriers. Tamano is scheduled to deliver 15 bulk carriers during 2006. This product line is steel fabrication intensive. This supports high investment in steel production automation, which is then also used for naval work. A second example is the Hyundai Heavy

Industries Ulsan yard in Korea. Hyundai has a separate area for naval shipbuilding, but blocks and modules for both naval and commercial ships are built in the main area of the yard. As a result, Hyundai can take advantage of steel production facilities investments whose business cases were justified by high-volume commercial work.

A further advantage of having a dual product line is elimination of a need to extend naval ship build schedules to fill in 'valleys' in shipyard capacity utilization. In fact, the motivation is to prevent a naval order from acting as a bottleneck.

In the absence of significant commercial orders, most U.S. defense contractor shipyards have few means of increasing the number of ships they can build. Therefore, the Asian approach to fixed costs and overhead, based on economies of scale, is not a realistic option for recapitalization.

Differences in subsidy structure

Every major shipbuilding nation applies either direct or indirect (or both) subsidies to their shipbuilding industries. A direct subsidy is a monetary grant given by a government to lower the price faced by producers (or consumers) of a good. Indirect subsidies are alternative mechanisms instituted for the same purpose. Such mechanisms include soft loans, debt guarantees, tax shelters, provision of equity capital, and others. The argument has been made that some additional types of government policies and actions such as research and development sponsorship, over-cost government contracts, failure to regulate externalities, and others are forms of indirect subsidies to producers.

European commercial shipbuilders have received direct construction subsidies for years. European governments have also supported domestic industries through numerous indirect subsidies, such as by providing equity capital to shipbuilding firms. For example, Italy's principal shipbuilder, Fincantieri, is state-owned and the French government owns 21 percent of Alstom, the parent company of France's premier shipbuilder, Chantiers de l'Atlantique. The trend in Europe is now to divest government ownership of shipbuilding. The results of divestment will dictate how competitive these supported yards remain.

Most Chinese shipyards are part of the state economy. In the late 1990s the Chinese government split the state-owned industry into two segments, the China State Shipbuilding Corporation (CSSC) and the China Shipbuilding Industry Corporation (CSIC). China is pushing its shipbuilders to achieve international commercial market penetration. As far as we know, these remain state-owned enterprises, and their capital structures are subsidized.

Japanese shipbuilders are owned by either listed corporations or are closely held. They are thought not to be directly subsidized but were supported by a complex, government-run cartel system during the depressed years following the mid-1970s shipbuilding market crash.

The Korean shipbuilding industry was established under government 'infant industry' support. In the early 2000s, the European Commission lodged an official complaint contending that Korean shipbuilders were provided with various indirect subsidies.

Foreign shipbuilders argue that the U.S. shipbuilding industry is subsidized via (for example) the Jones Act, which requires ships engaged in domestic trades (such as carrying oil from Alaska to California) to be built in U.S. shipyards. There are other U.S. and state government programs that support the industry. Some foreigners consider DoD contracts to be a form of indirect subsidy. Construction differential subsidies for foreign trading vessels built in the U.S. have not been paid since the 1980s.

Cost of labor, sources of labor, and outsourcing

Shipyard labor accounts for 25-35 percent of the cost of a typical commercial product in a competitive foreign yard. This is about the same proportion as in automobile manufacturing and other heavy manufacturing industries. In Japan, workers are paid more per man-hour but maintain competitiveness by expending fewer man-hours. Productivity is continuously increased by capital investment in labor saving mechanization, by efficient organization of work, and by very low workforce turnover.

In Asia and Europe it is difficult to 'hire & fire' by the contract. In Asia, the universal solution is to maintain a core group of permanent company employees and fill out the labor force with sub-contractor labor, which typically ranges from 30 percent to 60 percent of the in-yard workforce and fluctuates with workload.

Sources of labor are a growing concern in developed countries such as Japan, South Korea, and Germany. This includes not only production workers but also design staff. Fewer young people are interested in pursuing shipbuilding as a career. Shipyard staffs are aging and some schools, such as the prestigious University of Tokyo, no longer have naval architecture departments.

Outsourcing strategies vary widely. Strategic outsourcing is done in order to completely off-load a function. For example, the Aker Philadelphia shipyard has no steel blast and prime shop; that capability has been completely outsourced. Enthusiastic adoption of this strategy is often seen in Europe and it has been termed the European model. In contrast, several Asian shipbuilders are one sector of large diversified industrial corporations. These corporations generally (but not universally) tend to keep more functions in-house. Hyundai Heavy Industries is perhaps the most vertically integrated. On-site at Hyundai Ulsan shipyard, all standard shipyard functions are done, but Hyundai also builds main engines, casts propellers, and performs model testing.

Competitiveness in international commercial shipbuilding

Japanese competitiveness is based on keeping productivity increases ahead of wage increases. Common themes in Japanese productivity improvement are:

- Reduction in the number of workers
- Schedule compliance and schedule-driven process improvement
- Faster design-build time
- Improved accuracy control
- More use of automation
- Computer-integrated manufacturing
- Operations management
- Reduced material cost

Taking Compensated Gross Tonnage (CGT) per person as an approximation, Japanese productivity rose by around 7 percent annually from 1980 to 1998, and the trend has been accelerating lately.

Commercial vs. Military shipbuilding

Unlike the aerospace and most other defense industries where separate production lines are established for military customers, ship construction facilities can be effectively operated as "dual use" for military and commercial customers. However, the design and construction of naval combatants and commercial ships differs in enough key respects that one could argue they are separate industries.

- Where naval shipbuilding projects binary build rates of "0" or "1" per year, major commercial shipyards are in a high-volume business of 15-70 large ships per year.
- The product density of naval ship designs skews the design/build emphasis in naval shipbuilding towards outfitting. Commercial shipbuilders typically emphasize rapid steel production throughput as their first-order concern. By example, several Asian shipyards individually process a million tons of steel annually, roughly the equivalence of twenty aircraft carriers per year.
- This emphasis on steel throughout also affects facility investment strategies, by example, the use of automated thermal forming of steel shell plates in Asia, and laser welding in Germany.
- Unlike naval ships, prices of commercial ships are set by supply and demand, which can fluctuate significantly. The recent huge bull market in shipbuilding has prompted Asian shipbuilders to find innovative ways to quickly ramp up production to meet the demand.
- The bulk of commercial ships are very inexpensive compared to naval designs. Advertised prices for tankers vary from $59 million to $200 million. Even so, demand for increased amenities has forced the most expensive cruise ships over $1 billion.

6. DESIRED EFFECTS

The Navy's investment in our shipbuilders demonstrates our commitment to drive down the costs of our military warships. We can drive down costs by streamlining oversight, reviewing technical requirements, and designing to threshold, as opposed to desired objective. However, we can do more. The following discussion outlines opportunities for improvement. We are also actively challenging barriers in regulatory practice and statute that impede our ability to achieve greater economies on our military warships.

Remove Obstacles to improve efficiency: Competition

The cultivation of long-term relationships between shipbuilders, or any other contractor, and preferred providers is not encouraged by regulation. The universal promotion of competitive procedures is flowed down to shipbuilder suppliers and vendors through the review and approval of contractors' purchasing systems Federal Acquisition Regulation 44.3 (FAR 44.3). In evaluating the efficiency and effectiveness with which the contractor spends Government funds, auditors are directed to give special attention to the degree of competition obtained by the contractor. (FAR 44.303(a)). In today's niche market with many sole source suppliers and little commercial application, the policy is now counterproductive.

The primary regulatory obstacle to implementing changes in shipbuilding acquisition lie in the Competition in Contracting Act (CICA) of 1984, 10 USC 2301 et. seq., which is implemented in Part 6 of the FAR. CICA requires DoD to obtain its goods and services by full and open competition through the use of competitive procedures except in limited situations. This obstacle is not insurmountable. The public interest exception (FAR 6.307) could be used to justify non-competitive allocation of work to develop long-term customer relations and multi contract cost efficiencies. However, this exception requires a written determination from the Secretary of the Navy, and is rarely used.

Improvement is needed. We will be examining options for an additional exception, or broadening the circumstances under which procurement without competition may be permitted under the industrial mobilization exception (FAR 6.303.). This may offer an opportunity in low production scenarios to gain further economies of scale.

Teaming and Flow down across contracts

The FAR specifically recognizes that Contractor teaming arrangements may be desirable under certain circumstances. Therefore, it does not prohibit shipbuilder alliances, partnering, or consortia, which are entered into before or after the submission of an offer, given they do not violate antitrust statutes, arrangements that would limit the Government's right to consent to subcontracts, or arrangements that would limit the Government's right to pursue its policies on competitive contracting, subcontracting, and component breakout (FAR 9.604).

While the FAR requires price or cost to the Government to be evaluated in every source selection, it neither requires cost to be the most heavily weighted evaluation factor or the only factor. Therefore, the Government could, like its private sector counterparts, consider other factors, such as reliability, in selecting either a shipbuilder or a non-shipbuilding source as its prime contractor. Likewise, the selected prime contractor can consider factors other than cost, in selecting suppliers and vendors. However, given the emphasis on the use of competitive procedures, the shipbuilder can't simply allocate work to subcontractors with the best ability to perform it without the creation of some technical/cost tradeoff justification for the record.

Make corporations behave corporately

We are encouraging our two shipbuilding corporations to behave as a single entity rather than as six separate shipbuilding entities. In addition, we are considering options to economize the purchase of components across ship classes, which could be done in multiple ways. Currently, the funds to purchase ships are line item appropriated. This means that only funds for that ship may be used to purchase parts for that ship. Parts purchases across multiple ships could be used to generate quantity discounts. The Navy and Congress would need to address control over the line item appropriations process and the visibility into costs to achieve these potential savings.

Mechanisms to deal across contracts

Navy new construction shipbuilding contracts are largely allocated to six shipyards owned by two corporations. With more than two-dozen new construction ships under contract possessing thousands of procurement actions, significant potential exists to reduce material procurement costs within each corporation's three shipyards, within each corporation and across the government/industry partnership. Little statutory or regulatory impediments exist to achieving

these potential cost savings. By example, the Truth in Negotiations Act, implemented by FAR 15.4, would not prevent the bulk purchase or cross corporation purchase of parts. The use of bulk or cross-corporate purchasing procedures would not prevent the corporations from complying with the requirement to certify prices as accurate, current, and complete in non-competitive procurements. The statute and regulations may have to be amended to permit the timing of that certification to be some date other than the time of agreement on ship price.

The challenge is cultural, as both the Navy and industry share a legacy of inefficient procurement practices. Common specification and common parts catalogues, long championed by NSRP, must be leveraged for use in the earliest stages of ship design. Though the greatest opportunities for invoking standard specification are in future Navy ship designs, more near term economies are achievable through the implementation of common ordering systems across shipyards. Contracting methods currently exist to group material orders across contract types, though in many cases it is the Navy and industry's specification for uncommon parts that impedes the greatest economies.

Altered Acquisition Strategies

The context of the 313 ship Navy provides a foundation for development of acquisition strategies that are tuned to cost savings and stable industrial base. These include:

- Multi-year procurement
- Block-buy
- Split funding for CVNs and large deck amphibious ships (procured every 3 to 4 years) to spread cost over 2 fiscal years
- Specific contract incentives to promote recapitalization and modernization
- Fixed-price contracting

Altered Acquisition Management Process

Management of shipbuilding cost growth continues to be a priority within the Department of the Navy. The Navy has undertaken several important initiatives to mitigate future cost growth. These include:

- Budgeting to the independent cost estimate;
- Using realistic inflation assumptions and projections;
- Increasing use of risk analysis; and
- Increasing use of contract incentives

The Navy continues to take steps to manage cost growth on existing shipbuilding programs based on individual program circumstances. These steps include:

- Implementing requirements-to-cost tradeoffs and contract scope reductions;
- Implementing initiatives with industry including joint Change Management Boards, Lean Six Sigma programs, and Integrated Product Teams; and
- Using contract incentives such as steep share lines combined with performance incentives, multi-year procurements, and use of fixed price type contracts

Facilitation of Stable Shipbuilding Programs

The Navy is committed to providing stability in future shipbuilding plans, programs, and budget. While industry may not always know what work they will be awarded, they should have a reasonable expectation of what work will be available for competition. The Navy will continue

to enter into contracts that encourage and incentivize industry to make the capital improvements required to reach world-class status. Lastly, the Navy will transition programs away from cost plus type contracts to fixed price contracts as early in a program as practical. A fixed price environment provides industry the best incentive for cost reducing improvements.

7. CONCLUSION

The fundamental basics of reducing warship cost begin with a stable build program. The Navy's 313 ship goal provides this basis. Building on this foundation, the Navy can stabilize the industrial base by:

- Encouraging modernization through steady workload and a variety of contract incentives
- Acquisition strategies that enhance cost reduction such as multi-year procurement, block-buy, and teaming for flexibility
- Providing due consideration to findings of the benchmarking study

The shipbuilders should:

- Benchmark off of the best of European, U.S. and Asian shipbuilding practices and adopt the best strategies to increase efficiency
- Buy common components wherever possible

The Congress can help with:

- Providing Multi-year procurement authority
- Stable funding
- Consideration of how to best introduce commercial work at U.S. shipbuilders in an extraordinarily competitive marketplace

We appreciate the opportunity to appear before the subcommittee and stand ready to answer any questions the members of the subcommittee may have.