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Supporting the 355-Ship Navy with Focus on Submarine Industrial Base

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Chairman Wicker, Ranking Member Hirono, members of the Seapower Subcommittee, thank you for your invitation to testify today and for the committee's long history of support for United States Navy shipbuilding.

Following a brief introduction of the General Dynamics Marine Systems shipyards, this testimony will address the issues requested in your invitation letter, specifically, the ability of our shipyards to support increased shipbuilding demand with a focus on the Submarine Industrial Base. The Submarine Industrial Base has unique challenges which will be discussed in detail.

Introduction to General Dynamics Marine Systems Shipyards

The General Dynamics Marine Systems business segment includes three major business units: Bath Iron Works, Electric Boat, and NASSCO. Bath Iron Works operates one full-service shipyard in Bath, Maine, plus several fabrication and engineering facilities in the surrounding area. Electric Boat operates a full-service shipyard in Groton, Connecticut, a submarine module fabrication facility in North Kingstown, Rhode Island, and an engineering and design facility in New London, Connecticut. Electric Boat also has employees located in Honolulu, Hawaii; Washington, DC; and the submarine homeports in Kings Bay, Georgia; Pearl Harbor, Hawaii; Portsmouth, Maine; Bangor, Washington; Bremerton, Washington; and Norfolk, Virginia. NASSCO operates one full-service shipyard in San Diego, California, and four repair shipyards in Norfolk, Virginia; Portsmouth, Virginia; Mayport, Florida; and Bremerton, Washington. Combined, these shipyards employ more than 25,000 people. The group designs, builds, repairs and supports submarines, surface combatants, auxiliary ships for the United States Navy, and commercial ships for the U.S. Jones-Act commercial market.

Bath Iron Works

Bath Iron Works (BIW), located on the Kennebec River in Bath, Maine, since 1884, delivered its first ship to the United States Navy in 1893. Since then, BIW has delivered 256 military ships. BIW is the lead designer for both classes of U.S. Navy destroyers that are currently in production – the DDG 51 and the DDG 1000 Class destroyers. BIW's Planning Yard activities sustain 77 percent of the Navy's active surface combatant fleet, offering a full range of surface combatant engineering, design, production support, and lifecycle support services. BIW is Maine's largest single-site private employer with over 5,800 highly skilled engineers, designers, and shipbuilders who, on average, have over 17 years of ship design and construction experience.

Electric Boat

Electric Boat, headquartered in Groton, Connecticut, has been designing, building, and repairing submarines for the U.S. Navy since 1899. Starting with the first nuclear submarine,

the USS NAUTILUS, Electric Boat has designed and built the lead ship for 17 of the 20 U.S. nuclear submarine classes, and has delivered a total of 103 nuclear submarines to the U.S. Navy from the Groton shipyard. Electric Boat employs 15,200 engineers, designers, and tradespeople focused on the design, construction, repair and lifecycle support of nuclear submarines. Electric Boat is currently building Virginia-class submarines and designing the lead ship of the Columbia Program, the next SSBN.

NASSCO

NASSCO's primary facility, located in San Diego, California, has designed, built and delivered 134 new ocean-going vessels (Navy and commercial) over the last 57 years. This facility is the only remaining private, full-service shipyard on the West Coast designing, building, and repairing large vessels for the U.S. Navy and commercial Jones-Act customers. NASSCO is the largest industrial manufacturer in San Diego, employing 3,100 engineers, designers, and skilled shipbuilding craftspeople, plus 300 long-term, on-site subcontractor partners supporting the shipyard. NASSCO is currently building expeditionary sea bases and cargo ships for commercial customers. NASSCO also has a presence in four Navy homeports where its 700 employees and 300 subcontractor partners conduct surface ship repair for the U.S. Navy.

Introduction

General Dynamics Marine Systems supports the efforts of the Administration and the Congress to build a larger fleet for the U.S. Navy. It is our belief that the Nation's shipbuilding industrial base can scale-up hot production lines for existing ships and mobilize additional resources to accomplish the significant challenge of achieving the 355-ship Navy as quickly as possible.

This testimony will discuss what the General Dynamics shipyards must do to support the current U.S. Navy 30-year Shipbuilding Plan and what additional effort is required if more ships and submarines were to be authorized by the Congress to achieve the new fleet levels identified in the December 2016 U.S. Navy Force Structure Assessment. General Dynamics cannot speak for Newport News Shipbuilding on this subject except to note where both companies have been working closely together on an Integrated Enterprise Plan focused on co-production of both Virginia and Columbia Class submarines and carriers where appropriate (e.g., common suppliers etc.) and associated impacts to facility plans, trade resource plans, and supply base.

The Nuclear Submarine Industrial Base, which includes Electric Boat, Newport News Shipbuilding, and over 5,000 highly specialized suppliers in all 50 states, provides material and components for these national assets. Supporting a plan to achieve a 355-ship Navy will be the most challenging for the nuclear submarine enterprise. Much of the shipyard and

industrial base capacity was eliminated following the steep drop-off in submarine production that occurred with the cancellation of the Seawolf Program in 1992. The entire submarine industrial base at all levels of the supply chain will likely need to recapitalize some portion of its facilities, workforce, and supply chain just to support the current plan to build the Columbia Class SSBN program, while concurrently building Virginia Class SSNs. Additional SSN procurement will require industry to expand its plans and associated investment beyond the level today. After discussing the Submarine Industrial Base, this testimony will conclude with a brief review of the capability of our two surface ship construction shipyards, Bath Iron Works in Bath, Maine and NASSCO in San Diego, California, to support new prospective scenarios of increased shipbuilding demand, leveraging the work recently completed by the Congressional Budget Office (CBO).

Submarine Industrial Base

Historical Perspective

The production of a new class of SSBNs to support the Navy's strategic deterrent mission has occurred only twice before in our shipbuilding history. The "41 for Freedom" SSBNs were constructed by four shipyards over the 9-year period from 1957 to 1966. These submarines were replaced by 18 Ohio Class SSBNs, all built by Electric Boat over a 23-year period from 1974 to 1997. The lead ship USS Ohio (SSBN726) was delivered in 1981 and subsequent ships of that class joined the fleet at a rate of one ship-per-year in steady state continuous production. During this period of Ohio Class construction, Electric Boat also delivered 33 Los Angeles Class SSNs. The first EB delivery of a Los Angeles Class SSN was the USS Philadelphia (SSN690) in 1977 and the last was the USS Columbia (SSN771) in August 1995, an average rate of 1.7 SSN deliveries per year. The combined rate of submarine deliveries from Electric Boat was 2.7 submarines per year. During the same period, Newport News also delivered 29 Los Angeles class SSNs. The lead ship USS Los Angeles (SSN688) was delivered in 1976 and their last ship USS Cheyenne (SSN773) was delivered in 1996, with an average rate of 1.5 SSNs per year. The combined capability of the two nuclear submarine shipyards and the associated 17,000 suppliers delivered 4.2 submarines per year consisting of one SSBN and 3.2 SSNs per year.

Therefore, as you can see, the last time the industry built a class of SSBNs, we also delivered more than three SSNs per year. In fact, over the period from 1977 to 1996, our submarine enterprise delivered 65 SSNs and 17 SSBNs for about 770,000 tons of submarine displacement. However, the industry has been away from these levels of production for some time.

The most recent 20 years, from 1997 to 2016, has been a very different story. The follow-on SSN to the Los Angeles Class SSN was the Seawolf Program. Originally a 30-ship program,

it started construction in 1989, the year the Berlin Wall came down. That program was cancelled in January 1992 with the plan to only complete construction of the lead ship, USS Seawolf (SSN21). Funding for the second Seawolf submarine was restored by the Congress and construction began later that year in September. The program was later restored to three Seawolf Class SSNs by the Congress with $700M appropriated in November 1995 as a bridge to the follow-on Virginia Class SSN, which was to start construction in 1998 after a period of design development. The lack of stability on the Seawolf Program is one thing people still remember when they make investment decisions in new facilities and workforce development. The backlog in submarine work in 1989 was 32 (19 at EB and 13 at NNS), and by 1997, the backlog was three (all EB).

During the course of the 1990's, the submarine industrial base "rationalized" its facilities, skilled workforce, and unique supply base to survive in a period of very low rate submarine production. There were five years in the 1990's when no SSNs were authorized (FY92, FY93, FY94, FY95 and FY97). For example, Electric Boat had four final assembly positions dedicated to the Los Angeles Class construction program and two final assembly positions dedicated to the Ohio Class construction program. Upon completion of the Los Angeles class build program, the Los Angeles Class assembly positions were mothballed, reducing the Groton shipyard's final assembly capability to two positions. The skilled trade workforce at the Groton shipyard was reduced from over 12,000 at peak demand in the early 1980's to about 1,500 by the time Virginia Class started construction in 1998. Quonset Point peaked at 6,000 skilled workers and its workforce was reduced to less than 1,000 over the same period. Furthermore, the supply base started the 1990's with 9,000 suppliers (Cold War peak was 17,000) and was reduced to 3,000 suppliers by the end of that decade.

Electric Boat had several off-site fabrication and assembly locations (e.g., Charleston, SC at 400K sq.ft of facilities and Avenel, NJ at 400K sq.ft), as well as significant laydown and warehouse capacity in and around Groton, CT and at Quonset Point (which was 2.2M sq.ft of facilities during the previous peak). This expanded footprint and capacity available during the previous peak construction period was eliminated during the decline to low rate production. Similarly, NNS had offsite machining and fabrication facilities in Asheville, NC and Greeneville, TN, both of which were shuttered as shipbuilding demand declined. During this period of decreased build rate and low volume, work was moved from shipyard satellite facilities and the supply base back to the Shipbuilder to maintain critical skills as we adjusted to average build rates of ½ Virginia Class SSN per year at each shipyard (low point in year 1999).

The last 20 years from 1997 to 2016 marks a period of low rate production for the submarine enterprise, where 16 SSNs and one SSBN were delivered, for a total tonnage of 150,000 tons of combined submarine displacement. This represents a reduction of 80% from the prior 20-year period when we delivered 4.2 submarines per year.

Today's Submarine Enterprise Capability

The Virginia Class SSN started construction in 1998 and was initially procured at a rate of one SSN per year. The Shipbuilders implemented a co-production team agreement in 1997 to effectively share the production at ½ SSN per year with one SSN delivery from each shipyard every two years on an alternating basis. This approach was sufficient to maintain the requisite critical skills at both shipyards for nuclear submarine construction and delivery.

The Virginia Class SSN production rate doubled starting in 2011 and has continued at that rate ever since. The Submarine Industrial Base has facilitized over the last five years to support this step change in demand from one SSN per year to two SSNs per year. These submarines have been procured over the last 18 years under one block buy contract (i.e., Block I, four ships FY98-FY02), followed by three separate multi-year contracts (Blocks II, III, IV, 24 ships, FY03-FY18), which provided stability in the acquisition process and encouraged private investment across the entire submarine value chain. The successes in cost reduction and the dramatically reduced production cycle times that we achieved in this program would have been impossible without the committee's support for multi-year procurement.

We are currently under contract to build 15 Block III and IV Virginia Class submarines, and the President's FY18 budget is expected to request your authorization for the final two Block IV submarines in that multi-year procurement (i.e., FY14 to FY18). The Shipbuilders urge the Committee to continue its support of multi-year authority for this program in all subsequent blocks of Virginia Class.

Key facilities were added at both shipyards to support the increased production rate from one SSN per year to two SSNs per year. A CAPEX incentive feature in the Block III contract supported corporate capital investment required for two Virginia Class SSNs per year. A total of 27 projects between the two shipbuilders were completed for a total of $258M in capital investment, which supported all facility asset categories, including capital equipment, module construction facilities, transportation equipment, and final assembly, test and launch facilities. For example, Quonset Point added a $50M module fabrication facility in 2012, and in 2013, we added a $24M coatings facility with two specialized coatings cells as part of Electric Boat's overall capital investment plan.

Today, each shipyard has two submarine final assembly positions for a total of four positions at the enterprise level that are dedicated to deliver one Virginia Class SSN per year from each shipyard. The waterfront organizations at each shipyard have modules from five different Virginia Class SSNs in various states of final assembly and test. Virginia Class SSN delivery at one per year from each waterfront is just starting to be demonstrated. At Electric Boat, the delivery of the Colorado (SSN788) later this summer will demonstrate the shift in waterfront cadence from one SSN delivery every two years to one SSN delivery every year.

The facilitization that has occurred to date at both nuclear shipyards supports continuation of the Virginia Class construction program which is in steady state production at two submarines per year for the foreseeable future.

Supporting the Increased Demand Associated with the Navy's FY17 Shipbuilding Plan

The Navy's 30-year shipbuilding plan, issued in July 2016, is summarized in the figure below for the period that covers the Columbia authorization years. The submarine enterprise at all levels of the value chain has been working hard to develop facility and workforce development master plans and establish associated investment plans to support this plan of record.

FY2017 Navy Shipbuilding Plan (issued July 2016)

FY	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	Total
	VCS Block V (9)					*VCS Block VI (6)*					*VCS Block VII (5)*					*SSN(X)*		
SSN	1															1	1	3
SSN w/ VPM	1	2	1	2	2	1	2	1	1	1	1	1	1	1	1			19
Columbia SSBN			1			1		1	1	1	1	1	1	1	1	1	1	12
Total	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	34

We have been told by the Navy that we should be prepared to execute a plan that would add a second Virginia Class SSN with Virginia Payload Module (VPM) in FY21, so Block V is expected to be a 10-ship block rather than 9 ships. This would keep Virginia Class SSN procurement at two SSNs per year through FY23 with three submarine authorizations in FY21 (two VCS and one Columbia).

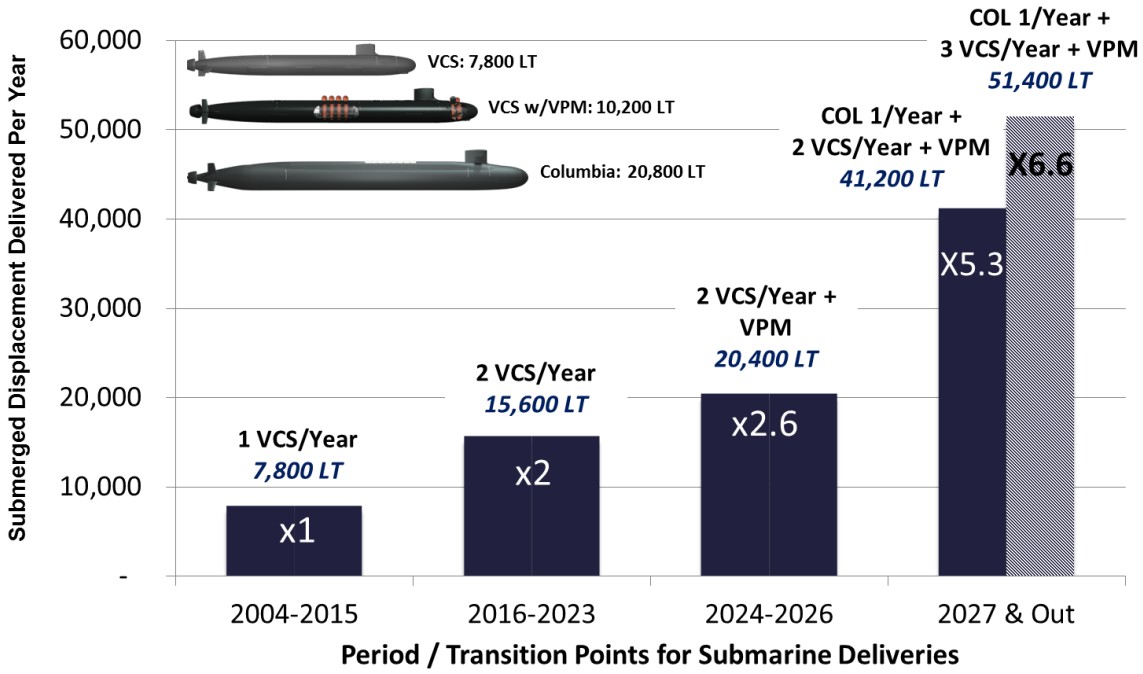
There are two major new demand drivers in this plan of record. The first is the Virginia Payload Module (VPM) which is an 84' hull section with four centerline large-diameter tubes that is inserted into the class design for additional payload capability. The VPM will provide additional payload capacity in each Virginia Class submarine to partially offset the loss in payload capacity from the four Ohio Class SSGNs that will begin to come out of service starting in 2026. This configuration of the Virginia Class SSN is planned for all subsequent Virginia Class SSNs starting in 2019 (ship two of that year). The VPM will increase the volume of work at the shipyards and in the supply base by about 28% based on displacement.

The second major demand driver is the Columbia Class SSBN construction program which is expected to be for 12 submarines and will reach steady state production starting with the

FY26 ship authorization. Each Columbia Class SSBN is more than double the displacement of a Virginia Class SSN. The Columbia construction program begins in FY21, two years after the Virginia Block V FY19 award.

The figure below illustrates the challenge in the submarine industrial base. Delivered nuclear submarine capability on an annual basis as measured by submerged displacement is plotted for different demand scenarios. As the chart illustrates, the major inflection points since the beginning of the Virginia Class SSN program are captured on the x-axis. The transition to two Virginia Class SSNs per year (doubling of demand) is occurring from 2016 to 2023. This is followed by a brief three-year period of increased demand at 28% for VPM. In the steady state, the annual demand jumps to double or triple, depending on the procurement rate of Virginia Class SSNs, either two Virginia Class SSNs per year or three, as noted in the figure below.

Growth in Submarine Tonnage Per Year – Delivered Submarine Capability



Over the next 20-year period that starts in 2017, the Submarine Industrial Base is expected to deliver 32 SSNs, 16 with the VPM configuration, and the first 8 Columbia Class SSBNs based on the Navy's FY17 30-year Navy Shipbuilding Plan. The increase in demand, just to support the Navy's FY17 Shipbuilding Plan of Record, is three times the level of the last 20 years that ended in 2016 (an increase of greater than 200%), with a projected 454,000 tons of delivered submarine displacement. In this plan of record scenario, Virginia Class procurement would drop to one SSN per year starting in 2026 when the Columbia is

expected to reach steady state production at one SSBN per year. At this point, the production rate for the submarine enterprise is two submarines per year, one SSBN and one SSN (with VPM).

The two nuclear submarine shipbuilders, Electric Boat and Newport News Shipbuilding, have been working an Integrated Enterprise Plan (IEP) to address the impacts to each company's skilled workforce, facilities, and supply base of this new shipbuilding era marked by the generational increase in demand of multi-class construction.

The two companies signed a team agreement in March 2015 to co-produce the Columbia Class SSBN and amended that agreement in February 2016 to be consistent with the Navy's Submarine Unified Build Strategy (SUBS). The approach maintains a plant focus for major module construction between the Columbia and Virginia Class submarines (e.g., Newport News builds bows for both programs, Electric Boat builds missile compartments for both programs, etc.).

There are three major resource areas that affect the Shipbuilders' ability to increase nuclear submarine production:

- Shipyard facilities and capital equipment
- Skilled shipyard trade and support labor resources
- Supply base capability and capacity

Facilities and Capital Equipment

Shipyard facilities and capital equipment under the current co-production plan for SSNs and SSBNs (i.e., the Navy's SUBS-E Plan) consists of the combined assets of the two nuclear shipbuilders, including hull fabrication facilities, modular manufacturing and outfitting facilities, final assembly, test and launch facilities, transportation assets, and post launch facilities.

Each shipyard has developed a Facility Master Plan that adds assets to support Virginia Payload Module construction or Columbia Class construction. Under the plan of record scenario, both companies are expanding shipyard module construction and final assembly capabilities and adding module transportation assets to support the build plans of both programs at the required levels. For example, at Electric Boat, we will be adding additional hull fabrication facilities and tooling to support the increased demand associated with the Block V Virginia Payload Module. Module fabrication and outfitting facilities are being added to the Quonset Point footprint starting next year. The current plan adds up to 575,000 square feet of new facilities to support the plan of record. Newport News Shipbuilding is also adding facilities to its shipyard to support the increased volume associated with multi-program construction of bows and sterns, among other modules.

Electric Boat and Newport News Shipbuilding are both working to expand final assembly capabilities to support increased combined throughput of submarine deliveries. As in the past, Electric Boat is evaluating whether to maintain separate facilities for SSN and SSBN final assembly and launch. The two final assembly and launch facilities on the Groton waterfront would be capable of delivering one SSBN per year (from a new South Yard facility with two final assembly positions) and up to two SSNs per year (from the existing North Yard facility that will be modified for VPM). Supporting this plan requires an investment that is currently estimated to be greater than $1.5B over the next 10 years.

In a similar fashion, Newport News is modifying its Modular Outfitting Facility (MOF) to place into service two additional final assembly positions, bringing its total shipyard capacity to four final assembly positions. This configuration will support a higher throughput of Virginia Class deliveries with VPM.

Labor Resources

Shipyard labor resources include the skilled trades needed to fabricate, build and outfit major modules, perform assembly, test and launch of submarines, and associated support organizations that include planning, material procurement, inspection, quality assurance, and ship certification. Since there is no commercial equivalency for Naval nuclear submarine shipbuilding, these trade resources cannot be easily acquired in large numbers from other industries. Rather, these shipyard resources must be acquired and developed over time to ensure the unique knowledge and know-how associated with nuclear submarine shipbuilding is passed on to the next generation of shipbuilders. The mechanisms of knowledge transfer require sufficient lead time to create the proficient, skilled craftsmen in each key trade including welding, electrical, machining, shipfitting, pipe welding, painting, and carpentry, which are among the largest trades that would need to grow to support increased demand. These trades will need to be hired in the numbers required to support the increased workload. Both shipyards have scalable processes in place to acquire, train, and develop the skilled workforce they need to build nuclear ships. These processes and associated training facilities need to be expanded to support the increased demand. As with the shipyards, the same limiting factors associated with facilities, workforce, and supply chain also limit the submarine unique first tier suppliers and sub-tiers in the industrial base for which there is no commercial equivalency.

Electric Boat has reengineered hiring to improve recruiting, streamline processes, and reduce the time to recruit new talent in order to appeal to the next generation of prospective shipyard workers. At Electric Boat, the time from application to start has been reduced from 163 days to 60 days with the goal of getting to 45 days by the end of this year. Electric Boat has increased hiring since 2011 when Virginia Class construction increased from one ship per

year to two ships per year. Quonset Point has hired over 3,200 people since 2011, and Groton has hired about 3,300.

Electric Boat has established partnerships with the Department of Labor, State Governors, and their respective workforce development organizations to implement pipeline programs aimed at acquiring and training the requisite number of people in the skilled trades we need in submarine construction. Electric Boat has also established partnerships with area technical community colleges that are currently sized to support training for over 3,000 tradesmen per year and embedded maritime trade curriculum into eight area career and technical education (CTE) schools in Rhode Island. This year, Electric Boat reinstituted apprentice programs in Groton for skilled trades and draftsmen, and plans to kick off an apprentice program at Quonset Point next year. Electric Boat also increased the effectiveness of internal training programs through active learning centers that provide training aids and mock-ups that deliver more hands-on learning. These active learning centers are designed to appeal to how people learn today and have reduced the time to develop proficiency for new hires on basic skills, as well as teach advanced skills. Lastly, Electric Boat's operations supervision and leadership programs, which draw on area colleges for content and instruction, have also been improved to increase volume and throughput.

We provide our demand signals for skilled trades to our community partners to support future growth and offer competitive employment opportunities at the end of the line, which is a win-win for all involved.

Supply Base Capability and Capacity

The supply base is the third resource that will need to be expanded to meet the increased demand over the next 20 years. During the OHIO, 688 and SEAWOLF construction programs, there were over 17,000 suppliers supporting submarine construction programs. That resource base was "rationalized" during submarine low rate production over the last 20 years. The current submarine industrial base reflects about 5,000 suppliers, of which about 3,000 are currently active (i.e., orders placed within the last 5 years), 80% of which are single or sole source (based on $). It will take roughly 20 years to build the 12 Columbia Class submarines that starts construction in FY21. The shipyards are expanding strategic sourcing of appropriate non-core products (e.g., decks, tanks, etc.) in order to focus on core work at each shipyard facility (e.g., module outfitting and assembly). Strategic sourcing will move demand into the supply base where capacity may exist or where it can be developed more easily. This approach could offer the potential for cost savings by competition or shifting work to lower cost work centers throughout the country. Each shipyard has a process to assess their current supply base capacity and capability and to determine where it would be most advantageous to perform work in the supply base.

Today, the Shipbuilders have approximately 147 critical suppliers based on contract value, part complexity, and current risk profile. Some of the suppliers are common between the two Shipbuilders and GFE prime contractors, making it more difficult to meet the demand challenges ahead of us. In response, the Shipbuilders have engaged the Tier-1 suppliers (i.e. survey and visits), and made additional inquiries of the second and third tier suppliers, to ascertain capacity and capability shortfalls with the advancing build-rate increase. The Shipbuilders anticipate the information gleaned from these inquiries to be the first step toward identifying critical capacity shortages at the Tier-1 suppliers, as well as pinch-points at the second and third tiers. The Shipbuilders further anticipate that much of the capacity shortfall will reside in the second and third tiers (e.g., ball valve castings & forgings for bodies, pump housings, motor bearings, etc.) and will require expansion of both the number of critical suppliers as well as select process capacity (e.g., non-destructive testing) within existing suppliers. In addition, the increase may offer opportunities, in some cases, to create new Tier-1 suppliers, thereby gaining additional resiliency and creating competition for critical components to further reduce material costs.

Achieving the increased rate of production and reducing the cost of submarines will require the Shipbuilders to rely on the supply base for more non-core products such as structural fabrication, sheet metal, machining, electrical, and standard parts. The supply base must be made ready to execute work with submarine-specific requirements at a rate and volume that they are not currently prepared to perform. Preparing the supply base to execute increased demand requires early non-recurring funding to support cross-program construction readiness and EOQ funding to procure material in a manner that does not hold up existing ship construction schedules should problems arise in supplier qualification programs. This requires longer lead times (estimates of three years to create a new qualified, critical supplier) than the current funding profile supports.

The Extended Enterprise initiative is an enabler to support higher demand in the nuclear ship enterprise. In the past, insufficient supplier and shipbuilder capacity and readiness have been some of the most significant contributing factors for lead ship overruns and cost growths in major shipbuilding programs. CBO reported in its analysis of the Navy's fiscal year 2017 shipbuilding plan that cost growth in lead ships almost always exceeds 10% and has averaged 45% (27% weighted average) for the most recent ships. Being prepared via this funded effort will result in cost mitigation and/or cost avoidance.

Funding of $400M over a 3-year period starting in 2018 is required for supplier base development. This funding is needed to "prime the pump", help identify pinch points in the supply chain (which are more likely to be in the sub-tier supply base), and establish capacity and capability ahead of the significant increase in VCS (with VPM) COLUMBIA and CVN demand. Additionally, the investment is needed at an important inflection point in history. Signals from the President indicate that the unprecedented investment planned in

infrastructure projects in the United States will require U.S. materials, effectively creating competition for material in non-traditional markets, where early movers will have advantages. Competition will also be heightened for skilled labor, making key elements of the investment request represented in this document even more time critical.

We need to rely on market principles to allow suppliers, the shipyards and GFE material providers to sort through the complicated demand equation across the multiple ship programs. Supplier development funding previously mentioned would support non-recurring efforts which are needed to place increased orders for material in multiple market spaces. Examples would include valves, build-to-print fabrication work, commodities, specialty material, engineering components, etc. We are engaging our marine industry associations to help foster innovative approaches that could reduce costs and gain efficiency for this increased volume. We have active efforts with the following key associations:

- Shipbuilding Council of America (SCA)
- American Shipbuilders Suppliers Association (ASSA)
- Marine Machinery Association (MMA)
- Submarine Industrial Base Council (SIBC)
- Aircraft Carrier Industrial Base Council (ACIBC)

These associations have existing infrastructure and memberships that can reach out to suppliers in all 50 states, at all levels of the supply chain, including first tier and sub-tiers. By partnering with Department of Labor, we can create programs that support workforce development and encourage investment in facilities and infrastructure. This is a “Buy American” initiative which the entire Congress and Administration should be able to agree on.

Supporting the Navy’s 355-Ship Navy in the Submarine Enterprise

Based on the Navy’s force structure assessment issued in December 2016, the SSN force level would be increased from 48 SSNs to 66 SSNs, an increase of 38%. Efforts to step-up production to support increased SSN deliveries would need to begin immediately due to the long lead time that is required to add capacity and capability at the two nuclear submarine shipyards and the associated unique supply base. We have looked at two scenarios of increased SSN demand that are within the historical precedence of one SSBN per year and up to three SSNs per year. Below are two scenarios to help bracket the discussion.

FY2017 Navy Shipbuilding Plan (issued July 2016)

FY	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	Total
	VCS Block V (9)					*VCS Block VI (6)*					*VCS Block VII (5)*					*SSN(X)*		
SSN	1															1	1	3
SSN w/ VPM	1	2	1	2	2	1	2	1	1	1	1	1	1	1	1			19
Columbia SSBN			1			1		1	1	1	1	1	1	1	1	1	1	12
Total	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	34

Scenario 1

VCS (VPM)			+1			+1		+1	+1	+1	+1	+1	+1	+1	+1			+10
Total Submarines	2	2	3	2	2	3	2	3	3	3	3	3	3	3	3	2	2	44

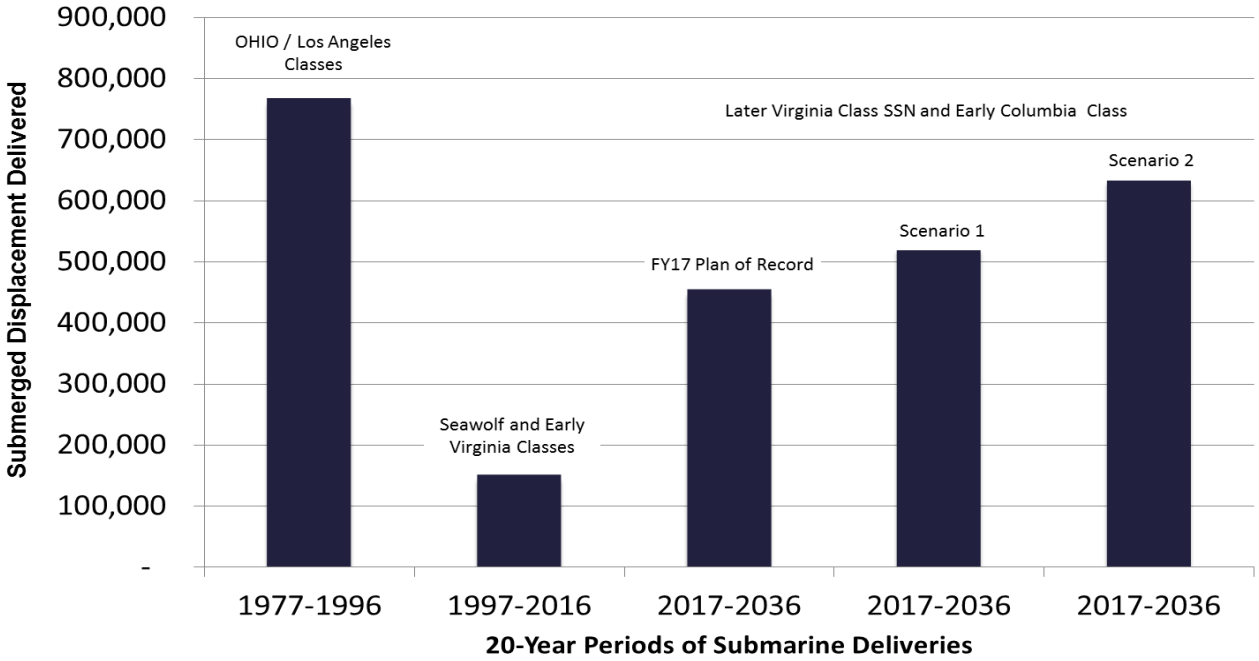
Scenario 2

VCS (VPM)		+1	+2	+1	+1	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2			+24
Total Submarines	2	3	4	3	3	4	3	4	4	4	4	4	4	4	4	2	2	58

The first scenario would maintain Virginia Class procurement at two SSNs per year during the entire 15-year period of Columbia Class SSBN authorizations (i.e., FY21-FY35). This scenario effectively adds 10 Virginia class SSNs to the Navy 30-year shipbuilding plan (which includes the second Virginia Class SSN in FY21). Under this scenario, the Navy would reach its force level goal of 66 SSN in three decades by the mid 2040's. Scenario one reflects three submarines per year in the steady state starting in FY26 which would consists of two SSNs and one SSBN per year. Over the next 20-year period that starts in 2017, the Submarine Industrial Base would be expected to deliver 39 SSNs, 24 with the VPM configuration, and the first 8 Columbia Class SSBNs. That level of submarine construction is 3.5 times the level of the last 20 years that ended in 2016 (an increase of greater than 250%), and includes a projected 525,000 tons of delivered submarine displacement.

The second scenario would increase the rate of SSN procurement starting in FY20 to three Virginia Class SSNs per year. FY20 would allow two-year advance procurement (AP) to be programmed into the FY18 budget should the Congress elect to begin as soon as possible. Under this scenario, the Navy would reach its force structure target one decade earlier in the mid 2030's. The figure below illustrates the two scenarios. Scenario two reflects four submarines per year in the steady state starting in FY26 which would consist of three SSNs and one SSBN per year. Over the next 20-year period that starts in 2017, the Submarine Industrial Base would be expected to deliver 50 SSNs, 35 would include the VPM configuration, and the first 8 Columbia Class SSBNs. That level of submarine construction is 4.2 times the level of the last 20 years that ended in 2016 (increase of greater than 320%), and includes a projected 636,000 tons of delivered submarine displacement.

Cummulative Effect of Submarine Deliveries over 20-Year Period



Government Commitment

Supporting the 355-ship Navy will require Industry to add capability and capacity across the entire Navy Shipbuilding value chain. Industry will need to make investment decisions for additional capital spend starting now in order to meet a step change in demand that would begin in FY19 or FY20. For the submarine enterprise, the step change was already envisioned and investment plans that embraced a growth trajectory were already being formulated. Increasing demand by adding additional submarines will require scaling facility and workforce development plans to operate at a higher rate of production. The nuclear shipyards would also look to increase material procurement proportionally to the increased demand. In some cases, the shipyard facilities may be constrained with existing capacity and may look to source additional work in the supply base where capacity exists or where there are competitive business advantages to be realized. Creating additional capacity in the supply base will require non-recurring investment in supplier qualification, facilities, capital equipment and workforce training and development.

Industry is more likely to increase investment in new capability and capacity if there is certainty that the Navy will proceed with a stable shipbuilding plan. Positive signals of commitment from the Government must go beyond a published 30-year Navy Shipbuilding Plan and line items in the Future Years Defense Plan (FYDP) and should include:

- Multi-year contracting for Block procurement which provides stability in the industrial base and encourages investment in facilities and workforce development
- Funding for supplier development to support training, qualification, and facilitization efforts – Electric Boat and Newport News have recommended to the Navy funding of $400M over a 3-year period starting in 2018 to support supplier development for the Submarine Industrial Base as part of an Integrated Enterprise Plan *Extended Enterprise* initiative
- Acceleration of Advance Procurement and/or Economic Order Quantities (EOQ) procurement from FY19 to FY18 for Virginia Block V
- Government incentives for construction readiness and facilities / special tooling for shipyard and supplier facilities, which help cash flow capital investment ahead of construction contract awards
- Procurement of additional production back-up (PBU) material to help ensure a ready supply of material to mitigate construction schedule risk

Submarine Industrial Base Summary

The Submarine Industrial Base stands ready to expand the scope of effort required to support increased submarine procurement if the nation has determined it needs additional submarines. Supporting three SSNs per year plus one SSBN per year is within historical precedence. The Columbia Class SSBN Program is the Navy's top development priority and, as the Chief of Naval Operations has stated, it is "foundational to the security of the Nation". Supporting increased SSN demand beyond the Navy's FY17 Shipbuilding Plan can be supported by scaling-up already existing master plans in shipyard facilities and workforce development. The nuclear shipyards will need to expand efforts to place work into the supply base, perhaps beyond proportionally increased levels due to constraints at shipyard facilities. Enabling the supply base to expand its support of increased submarine procurement will require additional non-recurring funding for supplier development and facilitization where submarine-unique capability at the required level may not exist anymore. It will take up to three years in some cases to develop and qualify new suppliers and/or new capabilities which in some cases will require qualification hardware to be built and tested. This non-recurring effort must begin now in the FY18 budget. The Shipbuilders urge a minimum of $150M in FY18 to support development of new capacity and capability in the supply base. In addition, increasing the level of material procurement for Virginia Class Block V and Columbia Class will establish a strong signal of Government commitment to industry to encourage additional investment in new capability, capacity, facilities, capital equipment, and workforce development that will need to be in place to support increasing levels of demand that are up to four times the level over the last 20 years.

Surface Ship Summary

So far, this testimony has focused on the Submarine Industrial Base, but the General Dynamics Marine Systems portfolio also includes surface ship construction. Unlike Electric Boat, Bath Iron Works and NASSCO are able to support increased demand without a significant increase in resources.

Bath Iron Works

Bath Iron Works is well positioned to support the Administration's announced goal of increasing the size of the Navy fleet to 355 ships. For BIW that would mean increasing the total current procurement rate of two DDG 51s per year to as many as four DDGs per year, allocated equally between BIW and HII. This is the same rate that the surface combatant industrial base sustained over the first decade of full rate production of the DDG 51 Class (1989-1999). Over this period, BIW was awarded two construction contracts per year and from 1994-2004 sustained an average delivery rate of two ships per year. Since then, the Navy's procurement rate has declined to only two ships per year and, although BIW adjusted to this lower volume, the company continued to invest in facility modernization.

No significant capital investment in new facilities is required to accommodate delivering two DDGs per year. However, additional funding will be required to train future shipbuilders and maintain equipment. Current hiring and training processes support the projected need, and have proven to be successful in the recent past. BIW has invested significantly in its training programs since 2014 with the restart of the DDG 51 program and given these investments and the current market in Maine, there is little concern of meeting the increase in resources required under the projected plans.

A predictable and sustainable Navy workload is essential to justify expanding hiring/training programs. BIW would need the Navy's commitment that the Navy's plan will not change before it would proceed with additional hiring and training to support increased production.

BIW's supply chain is prepared to support a procurement rate increase of up to four DDG 51s per year for the DDG 51 Program. BIW has long-term purchasing agreements in place for all major equipment and material for the DDG 51 Program. These agreements provide for material lead time and pricing, and are not constrained by the number of ships ordered in a year. BIW confirmed with all of its critical suppliers that they can support this increased procurement rate.

BIW is prepared to ramp up for increased production and looks forward to working with the Navy in support of increased surface combatant demand.

NASSCO

NASSCO builds Combat Logistics Force ships, strategic sealift and other support ships like the Expeditionary Sea Base (ESB). NASSCO is currently building ESB 4 and 5, the last of these ships currently programmed. NASSCO is designing the Navy Fleet Replacement Oiler (T-AO 205 Class) and construction will commence on the lead ship in September 2018. The Navy currently plans a production rate of one ship per year for the balance of a 17-ship class.

The Navy's Force Structure Assessment calls for three additional ESBs. Additionally, NASSCO has been asked by the Navy and the Congressional Budget Office (CBO) to evaluate its ability to increase the production rate of T-AOs to two ships per year. NASSCO has the capacity to build three more ESBs at a rate of one ship per year while building two T-AOs per year. The most cost effective funding profile requires funding ESB 6 in FY18 and the following ships in subsequent fiscal years to avoid increased cost resulting from a break in the production line. The most cost effective funding profile to enable a production rate of two T-AO ships per year requires funding an additional long lead time equipment set beginning in FY19 and an additional ship each year beginning in FY20.

NASSCO must now reduce its employment levels due to completion of a series of commercial programs which resulted in the delivery of six ships in 2016. The proposed increase in Navy shipbuilding stabilizes NASSCO's workload and workforce to levels that were readily demonstrated over the last several years.

Some moderate investment in the NASSCO shipyard will be needed to reach this level of production. The recent CBO report on the costs of building a 355-ship Navy accurately summarized NASSCO's ability to reach the above production rate stating, "building more … combat logistics and support ships would be the least problematic for the shipyards."

As NASSCO builds ships to commercial standards, its supplier base is robust, flexible and fully capable of supporting increased production of both ESBs and T-AOs.

I would like to thank the committee for the opportunity to speak this morning and I am ready to answer your questions.