

THE SUBMARINE REVIEW



JUNE 2019

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FROM THE PRESIDENT

The Naval Submarine League/Johns Hopkins Applied Physics Laboratory Submarine Technology Symposium (SUBTECH) was held on 14-16 May. This was the thirty-first in a series of classified symposia stretching back to 1988. The theme this year was *Expanding the Competitive Space from Undersea*. By all accounts, this year's SUBTECH was a big success. My thanks go out to VADM (Ret.) Mike Connor, the Symposium General Chair and Lisa Blodgett, the Symposium Co-Chair and JHU/APL Sector Head. Most of the SUBTECH presentations and discussions are held at the secret level so the proceedings are not included in *The Submarine Review* but the luncheon remarks by Ron O'Rourke will be included in the next issue.

I recently had the honor to speak at the dedication ceremony for a new WWII submarine veterans memorial along the Riverwalk in Chicago. The memorial was erected by the United States Submarine Veterans, Inc. and was inspired in part by the late Master Chief Torpedoman Harry Alvey, a WWII submarine veteran, a great leader and a personal friend. The memorial is dedicated to all U. S. Navy submariners, past present and future. It also pays special homage to the 28 Gato and Balao class submarines built in Manitowoc, Wisconsin. Each of those boats passed the site of the memorial on their way from Lake Michigan to New Orleans via the Chicago and Mississippi Rivers. The memorial is beautifully constructed in a park-like setting on the Riverwalk and is well worth visiting when you are in the Chicago area.

The story of the 28 "freshwater boats" built by Manitowoc Shipbuilding Company during World War II is a fascinating study of ingenuity and dedication. Most of the Wisconsin shipbuilders had never even seen a submarine prior to the contract to build the boats. The crews completed sea trials, ship commissioning and crew certification in Lake Michigan. The boats were then decommissioned and had their periscopes and upper shears removed for the barge transit to New Orleans in order to fit under the bridges along the way. In New Orleans, the boats were reassembled, ballasted for salt water and recommissioned before proceeding to the Panama Canal. The book *Fresh Water SUBMARINES The Manitowoc Story* by Rear Admiral William T. Nelson, USN (Ret.) is a good read for those interested in learning more about this remarkable shipbuilding feat.

John Jay Donnelly
President

president@navalsubleague.org

EDITOR'S NOTES

“May you live in interesting times” reportedly was not actually an old Chinese curse, as we so often hear. Whatever the source, it is certainly true, and we are fortunate to have a couple of articles in this issue that will support this.

Our Congressional representative at the Corporate Members Days was Congressman Adam Smith, D-WA, who is the Chairman of the House Armed Services Committee. We are fortunate to have received approval to publish his remarks in this issue. Rep. Smith agreed that we are in interesting times and he emphasized his priorities in his remarks. I hope that you will enjoy the view from his position as chairman of one of the most important committees in Congress, particularly from our vantage point. Additionally, he was willing to go “off script” in his response to some questions from our members and his answers were revealing.

The Honorable Franklin Miller has served as a senior defense policy White House staff member as well as senior director for defense policy and arms control on the National Security Council. He has served for over 30 years in government and has been a “go-to” expert in national deterrence and nuclear targeting policy as well as numerous related defense matters such as relations with major power nations, missile defense programs and submarine operations policy. Frank Miller has made available to us his remarks to the National War College earlier this year on the subject of US nuclear weapons policy and the Nuclear Posture Review. Combined with Congressman Smith’s remarks, these two pieces help frame an important discussion.

In a somewhat unusual entry, Congressman Joe Courtney, D-CT, has provided *The Submarine Review* a copy of a Congressional letter to the Chair and Ranking Member of the House Defense Subcommittee on Appropriations supporting submarines and their industrial base.

We are completing our transcripts from the Annual Symposium in this issue. Featured are the remarks of our distinguished submariners and civilians. Additionally, the panel discussions are interesting, candid and informative.

Featured in this issue are the Corporate Profiles of our members and the Corporate Member Spotlight. Our focus in this issue is PRL, Inc.



Please review these profiles for information that might be of assistance to you either on a business or personal matter.

Finally, we have four excellent “sea stories” that may bring back some pleasant memories on the part of many of you, enjoy!

I have been telling you, in these notes over the past two issues, that we are planning a technology-focused issues for September. We set this goal to follow the Submarine Technology Symposium in expectation that could be a catalyst for some inputs for the next issue. I am pleased to report that I have several “promises” for some good articles but we are always looking for your inputs, so if you have a topic that you would like to see published in your submarine journal, please contact me or just forward your input to me using the contact information below.

Good Hunting!!

Mike Hewitt

Editor@navalsubleague.org

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LETTERS TO THE EDITOR

From time to time, our readers write letters (or emails) to the NSL, expressing their opinions about submarine matters. When a decision is made to publish them, the reader should be aware that the views of the writers are theirs and are not to be attributed to the Naval Submarine League. We invite the expression of multiple points of view and encourage dialogue either on these pages or on our private NSL Group LinkedIn page.

I just finished reviewing the latest issue of ‘The Submarine Review.’ A very positive booklet. Well done having it published. However it appears the submarine community is continuing to do what they have done for years – tell themselves how good they are without looking at the world wide conditions. What I am talking about is the Soviet continued violation of the terms of the INF Treaty driving the administration to call for vacating the treaty. The fact that the Start Treaty inspection protocol expires in a year or so which will remove restrictions on FBM submarines. Combine this with a possible democratic/socialist administration following Trump. We have a significant problem nationwide. Articles that address these issues would be helpful. ... [Admiral Goebel suggested several possible authors by name] ... We need to quit pounding our own backs and take the lead on addressing the issues at hand.

Dave Goebel

RADM David M. Goebel, USN, Ret. is a Life Member of the Naval Submarine League.

Do Nuclear Weapons Matter Anymore? **The Honorable Franklin C. Miller**

Note: This address was given to the National War College by Mr. Miller on February 4, 2019 and is published here with the approval of the author.

It is interesting to note that that the relevance of nuclear weapons has become an issue again. That's something which could only happen here in the United States and in the United Kingdom, but not in any other nuclear weapons state. But happen it has.

Indeed, as you know from your readings list, *Foreign Affairs*, which thinks of itself as the leading American journal on international affairs, recently published a quarterly edition with a cover story titled "Do Nuclear Weapons Matter?"

And there *is* some reason for that question here. We experienced a demise in the salience of nuclear weapons after the Gulf War and End of Cold War. In the Gulf we defeated a large Soviet style and Soviet equipped army rapidly and efficiently with conventional weapons. The end of the Cold War eliminated the Soviet nuclear threat to the United States and our allies (or so it was believed by many at the time).

In that period of optimism and de-escalation, we lost a generation of scholars, academics, intelligence analysts and civil servants.

All of this helped produce the "Global Zero" movement which called for the abolition of nuclear weapons on a world-wide basis, but also called for the United States to take the lead in trying to make this happen.

The Global Zero philosophy reached a zenith in President Obama's speech in Prague in the spring of 2009. Mr. Obama called on the governments of all the nuclear weapons states to reduce the role of nuclear weapons played in their respective national strategies.

- The US did this, and so did the UK.
- But every other nuclear weapons state went the other way. Russia, China, India, Pakistan and North Korea -- all increased the role nuclear weapons played in their respective national security policies.



- All embarked on major improvements to their nuclear forces (and I will say a bit more on that later)
- Russia, in particular, developed a new military doctrine that features the tactical use of nuclear weapons, deployed weapons systems to support that doctrine, and displayed the use of those weapons systems in exercises to drive the point home to the NATO alliance. Mr Putin and his circle place particular value on nuclear weapons.

And yet, parts of the American public remain fixated on the notion that we must set an example for the world by continuing to reduce our own nuclear deterrent regardless of what is occurring in other nuclear weapons states.

This is very dangerous thinking on at least two counts:

- First, *It is not possible to maintain nuclear stability if your policy does not reflect the fact that global realities are moving in a different direction than your aspirations, and*
- *Second, it confuses the existence of nuclear weapons with an increased threat of war; actually, the reverse is true.*

Nuclear Weapons Changed the Very Nature of Major Power War

So let's talk about "Deterrence." "Deterrence" is not a new concept. The Romans wrote about it. George Washington wrote about it. Essentially it's about raising the barrier to aggression to the point that would-be or real enemies are convinced they would not succeed in an attack, and therefore pursue other policies. The fundamental problem with using only conventional forces to provide a deterrent shield, however, has been that throughout history leaders bent on aggression have come to believe that their military genius can overcome seemingly impregnable defenses. The Nazi thrust into the Ardennes, thereby nullifying the Maginot Line, is the poster child in this regard. Margaret Thatcher is famously (if apocryphally) quoted as saying, in reference to memorials honoring the dead of World War 1, "there are monuments to the failure of conventional deterrence in every European village".

The creation of nuclear weapons changed all of that. No longer could aggressors count on their military genius to deliver victory: nuclear weapons gave a nation on the brink of battlefield defeat the ability to destroy the opponent's homeland, turning the fruits of victory into the ashes of defeat.

Are nuclear weapons an all-purpose deterrent? Surely not: they never have been and the United States has never deployed them in that role:

- A nuclear response to a low intensity attack is hardly credible.
- Similarly, a nuclear response to non-state terrorism, even an act involving a nuclear weapon, is difficult to conceive.
- But a threatened nuclear response to the threat of nuclear attack or coercion, or a massive conventional assault, or a state use of a weapon of mass destruction, *is* credible. This is not a nostalgic comment reflecting the Cold War; it is a real and necessary fact of life in our present and predictable future world.

Our nuclear weapons serve to deter direct military attack by a major state power against US or our allies' vital national interests.

- They serve to deter nuclear blackmail or intimidation against the United States or our treaty allies.
- They serve as an "anti-proliferant" for allies capable of developing their own nuclear weapons.
- They serve to moderate Great Power behavior...in essence, in crude terms, to make war among the major powers too dangerous.
- Consider the number of times Europe's Great Powers went to war with one another since 1648, the date when the Treaty of Westphalia ushered the modern nation-state into existence.
 - From 1648 to 1800, there were at least seven significant wars per century;
 - From 1800 to 1900, there were at least six significant wars, and that includes lumping all the Napoleonic Wars into one and similarly count-

ing the three wars of Italian Independence as one;

○ In 1914 there was World War I, the “War to End All Wars”, whose massive carnage and destruction of a generation of European males was not sufficient to prevent World War II; and then, suddenly, after 1945, an historic pause. Did humankind change? Did the nature of governments change? I think not. No, war became too dangerous. The nuclear weapon had revolutionized war. No longer could an aggressor government count on the skill of its military leadership to conquer its victims: the nuclear weapon allowed the losing power to turn the victor’s triumph to ashes....

How Do We Deter?

Deterrence is the product of will and capability. Therefore, critical to maintaining an effective nuclear deterrent is our ability to have a credible retaliatory capability which threatens potential enemy leaderships’ most valued assets, even in worst case scenarios for us. This means we have to have confidence in our deterrent, and potential adversaries must have respect for it.

Deterrence is mostly about what goes on in the heads of potential enemy senior leaders, not in our own heads. We need to be certain they understand what we will fight for and what we consider our vital interests to be. They must understand we have the capability to destroy the things and assets they value most, and that we have the will to do so if we are attacked.

Deterrence cannot and must not be based on mirror-imaging. For example, there was a time several decades ago when the US Navy’s proposed response to a Soviet nuclear attack on a US aircraft carrier would be to retaliate against a Soviet carrier. But the Soviets would have gladly traded their surface fleet for ours in a nuclear war at sea, because our navy was vastly more important to us than theirs was to them. As a result, US policy made clear that Soviet nuclear strikes at sea would draw nuclear responses against land-based assets of high value to Moscow. Deterrence works when the enemy leadership understands it

will lose more as a result of our retaliation than it would gain through its aggression. This must always guide our deterrent policy and planning.

- This thought was perhaps best encapsulated by the 1983 Scowcroft Commission when it wrote: “Deterrence is the set of beliefs in the minds of the *Soviet* leaders, given their own values and attitudes, about our capabilities and our will. It requires us to determine as best we can, what would deter them from considering aggression, even in a crisis....” *This idea infuses the 2018 Nuclear Posture Review, to which I turn next...*

THE NPR and US Nuclear Deterrence Policy

One year ago, almost to the day, the Defense Department published the 2018 Nuclear Posture Review, a document which is perhaps the best statement of US nuclear deterrence policy in 30 years. If one perused the spate of articles which emerged after the leak of an NPR draft a year ago January, however, one might be forgiven for believing that the NPR:

- Represents a dangerous departure from long-standing US deterrence policy;
- Initiates a new nuclear arms race;
- Proposes an unaffordable and unnecessary plan to modernize US nuclear forces;
- Creates a new class of so-called “usable” nuclear weapons to carry out a nuclear war-fighting strategy;
- None, none, of these criticisms are accurate or valid.

Let’s turn first to the allegation that the NPR is not consistent with long-standing US nuclear deterrence policy.

The NPR is squarely in the mainstream of longstanding US nuclear deterrence policy. But it is important to remember what that means. And the mainstream does not begin with NPR 2010 and the Prague Initiative. The mainstream begins in the early years of the nuclear age.

- And, from those early years to today, the fundamental policy is deterrence -- the goal is to prevent nuclear or major non-nuclear attack on US and US allies, *This is a constant. You will find it in the NPR.*



- Uncomfortable as this may be for some, deterrence relies on presenting potential enemies with certainty that US retaliation will exact costs which exceed gains aggressor seeks to make. *This is a constant. You will find it in the NPR.*

- Since 1949, to make this threat credible, targets have included a mix of so-called counterforce and countervalue. *This is a constant. You will find it in the NPR.*

- And by the way, despite what some of you may have read in your college course work, there was never a great debate in the 1960s about whether we should hold at risk only counterforce or countervalue targets. That is a myth.

- US policy provides a President with options. Since the 1960s it has explicitly sought to raise the nuclear threshold. Options are flexible, and since the 1970s comprise both small and larger responses. *This is a constant. You will find it in the NPR.*

- Since 1980, policy and options explicitly threaten what a potential enemy leadership values most. Today, we focus on holding at risk what the Russian and Chinese leaderships value most. *This is a constant. You will find it in the NPR.*

- Given the different policies and goals of potential enemy leaders, deterrence is, and has been for decades, therefore tailored. *This idea is found throughout the NPR.*

- Deterrence is dynamic, not static. As then Defense Secretary Weinberger wrote several decades ago: “in order to deter successfully our capabilities must change as the threat changes, and as our knowledge of what is necessary to deter improves”. *You will find that same theme in NPR 2018.*

- So the NPR is precisely where it should be: squarely in the mainstream of US deterrence policy

- Your syllabus quotes Denzel Washington’s character in *Crimson Tide* saying, “In the nuclear world, the true enemy is war itself.” and notes that it may be accurate, but it’s not a strategy. That’s certainly true, if a strategy is a roadmap about how to achieve an objective. But the quote certainly reflects an excellent policy.

Next, let's consider the spurious charge that the NPR is creating a new nuclear arms race.

- The United States has not fielded a new nuclear system in the 18 years of this century.
- Since 2008, Russia and China have been embarked on major upgrades to their nuclear forces.
- Russia is deploying –that is to say, fielding -- two new types of ICBMs, three new types of SLBMs, a new long-range air-launched cruise-missile, has re-opened the Blackjack strategic bomber line, has 3 new SSBNs in the water and is building more, and is also deploying a host of new dual-capable air-, sea- and ground-launched cruise missiles. It is also in the final stages of developing a follow-on to the SS-18 ICBM, which has long been regarded by the West as a destabilizing system.
- China is deploying – again, to be clear, fielding -- two new types of ICBMs and a new SLBM, has four new SSBNs and is building a fifth, and has the most dynamic ballistic missile program in the world.

In contrast, no new US systems will be fielded until at least the mid-2020's, which will be, as the commander of US Strategic Command, has said, “just in time.”

As former US Defense Secretary Ash Carter remarked, “there is a nuclear arms race, but the US is not in it.”

Now, let's turn to the idea that the Triad modernization program is both unnecessary and unaffordable.

- The NPR does call for modernizing all three legs of the US nuclear Triad, essentially endorsing the previous Administration's plan to do so.
- So the first question must be “why a Triad?” The Triad started life, admittedly, as a bastard child, the offspring of inter-service rivalries of the 1950s. During the 1960s, however, strategists recognized that the combination of three different basing modes, each with different but offsetting vulnerabilities,



separate attack azimuths, and complementary alert postures presented potential enemy defenses with insurmountable obstacles. The value of that combination continues to be recognized today. Indeed, former Secretary of Defense Jim Mattis is quoted in the NPR as saying:

- “I have also looked at – I have questioned – the Triad and I cannot solve the deterrent problem reducing it from a Triad. If I want to send the most compelling message, I have been persuaded that the Triad, in its framework, is the right way to go.” [p43]
- Today, a Russian or Chinese planner contemplating a first strike against the United States must take account of the 450 Minuteman sites, the two strategic submarine bases, Washington, Omaha, and possibly the three nuclear bomber bases. This would obviously be a massive strike and would draw a major response which is why it won’t happen. If you eliminate the 450 ICBM sites, an enemy planner’s job becomes vastly simpler: two SSBN bases, Washington and Omaha...and by the way on a day-to-day non-crisis basis, none of our bombers are armed and on alert. A massive strike is no longer necessary.
- This said, by the mid-to-late 2020’s our bombers, strategic submarines and land-based missiles will have been deployed well past their anticipated end of life dates and will have to be retired, with or without replacement. Critics of modernization like to throw around a 30 year life cycle cost to produce a sticker shock reaction. This, however, obscures two points:
 - First, 30-year costs always look large, regardless of the program; and
 - Second the cost of the modernization program, even when in full swing by the 2020’s, is not expected to exceed 3-4% of the defense budget (before sequester caps were lifted). Current operating costs of the existing deterrent (which will continue) also run about 3% of the defense budget, so the total cost of protecting America and our allies from nuclear attack is between 6-7%

of the defense budget (and less than 1% of the Federal budget) – not too much to pay to prevent an existential threat.

- You will nevertheless hear people say that even that amount of money is a great deal to spend for weapons we never use. But the truth is we use those weapons every day.

- **Finally, let's review the claim that the NPR calls for the creation of usable low yield nuclear warheads to underpin a nuclear war-fighting strategy.** The NPR proposes to modify *a small number* of existing submarine-launched warheads to have significantly reduced yield. This adjustment in our deterrent capability is necessitated by serious concerns about developments in Russian military thinking over the past ten years. Let me repeat: the Russian military has devised a doctrine which envisions using a small number of very low-yield nuclear weapons to attack NATO forces defending Alliance territory. They have retained former Soviet systems they pledged to eliminate and have deployed new tactical nuclear systems, making the doctrine credible. They have exercised the doctrine using those weapons. All of this has occurred in the face of our (and NATO's) existing force structure, leading to the very real concern that the Russian High Command may have come to believe we lack a credible deterrent to such a low yield threat. Modifying a small number of U.S. Trident II warheads will enhance our deterrent capability and will, therefore, be important in dissuading the Kremlin's belief it can achieve tactical victories by using low-yield nuclear weapons. The NPR's critics counter this strategy by saying that the DoD is seeking to create "more usable" nuclear weapons. However, the NPR explicitly states the opposite:

- "Expanding flexible U.S. nuclear options now, to include low-yield options, is important for the preservation of credible deterrence against regional aggression. To be clear, this is not intended to enable, nor does it enable, 'nuclear warfighting.' Nor will it



lower the nuclear threshold. Rather, expanding U.S. tailored options will raise the nuclear threshold and help ensure that potential adversaries perceive no possible advantage in limited nuclear escalation, making nuclear weapons employment less likely.”

- And, in this regard, it’s worth noting something about the low yield Trident warhead which has been largely overlooked in the year-long debate. The United States does not need a low yield Trident warhead to deter attack on the United States. This initiative strengthens our ability to deter Russian attack on NATO Europe. It is an undertaking which underscores the American commitment to the defense of the European members of NATO. It is in NATO’s interest that this initiative be realized. And the United States deserves both credit and recognition for re-emphasizing, in these turbulent times, that we are fully committed to Article V and to the NATO Alliance.

Wrapping UP

Let me conclude by returning to the fundamentals of US policy, which apparently are not clearly understood by some, even in this capital city. Congressman Adam Smith, the new chair of the House Armed Services Committee – a highly consequential position – is one of those who does not appear to understand US nuclear deterrence policy as it has existed, successfully, for over 60 years. In a speech last November, he alleged our current arsenal is “based on plans ...contemplating how to win a nuclear war....”

But, as we have been discussing, that is completely wrong. US policy is based on the firm conviction that nuclear war – and major conventional war – would be disastrous. US policy for many decades has been based on *detering* nuclear attack and nuclear war. Remember that it was Ronald Reagan who famously said “A nuclear war cannot be won and must never be fought.” As someone who myself spent many years in the nuclear deterrence and nuclear planning world, I can think of no better summary of US policy. If Mr. Smith is interested in learning about what our policy is, however, he would do well to read the “Nuclear Posture Review” – which clearly he has not done. If he did, he would

learn about the nuclear building programs and policies of potential enemies, why we are concerned about them, and how US policy is tailored to reduce, as much as humanly possible, any chance that Mr. Putin or Xi Xin Ping will miscalculate and come to believe they could initiate and win a nuclear exchange.

So, in closing, permit me to leave you with the fundamental principles of our national policy:

- A nuclear war cannot be won and must never be fought
- That realization by US policy makers is not sufficient to prevent nuclear war; potential enemy leaders must understand and accept it as well
 - To achieve that, the United States must possess nuclear retaliatory capabilities which can confidently hold at risk those assets an enemy leadership considers most valuable
 - This requires a modernized deterrent force. The US deterrent is aging and must be modernized before it loses credibility in the eyes of potential enemy leaders

Thank you for spending time with me and I look forward to your questions.



*This letter was provided for publication by the Honorable Joe Courtney,
Chairman of the Seapower and Projection Forces subcommittee.*

Congress of the United States
Washington, DC 20515

April 1, 2019

The Honorable Peter Visclosky
Chairman
Subcommittee on Defense
Committee on Appropriations
H-405, The Capitol
Washington, D.C. 20515

The Honorable Ken Calvert
Ranking Member
Subcommittee on Defense
Committee on Appropriations
1016 Longworth House Office Building
Washington, D.C. 20515

Dear Chairman Visclosky and Ranking Member Calvert:

As you develop the Fiscal Year (FY) 2020 Defense appropriations bill, we urge continued bipartisan support for the submarine force and the nationwide industrial base that supports it.

Virginia-class Submarine

The Virginia-class submarine remains one of the most effective and sought after tools in our nation's arsenal. In a recent Senate hearing, Admiral Philip Davidson, Commander of US Pacific Command, stated that "continuing to build submarines is critically important...[The submarine force] is our most significant advantage in all domains right now." With Russia continuing to field advanced undersea capabilities and China on track to reach an estimated force of 70 submarines by 2020, the US submarine force is at the forefront of great power competition and our combatant commanders will need more submarines, not fewer, in the coming decades.

Despite this strong and increasingly urgent demand for attack submarine capabilities, our fleet is on track to decline to just 42 boats in 2027 without additional investment. Further, under current plans the attack submarine force will face the deepest and most prolonged shortfall below military requirements of any ship type over the next thirty years. Simply stated, we are moving in the wrong direction and bold action is needed. This year, the Navy demonstrated its recognition of this need by adding funding for a third attack submarine to its budget request. This decision will not only help to mitigate this shortfall in the force, but will also allow the industrial base to continue expanding its capacity and bolster supplier predictability – to the benefit of all submarine programs, including Columbia. There is a two-year gap between the procurement of the first Columbia-class submarine in FY 2021 and the second in FY 2024. This third Virginia-class in FY 2020 will help mitigate this valley in workload and production at the shipyards and within the industrial base.

The FY 2020 budget request supports the Navy's plan to continue procurement of the newest Block V submarines, the first Virginia-class submarines to include the Virginia Payload Module (VPM). The VPM will ensure that the United States maintains significant long-range precision strike

capacity as Ohio-class SSGN submarines are retired in the mid-2020s. We urge you to continue your strong support for the Virginia-class submarine program by:

- Fully funding Virginia-class procurement at the requested level of \$7.156 billion, which funds the procurement of three Virginia class submarines.
- Fully funding advance procurement at the requested level of \$1.888 billion and Economic Order of Quantity (EOQ) at the requested level of \$882 million to fully support Block V procurement.
- Fully funding Navy RDT&E, New Design SSN, at the requested level of \$121 million to support fielding advanced capabilities to the attack submarine fleet.

Columbia-class Submarine

Ballistic missile submarines are the backbone of the United States strategic deterrent. The Columbia-class submarine will replace the current Ohio-class ballistic missile submarines and will carry nearly seventy percent of our country's deployed nuclear arsenal. This program is the Department of Defense and Navy's number one acquisition priority and involves close cooperation with our British allies as they build the new Vanguard-class ballistic missile submarine which will share a common missile compartment with the Columbia-class. The 2018 Nuclear Posture Review reaffirmed the central role that our sea-based nuclear deterrent will play in the coming decades.

Fiscal Year 2020 represents a significant step in the Columbia-class program. With official procurement coming in FY 2021, FY 2020 will continue a major ramp up in advance procurement of long lead time materials and advance construction of critical components. It is therefore critical that sufficient funding is delivered on time and that the submarine industrial base is prepared to fulfill procurement orders which are expected to double by 2021.

As you know, modern shipbuilding is a long-term investment which requires a healthy industrial base from the major shipyards down to small, often family-owned manufacturers. Particularly with small manufacturers, it can be difficult to absorb not only shortfalls and disruptions but also significant ramp ups in business. Many small suppliers simply do not have the capacity to produce the critical components that will be required to ramp up submarine construction in the coming years, putting at risk the aggressive construction schedules currently planned by the Navy and approved by Congress. In the last two years, Congress has provided needed funding with bipartisan, bicameral support to strengthen the submarine industrial base, but we believe that additional funds should be dedicated this year to continuing to diversify and certify suppliers of critical components and de-risk limited capacity in the industrial base where it exists. These investments are critical to ensuring the Department of Defense's number one acquisition priority can continue to maintain its already aggressive construction schedule and meet US deterrent requirements. To this end, we urge you to continue your support for the Columbia-class program by:

- Funding Columbia-class advance procurement at \$1.852 billion, which includes an increase in funding for supplier development to \$175 million.
- Fully funding Navy RDT&E, Columbia Class Design, at the requested level of \$419 million to ensure maximum design completion in advance of construction.

Thank you, as always, for your strong support for these undersea investment priorities. We look forward to working with you on this important issue this year.

Sincerely,

Joe Courtney

JOE COURTNEY
Member of Congress

Jim Langevin

JAMES R. LANGEVIN
Member of Congress

Rob Wittman

ROB WITTMAN
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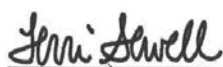
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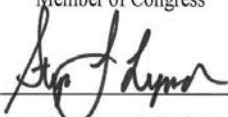
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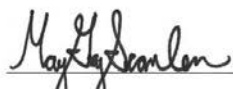
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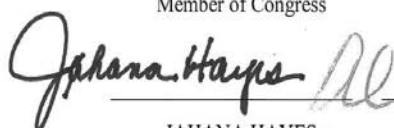
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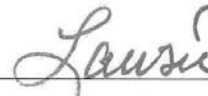
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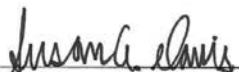
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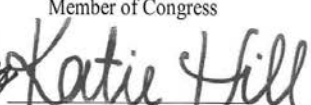
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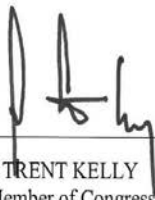
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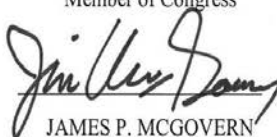
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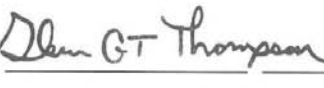
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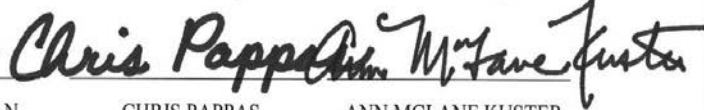
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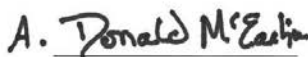


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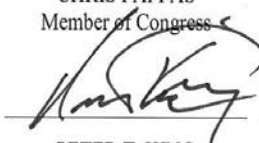


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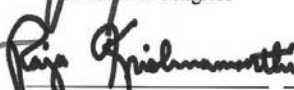
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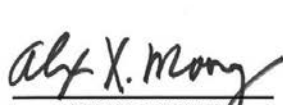
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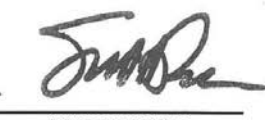
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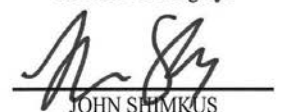


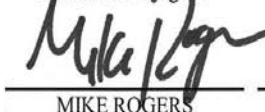
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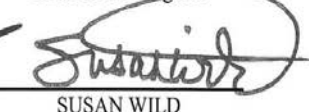

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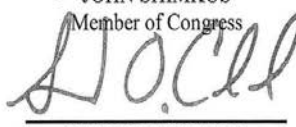

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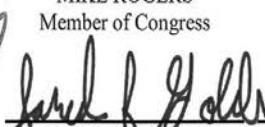

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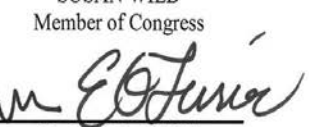

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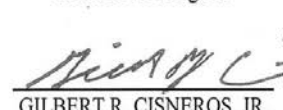

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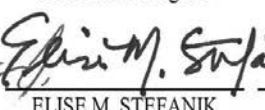

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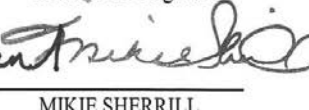

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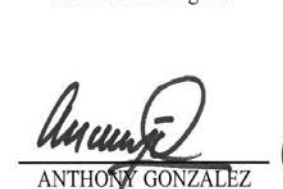

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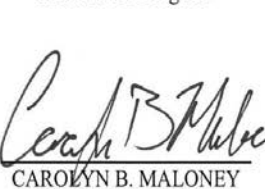

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2019 CORPORATE MEMBER DAYS

At the Westin Washington DC City Center
1400 M St NW, Washington, DC 20005

Agenda

Thursday 7 March

1700 New Corporate Member Reception (By Invitation Only)

GENERAL SESSION

1800 Welcoming Remarks by ADM Kirk Donald, USN, Ret., *NSL Chairman*

1805 Remarks by **ADM Frank Caldwell, USN, Director, Naval Reactors**

1900 Networking Reception/Buffer (secure about 2200)

Friday 8 March

BREAKFAST

0700 Breakfast

0730 Introduction – ADM Kirk Donald, USN, Ret.

ADM John M. Richardson, USN, Chief of Naval Operation

SESSIONS

0830 **Congressman Adam Smith, Chairman, House Armed Services Committee**

0910 **RDML (Sel) Rob Gaucher, USN, CoS, Commander, Submarine Forces**

0950 Recognition of Corporate Member 5, 10, 15, 20, 25, 30, and 35 Year Awards

1010 **RADM John Tammen, Jr., USN, Director, Undersea Warfare Division**

1050 ----- BREAK -----

1110 **VADM Johnny R. Wolfe, Jr., Director, Strategic Systems Programs**

1150 **RDML David A. Goggins, USN, Program Executive Officer for Submarines**

1230 Closing – ADM Kirk Donald, USN, Ret.

**Naval Submarine League
Corporate Member Days
Congressman Adam Smith (D-WA)**

VADM JAY DONNELLY, USN, RET.: Let me introduce our next guest speaker, Congressman Adam Smith from the Seattle area. His biography is in your program. I won't go into the details. Since January he has been the Chairman of the House Armed Services Committee, and we're really pleased to have Chairman Smith join us today. Thank you.

REP. ADAM SMITH: Thank you, it's great to be here and I appreciate all the work that all of you do to make sure that we have a strong national defense. I have many subcontractors in my district. I know we think of the Pacific Northwest as being all aerospace, but we actually have a number of companies in our district who make equipment for submarines and naval vessels as well. So, I see the work that you do. I know how complicated and how intricate and how important it is, so I thank you for that work.

I think we're in interesting times, as the cliché goes. There are both challenges and opportunities, and I will tell you -- I've told everyone -- as I became chairman people were like, what are your priorities? On the Armed Services Committee there are really two top priorities for all of us. Number one is to maintain the bipartisan nature of the committee. As I always say, we are the most bipartisan committee in Congress, and the joke is that's a very, very low bar to jump over.

But it is nonetheless true and maintaining that is incredibly important. I could not have a better partner than Mac Thornberry. I was privileged to serve as his ranking member for his four years as chair. We work very, very well together.

Because of that relationship, it has an impact on the committee. The committee is very bipartisan. In fact, I'll say this -- it will probably get back to him, but Matt Gaetz is on our committee. Matt has been on television, I think, more than any other member of Congress, normally in a way that Democrats don't like, but you wouldn't recognize it on the committee.

I haven't told him this, but the first couple of times I called on him

there's a certain sense of trepidation there. But it's all substance. He just told me the other day, he said it's great to be on a committee where we're focused on issues, focused on working together and solving problems. We don't always agree, but we have the opportunity to really do what legislators are supposed to do. So I appreciate that.

The second thing is, we pass our bill, every single year. I think it's 58, might be 59 years now, and that is almost never easy.

People take it for granted, but I can tell you in the seven, eight, nine years, whatever it is, that I've been ranking member, every single year there are at least three or four times when we're like, it's not going to happen. We can't solve this problem. I don't know how we get past this, but we always do. I think the biggest part of it is we know that we have to. It is our responsibility to get that done.

So those continue to be my top two priorities, and I'm cautiously optimistic that we're in good shape to do that this year. I will tell you Joe Courtney does a spectacular job on the Seapower Subcommittee. His understanding of all of these issues -- he works in the way that I just described, in a bipartisan way, moving the issues forward. He's incredibly efficient and effective, and I know how important submarines are to all aspects of our national security.

We had a hearing a couple of days ago on our nuclear deterrent and the Nuclear Posture Review. Without question, the submarines are the most important part of the triad and the most reliable, that we need. So, maintaining a robust submarine force going forward is a huge priority for me. By and large, I just do whatever Joe tells me, but I understand how important it is, and we're going to continue to do that, and I think we're on a good track.

The two submarines a year, now we're up, I guess, talking about perhaps building a third one. I'll save that for the Q&A. But we're on pace in this program. We're going forward with what we're talking about doing and you can see exactly how we're going to get -- continue, hopefully get, up to the 66 attack submarines that we want, and the Columbia Class. It's moving forward in a positive direction. You can't say that about every other aspect of the defense budget, as you might imagine. So, I feel really good about where we're at with Seapower.

The final two things that I will say that are sort of caveats to all



of that, that make this a bit of a challenge, is number one - this year's budget. There was a growing consensus -- a very positive thing happened about a year or two years ago now, when we got an agreement on FY18 and FY19. Prior to that point, as you know, we'd been stumbling through shutdowns and CRs and threatened shutdowns, and it was impossible. DOD did not have a full year budget in that entire post-Budget Control Act period. I can't imagine trying to manage anything when you don't know how much money you have or what programs you can fund from one month to the next.

But what happened when we got that agreement on '18 and '19 was finally -- and I'll spare you my long budget speech -- but finally we got to the point where as much as people were reluctant to address the appropriations process, because the short version of my speech is the American people expect us to balance the budget while cutting taxes and increasing spending on the programs that they like. In case you haven't figured it out, that's actually impossible. So, that is the reason why the Budget Control Act failed to begin with and why we don't want to pass appropriations bills.

Voting for an appropriations bill is by definition a bad political vote, because whatever appropriations bill you're voting for, it's not going to balance the budget while cutting taxes and increasing spending. To begin with, all appropriations bills, as you well know, are about a quarter of the overall budget. But that had just locked us into paralysis. You always wanted to be a "No" on the appropriations bills, and that created a problem.

But finally it reached the point where the devastating impact of all these CRs and all of this uncertainty, not just in DOD but across the discretionary budget, that impact finally reached the point where the cost of being responsible for that got ever so slightly higher than the cost of voting for a budget that didn't magically balance, and we got a deal. The momentum from that deal is still there. Senator McConnell and Steny Hoyer have been talking a lot. There is incredible momentum within Congress to get a deal for the last two years -- yes, we're finally down to it -- the last two years of the Budget Control Act. So, we're in a position to do that.

What Mr. Mulvaney has done over at the White House has not been

helpful. The budget that is going to come out on Monday, as you all know, keeps the budget caps in place. You should actually be laughing about that when you know what that really means but it keeps the budget caps in place by putting all of the increase in defense spending into the OCO (Overseas Contingency Operations) - \$174 billion in OCO. They've even gotten to the point now where they've divided the OCO up, and I love this. When irresistible forces and immovable objects meet you've got to come up with something that's nonsensical.

They now have the real OCO and then the OCO that is base. People have dubbed it FOCO.

Literally, fake OCO. You're calling it fake; everyone knows it's fake and it really isn't going to get very far. I've been here 23 years now and I said back actually during the Clinton years when I was first here, when people asked, do you support the president's budget, do you support the president's budget? I finally, in frustration, said look, the president's budget is a work of fiction. It always has been, and it always will be. Congress looks at it and then does what we were going to do in the first place. So, we have been moving past presidential budgets that we don't agree with for a very, very long time.

What I am worried about is how does the White House work its way back from saying that they're not going to lift the budget caps? Because I will tell you, there is no way on God's green earth that the budget that they proposed is going to pass. It probably wouldn't pass the Senate, it darn sure isn't going to pass the House, because if people haven't noticed Democrats are now in charge of the House, and we're not going to do that.

So how do we get back from that? We've been here -- I hope that the House and the Senate will continue to work in a bipartisan way to come up with a budget agreement that is doable. Because if we don't, and if the White House goes "No, we're going to stick to this non-starter of a budget plan", we're right back into CRs and shutdowns for who knows how long. If we're going to cut the deal in March, why don't we cut the deal in September?

As good as FY18 was in that eventually we got an agreement, it happened five or six months into the fiscal year. It didn't help -- we have too much money, we don't know how to spend it. Literally, that's what



they said.

And there were some mistakes made, because when you're trying to spend that much money in half the time, it's difficult. FY'19 was what we should do. On October 1 you had your budget, 100 percent, for the full year.

Yes, Virginia, there is a Santa Claus. It can happen. That's what we need to do, and not wait until the last minute and throw all that uncertainty out there.

The second thing that I always like to talk about, that I don't think anybody else on the Armed Services Committee likes to talk about, is that when you look at what we are projecting in terms of DOD spending -- and pick your thing: a 355 ship Navy, we need to spend more money apparently on missile defense, we've got a Nuclear Posture Review that's going to boost the amount of money we spend on nukes by about \$20 billion a year for 15 years, the Army wants a new strength that's 540,000 or something like that, the Air Force just came out and said they need 25 percent more planes. If you align all of that up, and typically that's what we do in the Armed Services Committee, we are very siloed. We have a group come in that says look, the combatant commanders are only getting 50 percent of their requirements met. Oh my God, so we have to spend the money to get the other 50 percent, and we're focused on that.

But if you actually step back and add all of that up, add all those sharings up, it doesn't work, not unless \$10 trillion is going to magically appear over the course of the next 30 years. I don't think that's going to happen. We are on pace, with the demands and expectations within our defense budget to require a yearly defense budget of well north of \$1 trillion. We're not going to have the resources to have a defense budget well north of \$1 trillion. We have to start making choices. And if we don't, we're going to come to the edge of a cliff and then we're going to be scrambling, not so much making choices as acting out of desperation.

Now I know budget futures are unpredictable, and we can sit here and say there's no way we're going to have a defense budget past this point. Maybe things will change, we'll get there. But there is a point at which on that scale where you have reached the absurd, where there is no way with a \$22 trillion debt and a deficit of \$1 trillion a year and an

aging population and infrastructure needs and healthcare needs and on and on, that we're going to be able. So, we set ourselves up for failure if we create a long-term budget expectation that we cannot meet.

What I'm really concerned about is readiness, making sure the men and women who serve in the military are trained, equipped and ready to do whatever mission it is that we ask them to do. If we decide we've got to be ready for everything, we will never be ready, and we will have men and women in our armed forces who do not have the training and equipment they need to meet the missions that we're talking about doing.

So those are my two concerns, getting through this last two years of the Budget Control Act, and then having a realistic budget for the future, so the Department of Defense can absorb that. I'll take your questions. I'm told this is not a shy group, so however you want to organize that.

But again, I appreciate the opportunity to be here. I look forward to working with all of you on getting some consistency into our budgeting process.

RDML KEN PERRY, USN, RET.: Mr. Chairman, good morning and thank you for being here. I'm Ken Perry.

Earlier this week you chaired a hearing on nuclear forces policy and posture, and you affirmed your support for a strong credible strategic deterrent. You also said, as I think you remarked this morning, that doesn't necessarily look exactly like the Nuclear Posture Review. Can you talk about, what in your view are the key components of a strong strategic nuclear deterrent capability, what makes it credible, and the challenges you're going to face in deciding how you fund, resource that strategic deterrent capability, recognized Admiral Richardson just presented his design for maritime superiority, and the Columbia Class is number one, an LOE-1 top priority?

REP. SMITH: A credible nuclear deterrent is very simple. We have to have enough nuclear weapons so that any adversary feels that if they launch a nuclear attack, they will absorb an unacceptable level of retribution, put simply. And my quibble is, how many nuclear weapons we need to have to make certain of that? I feel that we have -- and we've come down a long way from where we were when we had an absurd



number of weapons -- we've got about 4,000 warheads at the moment.

Nuclear weapons have an incredible destructive capacity. Do we really need 4,000, as I asked one of our witnesses the other day? If we had 100 nuclear weapons to launch at Russia, do you think that would be acceptable to them enough to take the risk? He really didn't want to answer the question. He was a very good witness, a very smart man. But yes, obviously. So, do we need as many as we're talking about? I don't believe that we do.

Now you can come up with, what if they were to come in -- whatever scenario you have at the end of it, we have hundreds, at this point thousands of nuclear weapons left over to attack. And we have to make it clear to all adversaries, any nuclear attack will be met with overwhelming response. This is my problem with the low-yield nuclear weapon. They say we need a proportional response. No, we don't. We need an overwhelming response. If the Russians think they can launch a low-yield nuclear weapon and we'll go gosh, we only have one that's bigger than that, we won't fight back, we need to disavow them of that notion as often as possible. We will hit you and hit you hard if you think you can use a, quote, "tactical" nuclear weapon. I just question whether or not we need as many nuclear weapons as we're talking about.

Now, I'm in the right crowd for this. If I was in the Midwest, they'd be throwing me out of here by the time I got done talking. But without question, the most important part of our deterrent are the submarines. It is the majority-plus of weapons, it is the most survivable, and it gives you the most flexibility in terms of how you respond.

So, I do not agree with one of our other witnesses that said we only needed like five. I'm a little skittish about the 12 number (of submarines), but I think it works with the number of tubes we're talking about doing. But how many bombers do we need and what is the role of the ICBMs? Do we need all of those silos and all of those weapons? They are the least survivable part of the triad, and also the most risky.

You've got a "use it or lose it" situation. If you look at a screen and say oh gosh, it looks like an attack is coming in, you've got a pretty small amount of time. And if we ever get to the point, which I'm sure we will, of hypersonic missiles, then you've got a really small amount of time to figure out whether or not you launch. And if you haven't had

the opportunity to read former Secretary Perry's book "My Life on the Nuclear Brink," the number of times when there were people looking at a screen and going, that looks like a nuclear attack. What's going on?

There were moments on both sides -- with the Soviets and with us -- there were moments when you thought an attack was coming in. Now, we didn't -- obviously, because we're all here -- step over that line, but I worry about that aspect of the triad. But overall, it's the sheer numbers. And again, it comes back to what I said about the budget.

They're talking about \$1.2 trillion for nuclear modernization. Okay, if we spend that, do we have enough money for a 355-ship Navy, enough money to build the airplanes we need? And more importantly, to my mind, is command and control.

This is what came out in the hearing, the ability to make sure that no one comes in and cyber-attacks us and neutralizes all of our nuclear. That's where I want to spend the money, and not just in the nuclear world. Our space, our systems control, cyber, information warfare, these are relatively low-cost -- our entire system is dependent upon all of that working.

With all of that, does it really make sense to rebuild everything and every piece that we had? I don't think it does. Typically, what people who come back at me say is, you think we should unilaterally disarm?

No, I didn't say that. I said that we need a credible nuclear deterrent. We're arguing about how much. And when people look at the Nuclear Posture Review and say, that's the gold standard, I have three responses to that.

First of all, we have this tendency to, whatever the number is, we've got to keep it there. What if somebody came back and said the Nuclear Posture Review should be up here? Is that now what we can't build below? I will not name the person who said this, but someone who was testifying when we were talking about having a \$730 billion budget, and this military officer said, anything below \$730 billion is an unacceptable level of risk.

Two or three weeks later the president said, we need \$750 (billion). I'm quite certain if that guy went back and testified, he'd say anything below \$750 (billion) is an unacceptable level of risk. That's just the way they think. We have to look at the budget and make it work.



The second thing is, I love the military. The biggest thing I love about the military is if you ask them, can you do this, the answer is yes, reflexively. Can you take that hill? Yes, and that is good.

However, I'm not going to 100 percent rely on the military coming in and telling me they need more, because they always tell me they need more - A; and B - there's a lot of mouths to feed here. If I say yes to everybody, eventually somebody is going to wind up short, and that's the concern.

As I said earlier, if we start, we've got to build this, we've got to do this, we've got to do that, then we get to the point where the budget goes like this, this is how a readiness crisis is created. So, I think there is money that can be saved, in terms of how we meet our nuclear deterrent requirements, and that was the dialogue that I was trying to spur.

The second piece of it is I also want to open up dialogue with the other nuclear powers. This was very important, dialogue in arms control discussions. If we're talking -- actually, I'll say a positive thing about Donald Trump. I think talking with Kim Jong Un is good. That makes a lot of sense.

That's one of the things I worry about - with the Soviet Union, we had developed a system of talking, which is part of the reason these false alarms didn't lead to a nuclear catastrophe, and we've lost that. So, I want to reopen the dialogue with other nuclear powers, Russia and China primarily, and North Korea, to say we don't want to obliterate the planet, and you don't want to obliterate the planet; why don't we open up lines of communication to make sure we don't do that? So, I think we need to sort of reboot how we look at nuclear weapons. That was the purpose of the hearing.

RADM MICHAEL JABALEY, USN, RET: Good morning, Mr. Chairman, Michael Jabeley. I understand that this is more of an appropriator question than an authorizer, but as a member of the Congressional leadership do you think that the experience with this year's partial government shutdown will make it more difficult to pass a standalone defense appropriations act?

REP. SMITH: It's going to be difficult to pass a standalone defense

appropriations act, period. The experience with the shutdown certainly didn't help. Randy Forbes and I used to have this argument every hearing.

There are other needs within our government. The discretionary budget -- and that's the big problem, of course, \$3 trillion is mandatory non-discretionary. But the discretionary is \$1.1 (trillion), a little bit more, defense is 55 percent of that, so the other portion of the discretionary budget is \$450, \$480 (billion). I forget what the BCA number is on the non-defense stuff, but it's really important.

When we were having the argument over the emergency to build the border wall, people were asking, where else would you spend the money? Our infrastructure. We have bridges collapsing across the country killing people. We have water that people can't drink. We have an aging infrastructure.

I understand that these estimates are no more reliable, but we're \$600 billion behind in terms of what we need to build in roads and bridges and water and sewer and energy grids and all of that. Also, a significant portion of the non-defense discretionary budget is also for security. It's the Department of Homeland Security, it's CIA, it's a whole bunch of different pieces that are incredibly important.

So, to say that the only thing that matters is defense -- and I've been told we can't hold defense hostage to the other needs in our budget -- yes, that's one way to look at it. We have collective needs. We can't say only one thing matters and everything else we'll just survive on it. Health care - people are dying in this country because they don't have access to health care, and we have an incredibly wasteful and inefficient health care system.

So, anything that we're going to do is going to have to be a package deal. We're not going to let defense go through the buffet line first and have everyone else go by and there's nothing left. It's not going to work.

Finally, last year, or two years ago when we cut this deal, Republicans in Congress accepted that. We cut a deal and we did it, and I think that's what we ought to do now. So yeah, defense approps is not going to go through and be signed by the president because we know full well that the president and others have made it clear that they almost literally don't care about the non-defense discretionary budget. That's not true



of Republican appropriators and some others, but they act like it's just wasted money.

To present a budget that is a five percent cut from the BCA number in non-defense, and I think \$174 billion above budget numbers like 25 to 30 percent -- so a 30 percent increase in defense spending and a five percent cut in everything else, that's not going to fly, and it shouldn't, in my view. That is not reflective of what the priorities should be for the American people and what we need to make our country what we want it to be. It's not just about the military budget. There are a lot of other priorities that I think need to at least be discussed.

Like I said at the start, we're really close, before the president put his budget out, before the whole shutdown the government over the wall thing, and that hasn't gone away in terms of the bipartisanship within Congress. But at the end of the day, the president has got to sign whatever we do, so that is the thing that gives me pause about being optimistic about the year.

CAPT BILL HOEFT, USN, RET: Thanks for coming, sir, Bill Hoeft. Just to follow up on this, when Kennedy was president the defense budget was 70 or 80 percent of the total federal budget. Today the defense budget and the rest of discretionary spending as you've described, are 15 or 20 percent of the total budget, and the entitlements or payments to individuals or whatever you want to call it, has gone from 15 or 20 percent to 80 percent. It's a tsunami.

As we play out the years going forward, the whole discretionary budget, defense and otherwise, is going to get buried with these other priorities. I guess my question is, how do you operate in Congress and what hope can we have of actually looking at the whole budget instead of just pretending like discretionary is the only pile and the rest is growing at a rate that's bigger than the Navy budget every year. Would you care to comment on that?

REP. SMITH: Sure, and now you're going to get my budget speech.

First of all, people talk about what the defense budget was during Eisenhower and Kennedy and all that, and that's wonderful but that was before Medicare. Before Medicare, when you got old, you didn't get

the health care you needed unless you had an enormous amount of money. Basically, our government became more robust because there were needs out there. If you remember, Bobby Kennedy going through Appalachia and seeing the unbelievable poverty out there.

So yes, we significantly increased other portions of the budget basically to try to give economic security to a broader group of American people. I think that's a good thing, and I don't think we should go back to the days when the defense budget was 70 percent of the budget, and we had people in that level of poverty, and we didn't have the infrastructure, and we didn't have the health care support through Medicare and Medicaid. So that's part of it.

That said, I completely agree that if you just look at the discretionary budget, you're not really looking at the big picture. What we've needed to do for some time is have a big conversation about revenue and entitlements. Now I will tell you why we haven't, and that's because -- I blame pollsters at the end of the day.

I remember they went out and did a poll about how we can reform Medicare and the public would support it. I looked through the poll and basically if you don't tell people the truth about what you're planning on doing, if you sugarcoat it, they'll probably like it. Someone paid \$50,000 for that advice? Basically, if you tell people what they want to hear they're going to be happy. I learned that when I was eight years old. But that has become the operating agenda for how we look at the budget question.

I remember I had a candidate who came to see me about 10 years ago now and wanted money. She was running in a conservative swing district. When you're a candidate in one of those campaigns you're like on auto-pilot. You talk in sound bites and it's really funny to see. She talked about, I'm for a balanced budget amendment. I said, so what taxes do you want to raise? Well, I don't think we need to raise taxes. What we need to do is we need to reform the tax system so that we get rid of the write-offs and it's fairer to people.

Yeah, that's a great way of saying nothing. Okay, well what do you want to cut? The entitlements are 50 to 60 percent of the budget. She said, I think it's really important that we shore up Medicare and Social Security.



Why is this person talking like this? They're talking like this because they did a poll that said the public wants a balanced budget, but they don't want anything they like cut and they don't want their taxes raised. So that's what you have to tell them.

This has become institutionalized. The whole thing, cutting taxes raises revenue -- I just want to slam my head against the wall every time somebody says that. I understand the argument. I'll go back to Kennedy for you.

I always have Republicans who come up to me and say, Kennedy cut taxes and he cut the capital gains rate and that increased the economy. I say, do you know what he cut the capital gains rate to? Fifty percent. It was 66. The top rate in this country was 90 percent. If your top rate is 90 percent and your capital rate is 66 percent, yeah, you've got a confiscatory tax system and cutting taxes will help revenue.

We don't have that anymore, okay? We have a 37 percent top tax rate and the capital gains rate, I forget what it is, but it's really low. So, you're not going to -- but that's what we've convinced ourselves of. Do you know how easy my job would be if cutting taxes increased revenue? You could literally put a chimpanzee out there, and it would be easy.

And then I have on the spending side people coming to me and telling me, for every dollar we spend on this program it saves six dollars down the line. Now being a Democrat, they're always surprised when they say that, and they've got their talking points and they're really earnest in my office, and I say no, no it doesn't. I love your program, I'm not saying I'm not going to support it, but that's bullshit, okay? And it's not helpful because it plants in your mind the notion that we can keep spending money and it will go up.

But this is why we can't address the deficit, because we have convinced the American public that they can get something for nothing. And then, to a certain understandable degree when they don't get it, they're pissed. Now I think there is a little bit of blame that the public believes this, and I think if we have a mature democracy, they shouldn't put all the blame on the elected officials. I mean, you voted for us. Vote for something different.

Now I don't do this. I tell people straight up, these are the numbers, and this is where we're at, but I am unusual in that regard. So as a con-

sequence, that is what has pushed this problem. There's another piece of it, but if we want to address it, you're right. But how do you come to us and say, cut Medicare and Social Security, when you just freaking cut taxes by another \$2 trillion, for no good reason other than to put even more money into the hands of people who have more money than anybody in the history of the human race has ever had? Really? It's frustrating.

So, we've got to get the revenue piece as part of the conversation, and then we can talk about the entitlements portion of the budget. But I've always got these sober -- I'm sorry, I was going to make a sarcastic comment about Howard Schulz. He took the Sonics away from Seattle, so I'm entitled.

Business guys are like, we must be fiscally responsible, we must deal with this, and by the way you need to cut my taxes so I can do even more good with the \$50 billion I've got in the bank. That just doesn't play well overall. So, we've got to have that broader conversation on how we get there.

The final piece of this, understand, is both conservatives and liberals have now come up with arguments for why the debt doesn't matter. I'm excited about that. It's like when the guy comes up to you and says look, I've got this great all ice cream diet. All you do is eat ice cream and you're in the best shape of your life.

I'm like, go on.

You're interested. So, I read about it. Basically, the debt -- the federal government is not like a business, is not like individuals. You asked me this question when I was supposed to be wrapping up, and there are so many important things here, but we print money. So, basically, the argument is the debt and the deficit don't matter because at the end of the day we can print the money and pay it off. That's true. It's also true that at a certain point if the interest rates and inflation is low enough, and there's other economic factors, it's conceivable you could do that and not do too much damage.

But what we've learned -- and I love this long article explaining why this is so -- at the end they say, the only downside is if you do this and you set off high interest rates and inflation, a problem is created. If that happens, you just raise taxes and you cut spending, because we all



know how easy that is. And also, once you've sort of start rolling down the cliff, it's a little hard to sort of find that branch to stop you, as Greece and a whole lot of other places -- even the United States, that's what we did in the '60s and '70s. That's why inflation was 20 percent.

So, I wish debts and deficits didn't matter, but what we're battling against to have the conversation that you want, is "Cut taxes - increase revenue, increase spending, decrease spending. Deficits and debts don't matter, we can make it work."

Why do we want to believe that? Because it's easier. It's hard, I mean, you don't want to cut spending. These things are difficult. But we're not having the conversation.

So before we can get to an honest conversation about the budget, we've got to deal with all that stuff I just said. Because, right now there aren't too many politicians saying what I just said. Decide what you want to do. That's fine, if you want to come out and say it, I hear you, but we're willing to have a \$30 trillion debt. We're okay with it.

Fine, but stop lying, okay? Stop making crap up to make it sound like we don't have problems that we really have. So, yes, we need to have that conversation, but we're 100 miles away from it right at the moment.

Sorry about that.

We have time for one more.

REP. SMITH: Don't ask me about the budget and I'll be briefer in my response.

MR. JOSEPH BUFF: Firstly, thank you for your suggestion about the all ice cream budget. I'm going to take that. My question, coming back to nuclear weapons if I may, especially in this audience where I think there's a lot of people engaged on this subject who can understand the issues, with what the CNO said this morning, set more emphasis on the nuances, something that I haven't seen much, or anyone has really in the open media, on the question of what's the right size for our nation's effective nuclear arsenal, is exactly what is the rule for launching a retaliatory strike in the event that someone else is foolish enough to make the first strike, which you never know and you should never say never

about anything in nuclear deterrence?

What I think is personally of interest and very much in your opinion and your committee's opinion, the bugaboo, which is in a way really what it is if you think it through of the incoming nuclear attack, or is it really the hypersonic missiles which give you less time than ever and are the hardest of any technology to intercept. My God, we've got like five minutes before they take out the White House, oh my God, or Chicago, New York, LA or name your favorite 20 cities. The problem is that bugaboo or red herring going around and around and panicking and making people be too anti-nuclear is all based on launch on warning. In fact --

REP. SMITH: It's not our policy, I know. Launch on warning is not our policy. I know that.

MR. BUFF: Okay, but that hasn't been made clear. But if we specifically articulate it -- maybe it's there, but I just haven't seen it, in which case I apologize.

REP. SMITH: It has not been specifically articulated, but let me take a stab at it, if I may. I think there are a couple of things that we need to be clear on. Our nuclear weapons are there to deter nuclear attacks, period, end of story.

When you start having conversations, as the Russians have, about using nuclear weapons first or for another purpose, that's when you go down the slippery slope. When we look at our arsenal -- I think our arsenal should be what's necessary to deter anybody from doing a nuclear attack. And like I said, then you get into all these scenarios about well, what if they launch this and took out all these missiles?

The reason we have as many as we have is --

MR. BUFF: I'm sorry to interrupt but someone is interrupting me. We do respect you both. My question is, what about formally adopting and publicizing the launch after attack strategy, or is that already what our strategy is, which is we let those missiles come, if they're real. And if they're going to hit, we see where they hit and if they're live we see whether their warheads are nuclear, and then decide?



REP. SMITH: Got it. That's another way of saying --

MR. BUFF: That was my point. Thank you very much.

REP. SMITH: That's another way of saying no first use, basically, and I agree with that. I am the sponsor of a no first use bill. So, end of discussion.

But what I really worry about and what I want people to know is once you -- there's no such thing as a tactical nuclear weapon, okay? That phrase has always concerned me. Once you launch a nuke, it's like -- I should have just played the movie "Wargames" for my committee. There's no way to win. No way, it doesn't work.

Once you start launching them you obliterate the planet. What we have to do is make sure that nobody starts to think, as the Russians did -- and I don't know if they still do -- well, we can use nuclear weapons to escalate to de-escalate. That's the kind of thing that we need to start a dialogue about, and we need to make it clear to them that there is nothing -- if you launch a nuclear weapon you will have an unacceptable amount of pain come your way.

That is why the dialogue is so important. This goes back to "Dr. Strangelove." Sorry, I saw the movie recently. Not my choice, it just worked out that way.

But if the other side doesn't know what you're doing, then they start thinking, maybe we can get away with it. That's why the dialogue is so important. Then yes, a robust nuclear deterrent. But when you start talking about low-yield nukes and proportional responses, then you're having a conversation about how to sort of live with a nuclear war, and that is a conversation I do not think we should allow.

Thank you very much.

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er of nuclear components and fuel to the U.S. government. BWXT provides technical, management and site services to support government in the operation of complex facilities and environmental remediation activities; and supplies precision manufactured components, services and CANDU® fuel for the commercial nuclear power industry.

CACI

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CACI provides information solutions and services in support of national security missions and government transformation for Intelligence, Defense, and Federal Civilian customers. A Fortune World's Most Admired Company, CACI is a member of the Fortune 1000 Largest Companies, the Russell 2000 Index, and the S&P SmallCap600 Index. CACI's sustained commitment to ethics and integrity defines its corporate culture and drives its success. With approximately 18,700 employees worldwide, CACI provides dynamic career opportunities for military veterans and industry professionals to support the nation's most critical missions.

CAMEO, Professional Support Services, LLC

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Cameo Professional Support

Services, LLC (CAMEO) is a small, woman owned business providing engineering, technical, logistic, configuration and contract administration/accounting services to the government, primarily the US Department of Defense (DOD). Cameo currently provides Fleet Site Support to Naval Undersea Warfare Center, Newport detachment and on-site-office at Bangor, WA, Kings Bay, GA, and Newport, RI. Services include system/subsystem technical resolution, logistic and modernization installation/management, configuration management, and classified data management for Ohio class submarines.

CEPEDA

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CEPEDA Associates, Inc. is an ISO 9001:2008 compliant, Level 1/SUBSAFE Qualified, 100% Department of Defense Supplier.

Services:

Engineering and Design

Development

Reverse Engineering

Prototyping

Product Support

Acoustic & Operational Testing

Product Qualification

Navy-Approved Welding & Non-Destructive Testing

GTAW: Stainless steel, carbon steel, aluminum, Hastelloy, Incoloy

GTAW: Socket welds in stainless steel down to 0.035" wall thickness

SMAW: Stainless steel, carbon

steel

Plasma Needle Arc: Hastelloy
GMAW-P: Stainless steel, carbon steel

Build-to-print

Large-Scale Custom Machining

CEPEDA's product line includes: CO₂ Scrubbers, CO/H₂ Burners, Automatic High Pressure Dehydrators (AHPD), Missile Dehumidification and Drying Machine, CO₂ Absorbent Canister Receptacles (Hoppers), Demineralizers, Hydraulic Accumulator Contents Indicators, Operating Rods, Piston Rods, Valve Components, Actuators, Candle Furnaces, Fire Extinguisher Brackets. Our products proudly support all Ohio, Los Angeles, Seawolf, Virginia, and Columbia Class submarines.

Cogitic Corporation

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Cogitic is a Colorado-based engineering and manufacturing company specializing in complex geometry components and assemblies produced from difficult-to-machine materials, for critical applications. Cogitic's specialty is "medium size" components, with capability of full five-axis machining up to 60" x 72", horizontal turning up to 38" x 176". Cogitic also has a full array of in-house support processes including welding and brazing to Tech-Pub S9074-AR-GIB-010/278, precision grinding, hydrostatic, temperature, and thermal shock testing, and ultrasonic

stress relieving.

Collins Aerospace

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Proven provider of products and services to global defense and commercial markets that enable mission success above and below the sea, in space, in the air, and on the ground. Manufactures products providing actionable intelligence through surveillance and reconnaissance solutions; products for small unmanned airborne systems; state-of-the-art Shortwave Infrared (SWIR) products to support warfighters; and environmental control and life support systems that enable humans to safely operate in space and under the sea. Long-time leader in development, testing, and manufacturing of high performance marine composite structures, rubber, and urethane products providing superior quality and longevity with reduced maintenance.

CUNICO

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CUNICO, is the leading manufacturer of specialty fittings (nuclear/non-nuclear), piping systems and valves for the U.S. Navy. CUNICO has unique capabilities, focused on submarine and aircraft carriers. CUNICO specializes in nuclear fittings and non-nuclear fittings, mil-spec valves



for the US Navy and the prime defense contractors for the Nuclear Submarines (SSNs), Nuclear Aircraft Carriers (CVNs), and U.S. Navy (USN) Surface Ships. Our products are also sold to the Navy of other countries worldwide. Products include custom fittings (all sizes, materials and pressure classes), plug valves, cartridge valves, manifolds, reducing stations, regulator valves, custom valves and assemblies are our specialty that we manufacture to specific customer specifications.

Related company, Dynamic Controls Ltd. (DCL), is the "Leader by Design" of high and low pressure cartridge valves, manifolds, reducing stations and fluid/gas systems for critical, demanding applications.

DCL has an extensive, growing installed base in excess of 60,000 cartridges (as of December 2015) on Nuclear Submarines, Diesel Electric Submarines, Aircraft Carriers, Navy Surface Ships and Gas Control systems for Rocket Launch pad(s) and LNG Gas Supply System for ME-GI Gas-Injection System manifolds for shipping vessels.

Curtiss-Wright

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Curtiss-Wright's Defense segment provides our nation, and several international defense forces, with vital aerospace, ground and naval defense systems and support. Reflecting our strong presence on key platforms, Curtiss-Wright

is well positioned even in challenging defense environments, providing a wide range of solutions and critical technologies required for today's most demanding defense applications, from controlling the lift, flight and landing of aircraft to stabilizing the weapons systems on armored tanks.

Cydecor

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Cydecor is a certified SD-VOSB supporting maritime expeditionary programs across the US Navy and Naval Special Operations Command for more than a decade. From the earliest years of our corporate history, Cydecor has leveraged best practices and incentivized productivity, assisting highly interdependent DoD organizations in providing innovative efficiencies to maximize resources towards essential mission requirements. We employ a flat, agile operational structure—a lean corporate overhead that has allowed our company to maintain a customer-centric approach coupled with the highest quality standards.

Cypress International

CAPT John Newton, USN, Ret.
cypressintl.com

Cypress International is a closely held corporation, organized in 1978 and staffed principally by retired senior military and civilian DoD

professionals. Cypress specializes in the business development, marketing of defense and aerospace products and services, and homeland security. The professional staff consists of retired senior military and civilian members of the four military services and defense agencies. The professional staff is further supported by a network of field representatives at key defense installations, a select group of contract professionals, and a full-time research facility.

Deloitte Consulting LLP

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As part of the largest management consultancy in the world, our consultants offer global experience and local knowledge to help you succeed in any public or private business environment. With more insightful business perspectives, we help focus your strengths, push your capabilities, and innovate for the future. Our consulting firm is organized into three primary service areas that power the potential of your business: Human Capital leverages research, analytics, and industry insights to help design and execute critical programs from business driven HR to innovative talent, leadership, and change programs. Strategy & Operations works with senior executives to help them solve their toughest and most complex problems by bringing an approach to executable strategy that combines deep

industry knowledge, rigorous analysis, and insight to enable confident action. Technology delivers solutions that help drive transformation, improve productivity, and streamline business operations. Our practical, innovative solutions are linked to measurable goals to help our clients achieve competitive advantage.

Delphinus

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Founded in 1994 as a small, diversified professional services company, Delphinus today employs more than 500 professional and technical personnel supporting a customer base that spans the Defense and Federal markets. A successful graduate of the Small Business Administration's 8(a) program, we have evolved into a leading provider of expert services in our core competencies of Information Technology, Marine Engineering, Marine Services, Facilities Operations & Maintenance and Business Management. Headquartered in Philadelphia, Pennsylvania, we have primary offices in Norfolk, Virginia; San Diego, California; and Bremerton, Washington, and a satellite offices in Huntsville, Alabama. Delphinus Engineering plans on expanding their operations and opening a satellite office in Honolulu, Hawaii this summer. Delphinus Marine Engineering is ISO-9001:2008 registered. Delphinus is actively engaged in expanding our support to the US Navy Submarine Force.

Draper

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At Draper, we believe exciting things happen when new capabilities are imagined and created. Whether formulating a concept and developing each component to achieve a field-ready prototype or combining existing technologies in new ways, Draper engineers apply multidisciplinary approaches that deliver new capabilities to customers. As a not-for-profit research and development company, Draper focuses on the design, development and deployment of advanced technological solutions for the world's most challenging and important problems.

Ellwood Group, Inc.

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Ellwood Group, Inc. (EGI) is a family-owned, privately-held company operating since 1910. Having grown to become the leading vertically-integrated supplier of quality metals and custom-engineered components for critical applications worldwide, meeting the most stringent requirements, the ELLWOOD footprint spans 11 business units and more than 25 locations across North America. While employing over 2,000 employees, the same family values are just as important now as they were in 1910. Our family of shareholders understands the necessity to

reinvest a majority of profits fueling organic growth and acquisition. Knowing our long term success depends on continued growth and adaptation we continue to invest in our people and our business with the future in mind.

As specifications become increasingly demanding, we re-invest millions of dollars annually in state-of-the-art equipment to deliver the highest quality metals and components. EGI is proud to provide our warfighters with a wide array of defense products including but not limited to ship shafting and power generation, nuclear and periscope parts. EGI presence can be found in VCS, Columbia, LPD, DDG-51, LCS Freedom Class, and the CVN to name a few.

Fluor Corporation

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Fluor is one of the world's largest engineering, procurement, fabrication, construction and maintenance (EPF-CM) companies, providing innovative and integrated solutions to government and private sector Clients in diverse industries. For over a century, Clients and government agencies have trusted Fluor to accomplish a wide variety of critical missions. From delivering base life support to tens of thousands of soldiers to performing decontamination, decommissioning, environmental remediation, laboratory management and construction services, Fluor



is proud to provide the global strength and innovative solutions on which Clients have come to rely.

Focus Data Solutions

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An award-winning services provider, Focus Data Solutions matches your business goals with the technology and management to see it through. We are your partner for everything IT, with the passion and technological expertise to easily develop and deliver solutions that will drive your business forward.

As a woman-owned business serving clients across all industries, Focus Data Solutions provides IT Essentials, IT Security and IT Strategy services in the Northern Virginia and D.C. metro area. More than simple a-la-cart solutions, Focus Data Solutions partners with you to provide comprehensive strategies that have been formulated for optimal IT maintenance and management.

General Atomics Electromagnetic Systems

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Founded originally in 1955 as a division of General Dynamics, General Atomics ("GA") and its affiliated companies now constitute one of the world's leading resources

for high-technology systems ranging from the nuclear fuel cycle to electromagnetic systems, remotely operated surveillance aircraft, airborne sensors, and advanced electronic, wireless and laser technologies. GA had an initial charter to explore peaceful uses of atomic energy. Leading scientists came to GA, forming the nucleus of a staff which, including affiliated companies, currently numbers about 8,000. GA carries out the largest and most successful nuclear fusion program in private industry. The company has been the primary developer of modular helium-cooled nuclear power reactor systems, and its TRIGA® research reactors have operated around the world for over 50 years. GA and its affiliated entities also manufacture, operate, and service state-of-the-art unmanned aerial vehicles, are engaged in uranium mining and processing, and provide nuclear instrumentation, aircraft launch and recovery systems, superconducting magnets, systems for hazardous material destruction, magnetic levitation systems, medical diagnostic products, information technology and many other products and services for government and industry.

General Dynamics Applied Physical Sciences

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Applied Physical Sciences Corporation (APS) is a growing research and development

company specializing in innovative technology solutions for emerging challenges in both national security and commercial markets.

The foundation of our problem solving approach is a fundamental understanding of physics and advanced mathematics. Applying sound engineering principles based on science, we tailor our technical solutions to meet our customers' most critical needs.

Our laboratories and manufacturing facilities provide the flexibility to rapidly build prototypes to address immediate needs as well as experiment with new innovations for the future. Our employees, our partners and our customers benefit from our commitment to integrity, initiative, and innovation.

As a wholly owned subsidiary of General Dynamics, we offer the agility and entrepreneurial spirit of a small company as well as access to the extensive resources of a large corporation. On a daily basis, we live our motto: "Engineering Solutions through Science."

General Dynamics Electric Boat

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For more than a century Electric Boat has partnered with the U.S. Navy to deliver submarines with the most advanced undersea capabilities in the world. Over that time, Electric Boat has achieved a number of significant first – delivering what would be the Navy's first

commissioned submarine, its first welded-hull submarine, its first nuclear submarine, and its first strategic-deterrent submarine. Today, the company is engaged in serial production of the Virginia-class submarine; design of the Columbia Class, the next-generation ballistic-missile submarine; and development of the Virginia Payload Module.

The company was established in New Jersey in 1899 to complete the world's first practical submarine, the Holland, and has maintained a presence in Southeastern Connecticut since 1911 when it established an operation in Groton to build diesel engines. Electric Boat's other primary facilities are New London, Conn., and Quonset Point, R.I.

General Dynamics Mission Systems

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General Dynamics Mission Systems is a business unit of General Dynamics, a global aerospace and defense company. We are a leading provider of mission critical C4ISR systems across the land, sea, air, space and cyber domains. For more than 50 years we have successfully applied our systems engineering and integration expertise on every U.S. submarine across a range of complex strategic and conventional weapons systems. Our Maritime and Strategic Systems business is a recognized industry leader in developing, manufacturing, installing and supporting high consequence

undersea systems for the Department of Defense, federal agencies and commercial customers. We apply unmatched platform-centric expertise to undersea sensors, undersea infrastructure, and a family of Unmanned Undersea Vehicles (UUVs). Our Cyber and Electronic Warfare business is leading, advancing and transforming cybersecurity to ensure the safety of our nation.

General Tool Company

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General Tool Company is an award-winning supplier of mission critical hardware and systems to the world's leading Aerospace, Defense and Commercial manufacturers. GTC's forte is meeting our clients' biggest challenges on new or long running projects. We use DFM- Design for Manufacturability-skills along with unique technologies, such as large multi-axis machine tool platforms, Friction Stir Welding, Robotic welding or Diamond tooling. The foundations for our success are our technical expertise, our commitment to the highest technology machine tools and ancillary systems, as well as our project management team that keeps customers up to date. We are located northwest of Cincinnati in the suburb of Reading where the Kramer family founded the company in 1947. We are guided by our Company Values that stress teamwork, integrity and open communication in a collaborative and learning environment.

Georgia Technical Research Institute

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The Georgia Tech Research Institute (GTRI) is the non-profit, applied research division of the Georgia Institute of Technology (Georgia Tech). Founded in 1934 as the Engineering Experiment Station, GTRI has grown to more than 2,000 employees supporting eight laboratories in over 20 locations around the country, and performs more than \$350 million of problem-solving research annually for government and industry. Each day, GTRI's science and engineering expertise is used to turn ideas into workable solutions for our customers. We take the best ideas, often co-developed with our Georgia Tech academic partners, and turn them into systems applications that provide a significant technological advantage over other approaches. GTRI's renowned researchers combine science, engineering, economics, policy and technical expertise to solve complex problems for the U.S. federal government, state and industry. We develop highly effective, practical solutions that we put into action. As a non-profit research institute, we are an objective partner who delivers workable solutions and manufacturable products. Our highly specialized laboratories and interdisciplinary research centers allow us to bring the right mix of talent, experience and creativity to every project.



Globe Composite Solutions

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Globe Composite Solutions is a full-service design-to-manufacturing company which provides innovative and cost-effective composite-based applications for the Defense industry. We specialize in material development, part design, prototyping and complex manufacturing of metallic and non-metallic components. Originally founded in 1890, Globe is unique among non-metallic specialists because we have rapid prototyping, machining and fabrication capabilities as well as extensive mechanical and material testing services. We are ISO 9001:2015 certified, have DoD Security Clearance, as well as expertise in: acoustics, corrosion resistance, hydrolytic stability, structural integrity at extreme depths, high-performance gaskets and seals as well as impact & shock resistant parts. Globe can also assist research labs in a wide variety of new technology development and component possibilities. Our engineers and material developers have deep experience in researching and finding creative solutions that enable our customers to more effectively accomplish their mission.

Graham Corporation

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Graham Corporation designs and builds vacuum and heat transfer equipment for process industries and energy markets worldwide (including the US Navy). Graham equipment is used by our customers to help produce synthetic fibers, chemicals, petroleum products, electric power, processed food, pharmaceutical products, paper, steel, fertilizers, and many other products that are used every day by people around the globe.

Gryphon Technologies

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Gryphon Technologies LC, headquartered in Washington, DC, is a premier professional and engineering services provider specializing in warfare systems and integration, naval architecture and marine engineering, program management, test and evaluation, and logistics. Gryphon provides the skills necessary to manage the development and operations of these mission critical systems.

For almost 20 years, the Company has designed, integrated, maintained, and upgraded state-of-the-art systems for the Department of Defense. Gryphon Technologies is the federal government's partner working in support of mission critical systems. We are proud of our ability to help shape tomorrow, while ensuring today's U.S. and coalition forces can carry out their critical missions and tasks.

Harris Corporation

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From ocean to orbit and everywhere in between, Harris provides mission-critical solutions to connect, inform and protect the world. Harris is a proven leader in tactical communications, electronic warfare, avionics, air traffic management, space and intelligence, and weather solutions. Harris delivers its innovative solutions through its three business segments: Communication Systems, Electronic Systems and Space and Intelligence Systems.

HDR, Inc.

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HDR is more than just traditional architecture, engineering, and environmental services. We understand the complex nature of planning and design required for large facilities for defense clients. We have the experience required to work with numerous agencies, administrations, and users to balance diverging interests and build consensus. Our projects range from minor renovations to multi-million dollar, new construction of our nation's most mission-critical assets, including laboratories, SCIFs, cybersecurity, hangars and maintenance facilities, EMP resistant facilities, and cybersecurity of control systems. Our teams work together to deliver technically

sophisticated, unique, facility designs in secure environments for our defense clients around the world.

Hilarides Partners, LLC

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Located in the Washington, DC area, Hilarides Partners delivers engineering, technical and consulting services critical to the US Department of Defense. With over 35 years of proven leadership in energy, intelligence, defense and shipbuilding we strive to provide business solutions that support the nation's most critical missions.

HI-TEST

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We are a diversified testing, research and design facility that has provided unparalleled testing and evaluation services to government and industry since 1975. Each and every day, HI-TEST continues to provide our customers with the very best in test program solutions. From pre-test analysis to post-test report generation, we offer our analytical engineering tools and expertise alongside our testing and design capabilities to make your test run smoothly, safely, and as efficiently as possible. HI-TEST is the only commercial facility in the country to offer all NAVSEA approved MIL-S 901 shock testing

facilities. Our engineers, instrumentation technicians and craftsmen are here to serve as an extension of your own engineering team. Our customers receive complete test program support, including design, fabrication and installation of test fixtures, equipment repairs, maintenance and on-site modifications.

Hunt Valve Company, Inc.

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Hunt Valve Company was founded 1919 to manufacture severe service valves for the U.S. steel industry. Hunt Valve's affiliation with the U.S. Navy dates back to the early days of submarine development with the supply of pneumatic valves that were used to control the periscope's up/down function. This valve was later used in similar submarine applications such as for the snorkel's up/down function. Hunt Valve also supplied valves for the first nuclear-powered submarine, the USS Nautilus in the early 1950's.

Today's Hunt Valve produces innovative engineering solutions that can be found in applications on all six industrialized continents. The company specializes in severe-duty valves, electromechanical actuators, and system solutions for applications that include primary metals, energy, process and U.S. Navy nuclear-powered vessels, including all submarines and carriers in operation as well as

the Virginia Class, Ford Class and soon-to-be-in-production Columbia Class.

Hydro Group Systems Inc

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Hydro Group Systems Inc specializes in the design and manufacture of subsea and harsh environment electrical and optical connectors, penetrators, cable assemblies and terminations for the oil & gas, renewable energy and defense industry. Building on three decades of proven capability and industry experience, Hydro Group has become the market leader in providing bespoke engineered cable/connector assembly solutions for subsea applications in both domestic and international markets. Hydro Group are at the forefront in the development and innovation of subsea product technologies, with involvement from prototype concept through to design, manufacture and project management. Hydro Group manufacture the complete package including FAT at its state-of-the-art facilities in Aberdeen, Scotland; umbilical cables, electrical and optical connection systems / assemblies for data, power and signal transmission. Our focus is primarily in subsea cable/connector assembly innovation. Our day to day business concentrates on product design, engineering and manufacturing of harsh environment composite cables, underwater connectors, topside connectors and pene-



trators for subsea, underwater, topside and onshore applications.

Hydroid, Inc.

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Hydroid is a field-proven technology leader in advanced marine robotics, specifically autonomous underwater vehicles (AUVs). The company designs and manufactures state-of-the-art solutions for use in a number of applications including marine research, commercial and defense. Located in the U.S., Hydroid is a subsidiary of Kongsberg Maritime, the world's most trusted manufacturer of AUVs. REMUS vehicles provide innovative and reliable full-picture solutions. Together, they represent the most advanced, diversified and field-proven family of AUVs and vehicle support systems in the world.

IMES

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"Assessing Risk, Delivering Integrity" Imes is an international engineering services company that provides lifting inspection and specialist engineering services. We exist to ensure our clients maintain the capability and availability of mission critical assets, such as cranes, fixed and loose lifting equipment and specialized structures. Imes is experienced in managing complex

schedules of inspection work in challenging environments – where critical infrastructure maintenance and integrity assurance is vital. Major players across key sectors trust us with managing asset integrity across their complex lifting fleets. We work with the cream of the offshore oil and gas sector operators, US and UK Navies, and major European refineries. They trust Imes to be a key component in their supply chain.

In-Depth Engineering Corporation

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In-Depth Engineering is a leading small business provider of combat systems solutions; development, integration and test services, and waterfront support to the United States Navy. Our programs and efforts span the development and deployment lifecycle; from applied research (SBIR programs), to 6.3 advanced development programs (APB, ACB and ASB), to engineering development programs (e.g. AN/SQQ-89, AN/BQQ-10, AEGIS ACB-20, IUSS, AN/BVY-1, SSTDT, AEGIS, CSEA), system integration and test (e.g. In-Depth is the LCS signal processing subsystem integrator), hardware design and integration (e.g. IUSS ship electronics design, assembly, installation and test), ship integration and waterfront installation and test support (AEGIS Ship Integration and Test), and logistics

and training systems (e.g. Adaptive Sonar, Combat and EW Training Systems).

Innovative Defense Technologies

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Innovative Defense Technologies (IDT) is an information technology business headquartered in Arlington, VA. Founded in 2006, IDT designs and develops best-in-class solutions that enable the rapid delivery of software-based capabilities for the Department of Defense (DOD). IDT's objective is to enable higher quality software to be deployed faster and more affordably through automation. Our technology and expertise facilitate the efficient integration, testing, analysis, and certification of complex, mission-critical systems—accelerating the delivery of capabilities to the warfighter. The company has additional offices in Fall River, MA; Mt. Laurel, NJ; and San Diego, CA.

iXblue Defense Systems, Inc.

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iXBlue is a leading global provider of innovative solutions and services for navigation, positioning, and imaging. Civil and defense customers rely on our systems, operations, and services for the challenges they face at sea, on land, in the air or in space. We are recognized throughout the industry

for our pioneering work on the development of ultimate performance fiber-optic gyroscopes (FOG), acoustic and sonar signal processing, and inertial-acoustic sensor data fusion. In all of these areas, we work to ensure that our products provide high accuracy, unrivalled performance and unsurpassed reliability. iXBlue's offerings encompass inertial navigation systems, photonic components and modules, acoustic positioning and sonar solutions, imaging systems, motion simulators, and stabilized platforms. Our solutions are used in challenging applications, including offshore construction and dredging, geophysics and hydrography, ocean science, maritime vessels and yachting, fishing, naval and land defense, land and air survey, optical communications and instrumentation, as well as aerospace.

JRC Integrated Systems, Inc.

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JRC INTEGRATED SYSTEMS, INC. is a Service-Disabled, Veteran-Owned Small Business (SDVOSB) that provides advanced professional services to solve complex problems for the Department of Defense (DoD) and other government agencies. JRC has the experience and knowledge to help solve your most challenging problems. With employees with decades of operational experience and highly skilled engineers developing

innovative solutions, we are able to provide the right people for the right challenge. Our expertise develops smart solutions. JRC provides an independent source of expertise that is free of organizational conflict of interests (OCI). Our employees will provide you an unbiased analysis that you can trust. We can help guide competing interests to provide the right solution. Independence produces trustworthy results. At JRC, we are motivated to build, create, and contribute. We are driven by the mission to help keep America and her allies safe. The success of our customers demonstrates the results of our work. Mission-driven results ensure the outcomes that you need.

Joe Buff Inc.

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Joe Buff Inc., "An Independent Think Tank of One," specializes in writing and speaking about rigorous intellectual capital for nuclear submarine advocacy; Joe takes a historicist-futurist perspective on undersea warfare policy and strategy. He has a number of articles in THE SUBMARINE REVIEW since 1998, including two first-prize NSL literary award winners, about China (2006) and Russia (2016). Experienced in pure math (algebraic topology) and applied math (actuarial science), he is currently engaged in a multi-year study of 21st century nuclear deterrence conundrums and open questions, develop-

ing some best practice suggestions for America's (and other countries') "nuclear posture after next." Joe has also published six Captain Jeffrey Fuller/USS CHALLENGER submarine technothriller novels; the latest of these won the 2006 Admiral Nimitz Award for Outstanding Naval Fiction from the Military Writers Society of America. The series is a cautionary saga of near-future tactical nuclear war at sea.

John's Hopkins University Applied Physics Laboratory

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For more than 75 years, The Johns Hopkins University Applied Physics Laboratory (JHU/APL) has provided critical contributions to critical challenges through systems engineering and integration, technology research and development, and analysis. Our scientists, engineers, and analysts serve as trusted advisors and technical experts to the government, ensuring the reliability of complex technologies that safeguard our nation's security and advance the frontiers of space. We also maintain independent research and development programs that pioneer and explore emerging technologies and concepts to address future national priorities.

L3 Technologies

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L3 Technologies is a leading provider of a broad range of communication, electronic and sensor systems used on military, homeland security and commercial platforms. L3 is also a prime contractor in aerospace systems, security and detection systems, and pilot training. For more than a decade, L3 has delivered superior performance to the U.S. government, our allies and leading corporations throughout the world. As a top ten defense contractor in the world, we know the critical role our products and services play in the protection and defense of freedoms worldwide. We take our responsibility very seriously, and we are privileged to support our customers and the men and women who get the job done.

Leidos

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For more than 40 years we have been tackling some of the biggest problems that face our nation and our world. We bring a mix of innovative technology and sector expertise to customers in defense, intelligence, civil, and health markets. Our approach is holistic, looking at all the interconnected complexities of a problem. Our brand of science is collaborative, with knowledge shared across disciplines. And our focus is always on making the real world better. Leidos makes the world safer, healthier, and more efficient through information technology, engineering, and science.

Leonardo DRS

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Leonardo DRS, based in the United States, is a leading supplier of integrated products, services and support to military forces, intelligence agencies and prime defense contractors worldwide. Through the acquisition of DRS Technologies in 2008, Leonardo is one of the most qualified and internationalized global players in defense electronics, with a strong presence in the U.S. market. With nearly 5,500 employees in 65 facilities in the United States, Canada and locations around the world, Leonardo DRS is a world leader across a range of state-of-the-art technology for military and civilian government customers primarily in the U.S., Canada, Australia, the Middle East and Asia. The Leonardo DRS' product range is also available in the UK customers through the country's Tactical Systems team. Leonardo DRS satisfies customers' needs in the aeronautical, land and naval sectors through five core areas of capability and hundreds of individual programs. These core capability areas include: naval power and electronics, network and computing, electro-optic and infrared systems, combat support systems, and global communications.

Liquid Robotics

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Liquid Robotics designs and manufactures Wave Gliders, the first wave and solar powered unmanned ocean robots. With our partners, we address many of the planet's greatest challenges, by transforming how to assess, monitor, and protect the ocean. We solve critical problems for defense, commercial, and science customers. Visit www.liquid-robotics.com to learn more. Liquid Robotics and Wave Glider are registered trademarks of Liquid Robotics, Inc. a wholly-owned subsidiary of Boeing.

Lockheed Martin Corporation

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Headquartered in Bethesda, Maryland, Lockheed Martin is a global security and aerospace company that employs approximately 100,000 people worldwide and is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services. Lockheed Martin delivers systems, sensors and payloads that help the Navy achieve acoustic superiority and mission success in the undersea domain.

Major Tool & Machine

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Major Tool & Machine Inc. (MTM) has a 72 year history providing contract manufacturing services in support of Tier 1 and government-direct customers. Our commitment to the Navy, through the manufacture of component parts and assemblies that require welding, machining, and manufacturing engineering services, is unyielding. Our specialty is the manufacture of medium-to-large, complex components and assemblies to close tolerances from all varieties of special alloys. We serve our customers worldwide by offering turnkey services with a defense in depth approach to manufacturing. Major Tool & Machine continues to evolve with the needs of our Naval customers. As an SBA registered small business, employing 400 skilled personnel operating out of our 600,000 sq. ft. world-class campus in Indianapolis, IN, Major Tool & Machine is driven to provide mission assurance through our unwavering dedication to quality, service, our people, and technology.

Marotta Controls

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With over 200 patents and 75 years of experience, Marotta Controls has become a leading control solutions provider for

complex technical challenges. System designers turn to Marotta for solutions they need for controlling pressure, motion, fluid, electronics and power. Advanced technologies include precision valves, manifolds, power conversion, motor controls and control actuation systems that are easily integrated into shipboard and sub-sea applications, weapons systems, military aircraft, and government and commercial spacecraft. Discover how Marotta's evolved control system technologies provide a strategic advantage with optimized design, reduced risk and increased reliability. Visit www.marotta.com to learn more.

Metron

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Metron is a scientific consulting company dedicated to solving challenging problems in national defense through the development and application of advanced mathematical methods. Problem solutions are realized in computer software with graphical interfaces that allow a user to understand and act on the results without having to comprehend the intricacies of the models themselves. Metron's employees are leaders in their technical fields who have made the commitment to solve real-world problems. They excel in statistical inference, operations research, physical modeling, and software development. Our success depends upon recruiting and retaining the best talent available in the

fields of applied mathematics, physics, and computer science. At Metron, we believe that employees should combine their innate talent with a willingness to work on challenging problems and to extend their knowledge to other disciplines. This philosophy allows us to create a team-based approach to problem solving and product development that has been highly successful.

MIKEL

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MIKEL has a tradition of delivering innovative technology and practical solutions to the U.S. Navy. Our core competency spans three major areas: Acoustic Tracking and Navigation, Combat Systems, Performance Assessment. In each of these areas, we provide a complete solution – ranging from an understanding of the operational context of the problem, to development of algorithms that process data, to the delivery of software and hardware systems. Our expertise is multi-disciplined. To solve real-world problems, we look at the situation holistically and deliver innovative products.

MITRE

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The MITRE Corporation's mission-driven team is dedi-



cated to solving problems for a safer world. We are a not-for-profit company that operates multiple federally funded research and development centers (FFRDCs). We work across the whole of government, through our FFRDCs and public-private partnerships, to tackle problems that challenge our nation's safety, stability and well-being. Our unique vantage point allows us to provide innovative, practical solutions in the defense and intelligence, aviation, civil systems, homeland security, judiciary, healthcare, and cybersecurity spheres.

Moog

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Over fifty years ago, Moog, Inc. started as designer and supplier of aircraft and missile components. Today, our motion control technology enhances performance in a variety of markets and applications, from commercial aircraft cockpits, to power-generation turbines, to Formula One racing, to medical infusion systems. In space and defense, Moog is the premier motion and flow control solutions provider for the following markets: satellites, human-rated space vehicles, launch vehicles, missiles, military ground vehicles, naval vessels, and security and surveillance.

Navy Mutual Aid

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Since 1879, Navy Mutual has faithfully fulfilled its duty to support military families by providing excellent life insurance and annuity products. We are proud to serve as steadfast advocates for Navy Mutual Members to ensure they understand the benefits and financial security they deserve. At Navy Mutual, our guiding principle is to serve our Members the same way they serve our country — with integrity, passion, and commitment.

Newport News

**Shipbuilding, a Division of
Huntington Ingalls
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Newport News Shipbuilding is the sole designer, builder and refueler of U.S. Navy aircraft carriers and one of two providers of U.S. Navy submarines. With approximately \$4 billion in revenues and more than 20,000 employees, we are the largest industrial employer in Virginia and the largest shipbuilding company in the United States. We build the most advanced ships in the world using our expertise in nuclear propulsion, naval design and manufacturing. We are currently building the new Gerald R. Ford-class aircraft carriers and Virginia-class fast-attack submarines, and

performing Refueling and Complex Overhaul (RCOH) on Nimitz-class aircraft carriers.

Nord-Lock/Superbolt

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As a global leader in bolting solutions, Nord-Lock Group strengthens the public and industrial infrastructures that shape modern living in decades to come. You can rely on our unique combination of secure bolting solutions and industry expertise to solve your toughest bolting challenges. Our solutions include Nord-Lock wedge-locking washers that keep bolted joints secure under any level of vibration, Superbolt multi-jackbolt tensioners that require only hand tools to install, Boltight state-of-the-art hydraulic tensioning system, and Expander system, a permanent solution for lug wear on equipment. Our high-quality products are manufactured at state-of-the-art production facilities in North America, Sweden, United Kingdom, Switzerland. Our production focuses on conducting multiple quality controls and producing genuine products that are assigned with unique control numbers to ensure full traceability. The extensive certifications we have been awarded from independent testing facilities confirms our market position and commitment to quality. The Nord-Lock Group is now the first bolt-securing partner to offer a full life-cycle warranty across all of its technologies.

Northrop Grumman Navigation & Maritime Systems

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Northrop Grumman is a leading global security company offering a broad portfolio of capabilities and technologies that enable us to deliver innovative products, systems and solutions for applications that range from undersea to outer space and into cyberspace. We provide products, systems and solutions in autonomous systems; cyber; command, control, communications and computers, intelligence, surveillance, and reconnaissance (C4ISR); strike; and logistics and modernization in support of customers worldwide. With more than 60,000 employees in all 50 states and in more than 25 countries, we strive to attract and retain the best employees by providing an inclusive work environment where employees are receptive to diverse ideas, perspectives and talents to help solve our toughest customer challenges: to develop and maintain some of the most technically sophisticated products, programs and services in the world.

NTT Data Services Federal Government

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NDFG partners with clients

to navigate and simplify the modern complexities of business and technology, delivering the insights, solutions and outcomes that matter most. As a division of NTT DATA Corporation, a top 10 global IT services and consulting provider, we wrap deep industry expertise around a comprehensive portfolio of infrastructure, applications and business process services.

Oceaneering International, Inc.

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Oceaneering Advanced Technologies (ADTECH) partners with our customers to deliver solutions that enable humans to work safely and effectively in harsh environments ranging from the depths of the sea to the outer reaches of space. Our innovative solutions support the development and application of practical cost-effective systems that meet challenges – from the routine to the extreme. Our experience and expertise across multiple industries uniquely positions us as a leader in the government, entertainment, logistics, space, and marine service markets. Our products and services meet the rigorous demands of the complex environments in which they operate delivering results with uncompromised safety and reliability.

ORBIS

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ORBIS is a Veteran Owned Small Business (VOSB) with over 17 years of major Navy Program experience providing Engineering, Technical, and Consulting Services to DoD and Commercial Customers. ORBIS is an ISO 9001:2015 certified, customer-focused company with a proud record of providing exceptional service and technical support to DoD/DON clients and our commercial clients. Our corporate headquarters are in Charleston, SC and regional business units located at the Washington Navy Yard, DC; Portsmouth, NH; Picatinny Arsenal, NJ; PA; Philadelphia, PA; and Norfolk, VA along with satellite offices in Huntsville, AL; Newport, RI; San Diego, CA and Aberdeen, MD.

Pacific Fleet Submarine Memorial Association, Inc.

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The Pacific Fleet Submarine Memorial Association was established in 1978, to operate and maintain the Pacific Fleet Submarine Museum as a memorial to those gallant Sailors who manned the Submarine Force in WWII, during the Cold War, today and into the future; to maintain the



Fleet Submarine USS BOWFIN (SS 287), for permanent display in Hawaii, as an educational tool and as an inspiration to present and future generations; to create an Educational Outreach Program including an endowed Bowfin Scholarship Program; and be a centerpiece for public awareness and understanding of the Submarine Force including its evolution, history and future.

Patrona Corporation

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Patrona Corporation is a certified small business focused on supporting the Department of Defense. With headquarters in Arlington, Virginia, Patrona is committed to providing smart, cost-effective services to the U.S. Government and its industry partners. Our team uses their extensive knowledge and experience to help clients manage many important and complex programs and projects. Patrona's services and solutions include: Program Management, Engineering, Sustainment, Strategic and Operational Planning, Quality Assurance, Financial Management, and Administrative Support Services. Several specific examples of Patrona's influence are; assisting Naval Sea Systems Command with In-Service Submarine maintenance and modernization sustainment programs, supporting the acquisition and life cycle support planning of the COLUMBIA Class SSBN replacement, assisting Naval

Shipyards with evaluations of nuclear platform overhaul performance, and management group support for Submarine Team One.

Penn State Applied Research Laboratory

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The Applied Research Laboratory (ARL) at Penn State is an integral part of the University and was established in 1945 at the request of the U.S. Navy. Originally focused on undersea weapons technology development, ARL now includes a broad research portfolio addressing the needs of various sponsors. ARL supports national security, economic competitiveness, and quality of life through education, scientific discovery, technological demonstration, and successful transition to application. As a Department of Defense (DoD) designated University Affiliated Research Center (UARC), ARL conducts essential research, development, and systems engineering in support of our nation's priorities free from conflict of interest or competition with industry. ARL is wholly reliant on sponsored research programs for operation of the Laboratory and therefore must maintain relevance to our sponsor base, as well as an operational agility to meet ever-changing requirements.

Preferred Systems Solutions, Inc.

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Founded in 1991, Preferred Systems Solutions (PSS) was originally focused on providing IT and engineering services to the commercial market. After building a successful commercial staffing practice, in 1998 PSS sold its commercial business to a publicly-owned company. PSS then shifted its mission to providing IT, engineering, and program management services to Government agencies. In September 2007, PSS was recapitalized by CM Equity Partners and its affiliates (CMEP). Since then, PSS has provided reliable, cost-effective solutions to meet our clients' goals and objectives in the core areas of: Systems & Software Engineering, Data Analytics & High Performance Computing, Cyber Security & Cloud Mission Support, Acquisition, Financial Management, and Program Management Support. PSS has a strong and diverse Government and commercial client base with key customer relationships in the Department of Defense (DoD), Intelligence Community (IC), and Civilian agencies. Our customers include the U.S. Army, U.S. Navy, Federal Bureau of Investigation (FBI), Department of Homeland Security (DHS), Defense Logistics Agency (DLA), Defense Intelligence Agency (DIA), Department of Transportation

(DOT), and various Intelligence agencies. Today, PSS enjoys continued success in the expansion of our client base through our dedication to our customers' mission success.

PRL

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PRL's mission is to provide exceptional quality components allowing peace of mind for our nation's military, nuclear, and industrial applications. PRL Industries, Inc., founded in 1969, provides customers with complete in-house Non-Destructive Examination and upgrading services on ferrous and nonferrous castings.

Progeny Systems Corporation

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Since 1995, Progeny Systems' mission is to be a trusted provider of innovative, cost-effective technical solutions and quality products while maintaining positive relationships with our customers, vendors, and employees. Progeny Systems is a privately-held, high-tech small business focusing on software and hardware system integration, computer-vision solutions, cutting-edge research and development, and manufacturing. We provide premium systems, services, and products for the

Department of Defense, government agencies and commercial clients. As a small business, Progeny Systems is a participant in the Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) programs. These programs complement Progeny's ability to leverage flexibility, rapid turnaround, customer responsiveness, and encourage an environment for experimental research. Progeny maintains more than 14 offices nationwide that are strategically located to better serve our customers.

QinetiQ North America

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For over 50 years, QinetiQ North America (QNA) has been providing world-class technology development, engineering research and development and revolutionary products to the defense, security, commercial and consumer markets. Our product offerings include vehicle and soldier protection, unmanned systems (robots) in various sizes, maritime systems and power sensors and control systems. Customers rely on QNA to increase readiness, improve processes, streamline operations, increase situational awareness, reduce costs and enhance security. Our technology solutions and products improve manufacturing processes, reduce costs, save lives and make it easier to monitor, manage and protect

complex systems and critical assets. QNA is headquartered in Waltham, MA with offices in Franklin, MA, Pittsburgh, PA and Ashburn, VA. QinetiQ North America is a wholly owned, independently operated subsidiary of QinetiQ Group PLC, one of the world's leading defense and security technology companies.

Qortek

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QorTek – The World Leader in Advanced Piezo-Systems With over 30 patents awarded and 10 more pending; more than 60 Federal funded R&D projects successfully completed; and with successful technology transition spanning medical, aerospace, automotive, oil & gas, and microelectronics no other company in the world has more experience and expertise in solving complex problems related to advanced 'smart materials-based' systems integration. Led by its unmatched piezoelectronics capabilities that include most of the critical technology advances over the past 15 years, QorTek now offers some of the World's most advanced power products and piezo-based actuators, sensors and devices.

Raytheon Corporation

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Raytheon Company is a technology and innovation leader specializing in defense, civil government and cybersecurity solutions. In a world of emerging challenges and evolving threats, US and allied forces need to maintain the advantage over our adversaries. Raytheon leverages our legacy of performance and innovation to develop solutions to make the world a safer place. For our global navy customers, Raytheon provides technologies and solutions that span the naval domains – above, on and below the water. From radars and sonars, networks, navigation and combat management, fire control and weapons, we are uniquely capable to provide integrated, end-to-end solutions – to enable warships to detect, control and engage any threat, whether from the air, surface or undersea.

RBC Sargent Aerospace & Defense

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Founded in 1920, Sargent Aerospace & Defense is a premier global supplier of precision-engineered customized components as well as flight-critical aftermarket aviation services. Leveraging more than 95 years of expertise, Sargent directly contributes to the safe operation of countless commercial and military aircraft and rotorcraft, submarines and land-based vehicles. Sargent's continuing

investment in people, assets, technology and process quality ensures excellence and is integral to the company's commitment to customers and their end-users. Today, Sargent performs critical functions on a variety of commercial and military aircraft, submarines and land-based vehicles in operation worldwide, and our customer base includes some of the best-known names in aerospace and defense for both the OEM and MRO marketplaces. Sargent Aerospace and Defense is fully owned by RBC Bearings, Inc.

Rite-Solutions, Inc.

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Rite-Solutions is an award-winning software development, systems engineering, information technology and learning development firm based in Middletown, RI with satellite offices in Pawcatuck, CT, Virginia Beach, VA and Washington, DC. We are a Service Disabled Veteran Owned Small Business (SDVOSB) with over 200 employees – consisting of scientists, engineers, information technology (IT) specialists, cyber-security specialists, instructional designers and consulting professionals. The nature of the work we do is as dynamic and diverse as the makeup of our workforce. From helping the Navy maintain dominance in undersea warfare to assisting healthcare and financial institutions improve workplace

performance, Rite-Solutions helps our customers optimize their people and processes, execute their mission, and achieve organizational success. We strike a desirable and distinctive balance between being agile and, as a CMMI Level 3-appraised company, disciplined – the best of both worlds. Through this approach we are able to deliver exceptional quality and reliability with the speed and affordability that only a small business like Rite-Solutions can achieve. This isn't just a competitive advantage for us, but also a means by which we are able to maintain a talent pool of the best and brightest who we embrace as the F.E.W. or Friends Enjoying Work.

RIX Industries

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RIX Industries manufactures a wide range of pneumatic energy storage and transfer system solutions, including reciprocating piston compressors and gas generators and liquefiers on the USS Ford-class aircraft carriers, industrial gasses and breathing air. RIX specializes in applying oil-free technology to high-pressure applications on USS Seawolf and Virginia-class submarines and other highly demanding environments. RIX has been in business since 1878 and has been proudly serving our US Armed Forces for over 120 years. With a solid industry reputation that is second to none, RIX is the established

leader in American-made compressor engineering and manufacturing. A company built on trust, experience, and a solid client base of over 80% repeat customers, RIX is dedicated to making clients for life, both domestically and globally. RIX Industries' compressors and generators are used by an extensive list of customers including industrial gas companies, refineries and chemical plants, offshore oil platforms, commercial diving, OEM's, SCUBA tank filling, and Government Agencies, all of which increases RIX's global role in strategic deterrence, homeland defense, and industrial innovation.

SAIC

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SAIC is a premier technology integrator providing full life cycle services and solutions in the technical, engineering, intelligence, and enterprise information technology markets. SAIC is Redefining Ingenuity through its deep customer and domain knowledge to enable the delivery of systems engineering and integration offerings for large, complex projects. SAIC's more than 15,000 employees are driven by integrity and mission focus to serve customers in the U.S. federal government. Headquartered in Reston, Virginia, SAIC has annual revenues of approximately \$4.5 billion. For more information, visit www.saic.com.

SBG Technology Solutions

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SBG Technology Solutions, Inc., a Service-Disabled Veteran-Owned (SDVOSB) company, has delivered on over 100 federal and private sector contracts since 2004. SBG provides innovative and cost-effective program management, engineering, intelligence, and IT solutions to numerous federal and commercial clients, with a focus on US Navy (NAVSEA, SPAWAR, NSWCDD) and the Department of Veterans Affairs. We provide Program Management Analyst support to the Program Executive Officer, Submarines (PEO SUB). Our core capabilities include Cybersecurity, Systems Engineering, IT Modernization, Program Management Support, and Training. SBG has in an in-house Cyber Range for commercial and government use that incorporates various Security Information and Event Management (SIEM) tools to conduct Cyber Training, Penetration Testing, and Red Teaming. Our current prime contract vehicles include: Seaport-NXG, Seaport-e, T4NG, VETS 2, GSA IT 70, GSA PSS, GSA 8(a) STARS II, RS3, and ITES-3S.

Schaefer Electronics, Inc.

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Design and Manufacturing Power Supplies Company, Schaefer, Inc. was founded

in 1969 and has grown from a small family enterprise to a dedicated workforce of approximately 200 people in Germany, Ireland, and the USA. Schaefer, Inc. possesses a comprehensive worldwide sales network, and the company is continuously on steady growth path. Thanks to decades of experience in design and manufacturing of power supplies, Schaefer offers a large variety of products, options and enhancement features. In the field of high power requirements, Schaefer has achieved, and continues to command a leading position. Schaefer power supplies are often used for applications which demand a high level of reliability under severe environmental conditions, e.g. Railroad industry, Automotive industry, Telecommunication, Power generation plants, Chemical plants and oil refinery, Factory automation and Military industry.

Securitas Critical Infrastructure Services

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Securitas Critical Infrastructure Services (SCIS) provides specialized security and fire services to the highly regulated Aerospace, Defense, Nuclear, Government, and Aviation industries. To meet the unique needs of each industry, expert management teams guide and support operations for each business sector. SCIS has been approved by the De-



fense Security Service (DSS), Department of Energy (DOE), and all other government agencies to retain security clearances and operate contracts requiring security clearances. SCIS delivers the most effective security solutions by offering customized solutions to meet the requirements of any organization. The parent company of SCIS is Securitas AB, a global knowledge leader in security.

Sedna Digital Solutions, LLC

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Sedna Digital Solutions mission is to provide high quality systems/software engineering and integration capability to the national security community. As a small business, Sedna provides unparalleled agility while providing mission critical solutions to our customers. With a dedicated focus on Sonar Signal Processing, Electronic Warfare and Surveillance programs, Sedna has been on the forefront of providing software and hardware production to the Submarine Force and Industry Partners. Sedna continues to pursue payload adaptation for unmanned systems that incorporate the scaling of our current hardware/software expertise.

Seemann Composites

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Seemann Composites, Inc. (SCI), was founded in 1987 to develop the technology of vacuum infusion, specifically SCRIMP (Seemann Composites Resin Infusion Molding Process). Its founder, Bill Seemann, had worked for decades building fiberglass boats and distributing composite materials throughout the Gulf South. SCI was founded on its research and development innovation with composite fabrication processes and is a recognized leader in large-scale resin infusion technology. SCRIMP enjoys worldwide usage today and has been attributed to starting an industry-wide revolution in vacuum assisted resin transfer molding of composites. Today, Seemann Composites is primarily focused on manufacturing production components for DOD and commercial platforms, but also maintains a significant research and development capability to stay on the forefront of composites processing technology. SCI has fabricated and delivered thousands of advanced composite structures and products (of all sizes and levels of complexity) to all branches of the U.S. military, many major defense and commercial customers.

Siemens Government Technologies

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Siemens Government Technologies, Inc. (SGT) provides solutions for our nation's greatest challenges in the federal market. SGT delivers Siemens' globally trusted and recognized offerings (products and services), in all 50 U.S. states and territories, and in many countries at U.S. government locations. With exceptional resources, proven technologies and customer focus, we help advance mission-critical programs for the federal government to manage operational demands with greater efficiency than ever before. We offer the Sea Services a variety of capabilities, including product lifecycle management, integrated power and energy systems at sea, and infrastructure solutions ashore. Whether the challenge includes upgrading and modernizing infrastructure, managing and monitoring automation technologies, improving energy efficiency, security and resiliency or shifting to renewable energy, we are helping our federal customers perform their missions better than ever before.

Sierra Nevada Corporation

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Sierra Nevada Corporation (SNC) delivers customer-focused technology and best-of-breed integrations in the aerospace, national security and defense sectors. SNC has been honored as one of the most innovative U.S. companies in the space, a Tier One Supplier for the U.S. Air Force, and one of America's fastest growing companies.

SNC technologies are used in diverse applications the world over - from land to sea, air and space - including navigation and guidance, telemedicine, electronic warfare, communication and surveillance systems, aviation, commercial space and cybersecurity.

Founded in 1963 and headquartered in Sparks, Nevada, SNC operates under the leadership of owners, CEO Fatih Ozmen and President Eren Ozmen. SNC provides global support to its customers with a workforce of more than 3000 personnel in 33 locations in 19 U.S. states, England, Germany and Turkey.

Sonalysts, Inc.

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Sonalysts, Inc. is an employee-owned professional services business founded in 1973. We offer extensive experience and strong qualifications in a wide variety of technical disciplines. We have grown steadily by providing high-quality products and services on time and within budget. Our multidisciplinary services organization includes

approximately 350 engineers; scientists; computer scientists; and publication, media, and training specialists. Our main campus in Waterford, CT, consists of offices, research space, sound stages, video, animation, and audio production facilities, a construction shop and sensor fabrication lab. The campus includes spaces for both public and Government/classified work. We also maintain offices across the United States.

SSS Clutch

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SSS is the world's leading supplier of automatic over-running clutches for low to high power applications, and for low to high speed in power generation, marine main propulsion, mid-stream and down-stream oil & gas industry applications. Specifically, SSS Clutches are produced for powers of 100 KW up to 400 MW at 3,000 rpm, and depending on the application, are operating in low speed applications such as automatic SSS Clutches in propeller shafts in British Navy Type 23 ships, Korean Navy FFX-IIB ships, and Japanese Navy Asuka. SSS Clutches operate up to 17,000 rpm in the US Navy's new Ship to Shore Connector (LCAC-100) and numerous other high speed gas turbine propulsion systems. SSS Clutch reliability has been documented and has achieved 271,000 hours MTBF on three classes of US Navy ships (DDG-51, CG-47,

and FFG-7) over thirty years of operating service.

Of nearly 37,000 SSS Clutches which are installed worldwide, SSS Clutches are used by over fifty navies in gas turbine and combined main propulsion systems of surface ships including COGAG, COGOG, CODOG, CODAG, CODELOG, etc. arrangements. For thirty years SSS Clutches have been supplied for steam turbine and EPM drives for submarines. EPM drive SSS Clutches are used in US Navy 688i, SSN-21, and Virginia Class submarines.

SSS thanks our many customers worldwide, and in particular the US Navy, for their continued confidence in SSS Clutches for critical main propulsion applications.

Subsystem Technologies, Inc.

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Subsystem Technologies, Inc. (SUBSYSTEMS) is a leading provider of Engineering and Technical Services, including Manufacturing and Manufacturing Technology Support, Logistics and Field Support, Software Solutions, and Management and Mission Support services nationwide. We are a diverse company, including professionals with expertise in Science, Research, Engineering, Information Technology, and Data Sciences. Our strength is in collectively providing integrated services. We are dedicated to moving our Nation's agenda forward. It's the key ingredient that



makes us who we are - like our passion for excellence, our innovation throughout our organization and our long standing customer relationships. You will see this simple philosophy at work in everything we do. It defines who we are, challenges us, forces our minds to be open, and to be a world-class company.

Systecon

CAPT Ron VanCourt, USN, Ret., Director, Strategic Development

www.systecon.us

Systecon and their Opus Suite of tools have been optimizing some of the most complex Life Cycle Management projects in over 20 countries worldwide. We are the market leader in predictive analytics, with the DoD embracing our tools to solve complex problems, including US Navy, USMC, OSD, and the F35 Joint Strike Fighter. We work across the entire product life cycle, relying on methods that have been tested and refined for over 40 years and analyses using our proprietary, global market-leading Opus Suite software. For our customers, this means more efficient operations, controlled costs, and most importantly: decisions based on facts. Under continuous development, our customers continue to see advances in the tools year after year. Systecon embraces the latest in technology and continues to advance its position as marketplace leader, having been selected in every head to head comparison of tools for the past 15 years.

Systems Planning & Analysis

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Ultra Electronics Ocean Systems

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University of Texas at Austin, Applied Research Laboratories

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Applied Research Laboratories, the University of Texas at Austin (ARL:UT), is a Department of Defense University-Affiliated Research Center (UARC). Since 1945, ARL:UT has been engaged in sponsored research dedicated to improving national security through applications of acoustics, electromagnetics, and information sciences. ARL:UT has provided both tactical and security support to the Submarine Force for many years. These efforts include delivery of capability for high frequency sonar array, active signal processing, and operator interface design and implementation; mid frequency active and passive sonar signal



processing design; towed and hull array adaptive low frequency algorithm design and implementation; sonar tactical decision aids; training; and engineering measurement and evaluation. Since inception, ARL:UT has been an integral part of the APB process as well as AN/BQQ-10 sonar modernization. ARL:UT efforts for the Submarine Force are crucial to maintaining operational advantage.

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CORPORATE MEMBER SPOTLIGHT PRL, Inc.

Recently, the Executive Director of the NSL had a conversation with Ms. Pat Herschkowitz, Director, PRL, Inc. If other NSL Corporate Members would be interested in a similar conversation, please contact execdirector@navalsubleague.org.

Oliver: Tell me how PRL got started and how you've been associated with it?

Herschkowitz: PRL was founded 50 years ago as "Pennsylvania Radiographic Laboratories" with a single x-ray machine to perform Radiographic Testing on castings. My father, Erwin "Herk" Herschkowitz purchased it from the founder's widow in 1972. At that time, the company operated in a rented facility, and employed about a dozen people. Our family had recently moved to the States from South America, and my father had been told about the company by a fraternity brother of his from his time as an engineering student at Penn State University.

In the early '70s, the company had added upgrading capabilities. The name was changed to PRL Industries, Inc. shortly after relocating to its current facilities in Cornwall, Pennsylvania in 1974. After adding two machine shops - one in 1977 and another in 1985 - the holding company, PRL, Inc., was established. The two machine shops were eventually merged to form LTC, Inc., so now PRL, Inc. consists of PRL Industries, Inc., Regal Cast, Inc., and LTC, Inc. Our metallurgical laboratory is located at the Regal Cast facility in Lebanon, Pennsylvania.

Oliver: How did you get started as a submarine supplier?

Herschkowitz: Up through March of 1978, most of PRL's customers were in the nuclear power industry. After the accident at Three Mile Island, PRL began to diversify into the defense industry, which included the submarine and other shipbuilding industries.

I joined the company in early 1985 as Public Relations, Advertising, and Creative Director. My sister, Jan (a senior financial analyst for a

then-major electronics company), joined PRL in late 1988, and she became our CEO in 1989 after the unfortunate death of our father. Later that year, we became a fully integrated company when we opened our ferrous and nonferrous foundry, Regal Cast, Inc. Within the next two years, Regal would become the smallest foundry in the world to operate an AOD (Argon, Oxygen Decarburization) refining vessel.

Oliver: What percentage of your business would you say is submarine-related?

Herschkowitz: About 55 percent.

With the prospects of a growing demand for submarine products to support more submarine construction, how do you feel about the company's preparations to meet the growing demand?

As is the case with the entire supply chain, our main concern is with the shortage of skilled labor. Suppliers have been talking about this issue with our legislators since the late 1990s, when the average age of our workforce was about 45. This is an issue that PRL has been working on through developing relationships with area schools, and through successful in-house mentorship programs. We were recently told that a Pennsylvania school district is now emphasizing trades as much as it is emphasizing college for their students' future. Hopefully this is, or will become, a nationwide trend.

We are also looking at opportunities to expand our foundry capacity.

Oliver: Do you have the information that you need to grow your business and to support the growing demand on the supplier base?

Herschkowitz: Yes, and as a result of that, PRL is currently doing a thorough analysis on all of our facilities to review any constraints. At the same time, we are looking for opportunities to improve efficiency.

Oliver: Do you have any ideas about any actions that could be taken that would enable you and other suppliers to be better able to respond to the growing market demands?



Herschkowitz: It would be very helpful to small businesses, such as PRL, to receive future forecasts so that level loading could be better attained. Consistency is important for small businesses to retain and grow our skilled workforces.

Oliver: As a corporate member of the NSL, what have been the most important features of Corporate Membership to you?

Herschkowitz: The NSL's Annual Symposium in the fall, and the Corporate Member Days in the spring are very informative. As an attendee, I learn a lot on what we, as suppliers, can expect, and there's also an opportunity to ask questions to better understand what the Navy expects of us. The information gathered at these events is shared with the folks back at PRL, which helps us to move forward as a team. Also much appreciated is that the speakers' words from the Annual Symposium are shared in the quarterly *Submarine Review*. The things learned at NSL events, or in the NSL's publication or website, also help enhance my work with the Submarine Industrial Base Council.

The other advantage of the NSL's conferences is the opportunity to interact with fellow suppliers. Aside from the exchange of thoughts, ideas, and experiences, it fosters a sense of community and pride in participating in our country's submarine industry.

Personally, I am very interested in the history of our submarine force and have learned more through other NSL members or your publication!

Oliver: How else could the NSL help you and your company?

Herschkowitz: Please continue the forums, for the reasons stated previously.

Also, PRL has a monthly newsletter for our employees. Any relevant quotes or thoughts that you could share from submariners (past or present) that helps connect our skilled workforce to them, would be greatly appreciated! Our co-workers are motivated for the right reasons, but an occasional word from our end-users would mean a lot.

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Naval Submarine League
36th Annual Symposium and Industry Update
Recognition of Distinguished Submariners
ADM Hank Chiles, USN, Ret.

ADM CHILES: Thank you very much. I must say that no honor is as meaningful as that of being recognized by your peers, and there are many in this room with whom I've served for any number of years. So, I am humbly and incredibly thankful for the many folks with whom I've worked that have helped us to move the Submarine Force forward and enabled me to serve everywhere from the North Pole to the other side of the continent of Australia.

But this will really sound like an addendum to the Jerry Holland shout-out: I refer to Jerry as we go through this starting back in the shipyard at Mare Island (mid 1970). When *Pintado*, led by Jerry Holland and Frank Caldwell Sr. as XO, was finishing up new construction work at Mare Island: on the *Drum*, we were just checking in.

And so, I picked the brain of Frank Caldwell Sr. to try to get an understanding of how the *Pintado* had organized and done their work. That was a fabulous experience for me, and we implemented everything we could onboard *Drum* in order to get through that shipyard experience with no one (*Drum* was the last Mare Island submarine) following us, and nobody we could steal from in order to pull that submarine together. *Pintado* was a great help.

Later, Jerry was my boss at Submarine Group 5 in San Diego, and we shared the duplex quarters at 154 Sylvester Road on the Submarine Base in San Diego. I could hear Jerry very well on our side of the house, so I knew what he was thinking. It really helped me to deal with him as a commander (COMSUBRON Three), working for him.

(Laughter).

We also named the back alley behind our house "Anne's Alley" for her birthday. I checked today, Anne, and the sign is still up. It still reads Anne's Alley, and it's deservedly so.

So, it was wonderful to be there (and work for Jerry), but also there were many more senior folks that a number of you know who really helped me along the way: Bud Kauderer, Bruce DeMars, Frank Kelso,

Hank Hanssen, and many others. And yes, the junior guys we worked with were just as important: people like Rich Mies and John Padgett, Jay Donnelly, Kirk Donald and a host of enlisted leaders. These folks have all served the Submarine Force exceptionally well.

I want to also mention Mike Hewitt, who picked up the reins inside of the Submarine League and is now working to bring together, within our publications, articles that are worthwhile and valuable to you as submariners, and not just retired guys.

Back to Jerry Holland: The Jerry Holland quote I'll never forget was in his remarks when I turned over COMSUBRON THREE that went like this. "Chiles, sometimes you're okay, but Katy's always spectacular." That's an identical quote, I hope you remember, Jerry.

Jerry had it right. Katy was a magnificent partner throughout my time on active duty, and was engaged in family issues, as was Anne Holland. The two of them, I think, really added to the improvement of Navy family life. Thank God for our wives out there, working that circuit to make sure we know what's going on and what we need to be working on.

I must say my current wife, Alice, Katy's sister, continues a legacy of service to others with her work with Hospice, but also in knitting dolls for people (children) in Africa who have never had a toy. It's a service that I think serves us all well.

(Applause).

Alice is with me tonight. My son, John, is here. John is a glass expert. He was part of a small team that installed the new glass in the dome of the U.S. Capitol a year or so ago. With him is his friend, Rebecca Kinkead. She's a renowned artist in her own right. I thank my family for all their support over many years. They've been wonderful.

(Applause).

Our Submarine Force expertise is regularly sought and reported to senior Navy and OSD leadership. Our research and development have consistently been ahead of the game and led to improved force capabilities. We must remain vigilant, continue our research, argue for the resources we need. We must make those (arguments) as strong and as competently as we can.

Thank God for the Submarine Force leadership of today. You guys



are inspirational in what you do. The Submarine League is strong and more powerful with your support.

So, thank you for this honor. Thank you for your service either in the Navy or as civilian supporters of our organization, and continued work to support our Force. God bless the United States of America.

**Naval Submarine League
36th Annual Symposium and Industry Update
Recognition of Distinguished Submariner
RADM Jerry Holland, USN, Ret.**

RADM JERRY HOLLAND: Admiral Beckett, as you've heard, I am the duty scribe for this crowd. As such, it is my duty to take issue with your pronunciation of the word submariner. That is acceptable in the Royal Navy, but we are better mariners than most, and so in the United States we're called submariners.

(Applause).

Having done my duty, like these gentlemen that were ahead of me, I owe much to hundreds of people, too numerous to name or enumerate, over a long career, who were mentors, leaders, advisers, shipmates, crew, who kept me on the straight and narrow when often I would tend to whirl off into the atmosphere. Not least among those was my friend Frank Caldwell; those of you who were here the first day heard his son talk about our joint duty. He was typical of people with whom I had the great privilege to serve, and to whom I am in great debt.

But that debt is no less than it is to the lady who 65 years ago accepted a blind date with a fat and ugly midshipman at the Naval Academy -- (Applause).

-- and to her seven very accomplished children, with whom I had only the father's duty to help procreate.

(Laughter).

And so, I appreciate those people beyond any ability that I might have to express that appreciation. I thank the Submarine League for this recognition, not just for me, but for my shipmates and my family. Thank you very much.

(Applause).

ADM DONALD: On the occasion of his birthday, I think a round of "Happy Birthday" would be appropriate.

(Sings "Happy Birthday")



**Naval Submarine League
36th Annual Symposium and Industry Update
Distinguished Civilian Award
Mr. Fred Harris**

Good evening,

I will begin by promising to be brief.

First, I would like to thank the Navy Submarine League for this high honor.

I began my career as a senior engineer at EB in 1973, working in nuclear engineering on the Trident Program.

During my career I worked with various naval groups, suppliers and personnel from numerous other shipyards, all of whom helped to make my career both challenging and rewarding.

Tonight, I wish to both recognize and thank a few individuals from each of these organizations. First from Electric Boat: Herb Berry, Jim Turner, John Welch, Mike Toner, John Casey and John Leonard.

At EB I learned what integrity and commitment to job and country is all about.

From Naval Reactors: Souren Hanessian, Carl Oosterman, Bill Shirley, Steve Rodgers and Admirals McKee, DeMars, Bowman and Donald. From NAVSEA: John Kenworthy, Captain Dave Burgess, Admirals Sullivan, Hilarides, McCoy, Eccels and both Steve and Dave Johnson. I would also like to thank the hundreds of Naval Reactors and NAVSEA personnel who worked so hard over the years to insure the success of our programs.

Working with Naval Reactors and NAVSEA, my understanding of the term commitment and accountability took on a whole new meaning.

From Newport News Shipbuilding: Tom Schievelbein, Chet Long, Greg Cridlin, George Wade and Matt Mulherin.

After years of intense competition between the yards, I learned that teamwork and mutual respect were key enablers in the successful execution of the Virginia Class Program.

From our supplier base, who provide the US a leg-up with on time delivery of high quality, technically advanced equipment.

I learned the meaning of fairness, trust and again, commitment and

team work.

I would also like to thank the thousands of General Dynamic employees at EB, NASSCO and BIW who labor with other shipyards from across this great country to keep us free.

And last but certainly not least, is my wife Peggy who has stood by me in both good and bad times throughout my career. She always had a keen interest in what I was doing and understood the importance of the work, even when I left early and came home late day after day. I would not be standing here tonight to receive this honor had it not been for her commitment.

Again, many thanks to the Navy Submarine League for this high honor.

Thank you all for being here.



**Naval Submarine League
36th Annual Symposium and Industry Update
Distinguished Civilian Award
Mr. Bill Johnson**

MR. BILL JOHNSON: When I found out a couple of months ago that I was going to receive this award, the first person I called was Dr. Bob Snuggs, my mentor and friend. My question to Bob was, what should I say when I'm standing up here? He gave me three words, "keep it short."

(Laughter).

I haven't been involved in submarine work for a while now, but today I met a lot of friends. A lot of these friends were involved in this program. A lot of them, to this day, say it was the most rewarding experience of their career. It was for me. We learned a lot along the way. We were on the edge of the frontier when we started. We did not follow a path.

We've known a lot of people who drive trains. They keep them on schedule, they keep them on the track, they fuel the train, but when they get to the frontier they stop. Well, we didn't have a choice. We had an acoustic superiority crisis. We had to get better fast. Although we had lost 70 percent of our R&D budget, we had to figure a way to pay for it and we had to do it quickly. We didn't have time to mess around. The fleet needed this.

For a lot of the acquisition community, this crisis came as a surprise. A lot of it was a surprise. I had a little time to figure out how I was going to do this. Bob Snuggs and I used to park at the same building in Crystal City. I'd see him at 6 o'clock in the morning on the way to my office. He'd be telling me about commercial-off-the-shelf stuff. He'd say we should be buying processors, not building them. He also told me about people who supported other Navy sonar programs...people whom I wasn't tapping into. The Acoustics Research Lab at the University of Texas was one such organization. The Acoustics Research Lab at Johns Hopkins was another. Plus, a lot of small businesses that were doing good work for him on undersea surveillance programs.

So, part of my thinking was: how do we collaborate with the people

who are experts but aren't connected to our program. That was one big change. The other was, how do we get support for what we intended on doing?

Admiral Giambastiani at the time was fairly new at OPNAV. He was still wearing four stripes when I first met him. He got it right away. He understood.

I think anytime you're pioneering you need to have somebody in a leadership position who really understands the vision and what we're going to do about achieving it. He did that for me, and for all of us. I was telling him earlier, we regarded him as our Dad. If we got in trouble with NAVCOMP or whoever it was, call Dad. He'll fix it for us

So, we had good support at the top, but we also had the good leaders all the way down the organization. One guy who stood tall and provided great leadership is Rich Carroll who's over in the corner. He owned a small business and we used the SBIR setup to buy a component from him. He did that and way more.

What that did was provide a sense of competition for everybody else. If he can do it, then I can do it. We had a lot of incumbents who weren't performing up to speed as well as they could. They'd gotten to a comfortable position where they "owned" the business and pretty much kept other people out.

Well, we opened it up. That's where open architecture came about. We didn't call it that then, but the idea was let's not limit ourselves to who currently has the ideas and who sells us products. Let's also look outside the current set up for the best ideas and products. Let's have a system that we own. Now we, the Navy, truly own that architecture.

I think one of the aspects of that architecture was that we had a vision for what it would look like, but we didn't have all the answers. We had a good team and the team was composed of a lot of different organizations: the Navy Undersea Lab in Newport, Lockheed Martin, which was our traditional prime, and now integrator, for submarine sonar; and various university labs and small businesses. We had some great examples, like Rich's, who really connected with the new way of doing business. I think what we did was set up a sense of competition for everybody. Everybody knew they were competing, even though we weren't changing the paperwork, the contracts, but everybody knew there was



an opportunity for them if they provided value. That value was determined by data-driven decisions and analysis. That's how we did it. It wasn't based on your position in the industry or whether or not you were a favorite son or if you'd had a lot of experience. No, we tried to open it up to everybody that was qualified.

We went to university labs and a lot of small businesses and people that had never worked on submarines before. I think what happened was they produced, and we set a very aggressive schedule. Our idea, my idea, was we have to move fast, and not just because the fleet needs it fast, but because, if we move slow, bureaucracy will catch up. We'll get a lot of barnacles. We didn't want that. We wanted to move fast and not let the barnacle people slow us down.

So, we did, and it worked. There were lot of the people that could have stood in the way. They didn't pay us much attention thinking we'd probably fail. But after they saw us producing and succeeding, then they wanted to get involved. Then they were like, how did you do that without me?

So anyway, to make a long story short, it has been a big success. I'm personally a little bit disappointed that it hasn't caught on at a larger scale elsewhere. I think it's starting to catch on. In my recent work, I consult. I basically do a lot of work that I don't get paid for. I'm told it's an honor to do this. Nevertheless, I feel a sense of fulfillment. Over the last two years I was picked by the National Academy of Medicine to look at healthcare systems. They have a huge problem in healthcare systems with systems that don't interoperate. They have these proprietary systems that won't talk to one another and are very expensive to upgrade. It's like you're buying a car and they say, oh you wanted tires on that? You didn't tell me that. So how do you get a handle on those guys?

We showed it could be done. Submariners did it. In fact, they asked me to write a little case study for this special report that we put out. They look at it as kind of an inspirational story for them. To me, the biggest issues are not technical, they are people and business.

When people talk about open architecture they talk about technical things. But really, that's the kindergarten part of the business. How do you get the people onboard, how do you get the culture of the commu-

nity to operate this way to look for opportunities to do something different? There may be an alternative that we haven't tried before. I think that goes all the way from the top all to the bottom.

So, thinking back to what events really stood out and made me proud, two instances come to mind.

I've always enjoyed participating in team sports. I like team things. In our program we had a real sense of being on a team. Teammates could see themselves in the product. Our Program received two Hammer Awards. These were awarded back in the days of the Clinton-Gore administration. The Hammer Award was for acquisition excellence. There was a list of goals to be achieved and we met them all. We had 493 recipients of that award and each person was called out and invited to come up to the dais and receive their gold lapel hammer.

The feedback from the fleet was second. One thing that we did in ARCI that was different from other programs—all programs talk to the fleet employing fleet reps and some communication—but we actually incorporated them within our team, in the inner part of our team.

There was a guy by the name of Rocky English, who I'm sure a lot of you older guys know, who came from SUBLANT and eventually went to work for Raytheon, I believe. I brought him aboard and Rocky's job was to keep me informed of how the fleet was viewing our system. He'd basically come to our meetings and then go back home to Norfolk and tell the truth to fleet leaders about our program. What he did was help me get sailors, people on the pointy end of the spear, to be part of our program. We called it the ConOps Team.

These ConOps guys would come and they would tell us what they wanted. At first, they were kind of skeptical, because they were used to coming to Washington and saying their piece and going home. But no, we had them come up very frequently and they would work with our contractors. They first started looking at the displays and saying, we'd like you to take narrowband and broadband and put them together. They had all kinds of ideas. We'd like this display to be bigger than it is. Why are you keeping it this size? Make it bigger.

I got so much out of those guys. We're off designing fishing lures but we never catch any fish. It's these guys on the pointy end of the spear that catch the fish. Once they saw that we were really listening,



they got really enthused about the program.

I remember for the first APB, Advanced Processing Build, they gave us specifics on what they'd like to see. We did it. My engineering team with my contractors, they were kind of -- these guys keep changing their mind and this and that.

I told them to hang with them because at the end, they're going to own it. They're not going to blame us if we give them the wrong thing. Sure enough, when they deployed with it and they came back, they said we give ourselves, the ConOps team, a 70. We went out thinking we had 100, but we give ourselves a 70. We're confident you guys can give us that 30 percent we missed.

So, I'm looking back and thinking what's the most -- I remember talking to Admiral Padgett. He was the deputy for Admiral Giambastiani. We had a slide over at his office and it had about 20 different attributes of what we were trying to do. He said, which one of those is the most important? I said, if I made a list of all the parts of my wife and you told me to pick out which was the best one, I'm in trouble no matter what I say.

(Laughter)

I think Bob Zarnich bailed me out on that one. I forget what he said. But anyway, I've had 20 years now to consider the answer to that question. I think it really was that connection with the fleet that we had. It was meaningful... not just run it under their nose after it was 99 percent complete and ask, what do you think? It smells good, doesn't it?

No, they were involved in actually telling us what they wanted, and they're the guys who are out there fishing. So seeing the smile on their face -- and I would have them come back every year and I'd gather all my team: big business, small business, university labs, and we'd go out to Lockheed where they had a big room, and these Chiefs would come back and tell us how deployments went. To me, it was inspirational.

**Naval Submarine League
36th Symposium and Industry Update
Program Managers Panel**

**CDR Mark Parrella, USN,
PM, Construction and Test of Columbia Class Program
CAPT Christopher Hanson, USN
PM, Virginia Class Submarine Program
CAPT Jonathan Rucker, USN
PM, Columbia Class Submarine Program**

ADM. DONALD: Next we're going to move on to our program managers panel. If our program managers will meander their way up here to the podium, I'll just make a very quick introduction and turn it over to Admiral Donnelly to start the panel off.

We have first Commander Mark Parrella, principal assistant program manager for construction and tests, Columbia-class program office; Captain George Arnold, program manager PMS-401; Captain Christopher Hanson, program manager Virginia-class submarine program office; and finally, Captain Jonathan Rucker, program manager for Columbia-class submarine program. Gentlemen, thank you very much for being here today. We look forward to a great panel.

ADM. DONNELLY: These guys are major program managers, where the rubber meets the road. If you have any questions for their specific programs, please start generating those cards. I will definitely leave time for questions from the audience. What I'd like each of you to do is just make a brief introduction of your program and any big concerns that you have. We'll start with Captain Arnold, who is the program manager for PMS-401, that's our acoustics program, so all our sonar systems, processing, and stuff like that.

CAPT. GEORGE (RICH) ARNOLD: Hi, Captain Rich Arnold, PMS-401 Submarine Acoustic Systems. Our job is to procure, produce, install and sustain towed arrays, onboard systems and the associated onboard Acoustic Rapid COTS Insertion (ARCI) processing. You notice



I didn't say advanced processing, because that's something we rely on the Integrated Warfare Systems (IWS) 5 community, Pete Scala and Captain Doug Adams, to produce, both in terms of the software development but in terms of the sensors, and a lot of other sources, which lets us take those right about to Milestone C and production lines with very little risk and get them out to the fleet in a prompt manner.

As far as towed arrays, we manage the in-service. We're talking the TB-16, TB-23 and our legacy TB-20 Alphas. For new construction, the TB-29 Charlies and our TB-34. And unlike the last couple of years I can say we see an uptick in TB-29 reliability, basically due to solid engineering, of taking the design and making it simple, reducing the power and getting it out to the fleet.

Lots of great movement in hull sensors as far as ARCI. Admiral, we heard your number one priority, we're in line. My number one priority for years has been the SSBN modernization, both in the shipyards and the one that's happening now during an extended refit period. We've gone in and have taken the combat systems completely to bare metal, from roof to foundation, and are installing an SSGN-like TI-16 system on them. The first one has already gone to sea. We're working through the rest, including the TI-18 versions.

With that, I'm really not that important because I don't do anything by myself. I'm part of a team at Submarine Warfare Tactical Systems (SWFTS) that manages and installs these systems, it doesn't matter unless I have 425 and 435 with me. We come together as a community and install, leveraging advanced development efforts and leveraging on the new construction efforts and similarities we're driving with both 450 and 397.

ADM. DONNELLY: Great, thanks Rich. Next is Chris Hanson, program manager for the Virginia-class program.

CAPT. CHRISTOPHER HANSON: It's great to be here and see so many familiar faces. Actually, tomorrow morning I look forward to making sure that we've made some progress on constructing some submarines, with all the leadership here. I want to talk about two main points that I'm focused on. First of all, to give you a little intro, it has

to do with what I see out of the rearview mirror and looking forward.

My first contact with the Virginia program was undocking the lead ship, the USS *Virginia*. I was assigned as the docking observer, so I had the official government clipboard making sure everything was proper. As most of you know, there's a law that says we can only undock ships in the middle of the night and when it's pouring rain.

So that was the beginning, and as George just mentioned, we've now delivered 17 submarines. When I look at it from the production standpoints, when we were at a one per year production rate we were able to use the sprint-hero mentality, where we could focus on the next key event, the next ship, get that ship through that key event, and then we could focus on the next one.

In 2011 we stepped on the gas pedal. We doubled our production rate to two per year. That was in 2011, but obviously then we have to build a submarine. So the entire system wasn't at a two per year production rate until 2017. I call that a submarine construction marathon. That's where we are.

Looking forward, a lot of us at this table have to prepare the country for the submarine construction triathlon. That's where we layer in Virginia Payload Module (VPM) and layer in Columbia on top of that. I don't run marathons and triathlons, but I do know some people that do. You prepare differently depending on that type of race. That's one of my focus areas right now, is in the Block IV, making sure that we are preparing and running a marathon correctly.

George mentioned the vendor base. It's a key focus of mine. In the continuous continuous production we're in, the delivery date of that ship is roughly set before you start construction. That has to do with the design, the vendor base, the material, the quality of those materials, the workforce, and then how you have that integrated in the production facility with everything else. That's why my first key focus now is getting to run the marathon as best we can.

The other key focus of mine, and this is really to focus on a little bit more about tomorrow, we've been dealing with Virginia-class from the designs through construction for decades. But the first large capability increase actually isn't going to occur until the second hull of Block V, which starts construction near the end of next year. So for decades



we've been in this mindset of faster and cheaper, which obviously allowed us to get to two per year. We've handled that as sort of a one off, the designs but now we're in a phase where we need to be continuously thinking about that, and that's something that is different in the legacy Virginia DNA on the government's side and in the contractor side.

So not only right now are we getting ready for designing and getting ready for Block V, we're also in the phases of Block VI, because that comes five years later. That's a second key focus of mine that I would like to highlight. We'll hear about TSEP, but what does that really mean when you try to operationalize it through the entire government and industry sector? It does take, and I see it, a different mentality to have one set of people concentrate on the legacy production side, and then have the right people focusing downstream for the next step change in technology.

ADM. DONNELLY: Thank you. John Rucker, the Columbia-class.

CAPT. JOHN RUCKER: Good afternoon. My name is John Rucker and I'm in charge of a very small project, the Columbia-class. I will tell you; I just want to start with the most important aspect. Those of you that maybe didn't watch TV last night, there was a very important basketball game that occurred between Duke and Kentucky. I'll tell you good won versus evil, so Duke won. If you look at my bio you'll understand why that is.

But looking at the Columbia, we are in full swing. If you look at the detailed design, advanced procurement, advanced construction and prototyping efforts, the program is moving forward on all cylinders. If you look at what's most important in delivering the nation's next strategic deterrent, the most survivable leg, obviously you've got to have stable operational and technical requirements.

I can tell you, any of you that have read books, you've probably heard of a book "Getting to Yes." In my case, my staff basically is writing a book on "How to Get to No," which means don't change the requirements. We need to have stable requirements as we move forward.

We also want high design maturity when we start. That's a lesson learned from Chris' programs in the past with Virginia and other ones.

When you get to that construction start you want to be able to minimize the change that you have, so we're working with both of our shipbuilding partners to be able to achieve that 83 percent design construction percentage when we get ready to start construction in October of 2020.

We also can't get there alone. The Navy can't succeed without you, the supplier base and our shipbuilding partners. So, getting the manufacturing readiness, as well as the supplier readiness, which Mr. Drakeley started talking about and Commander Parrella will go into a little bit more detail, is critical.

It's just like mowing your lawn. When you first get started, it's not a lot of fun when you first start but you've got to get up on the governor and you've got to get everyone ready to go. That's the phase we're in right now, working with both our shipbuilding partners and the industrial base.

The last thing is cost reduction. In order to assure that the Navy gets to its 355 ships, that's both submarines and those other things called surface ships, we have to be able to afford those. We need to be able to get Columbia down onto an affordable program and affordable lead ship, as well as follow-on ships, for the cost for those ships. So we're working with the shipbuilders on that.

Right now, we are fully on track to start lead ship construction in October of 2020. Our arrangements, which are a big part of the ship, are about 92 percent complete, and our design disclosures which in today's day and age are electronic design disclosures, are about 34 percent complete. We have multiple component developments ongoing. You hear Mr. Drakeley talk about the advanced carbon removal unit, the air conditioning plants, propulsor shafting, there are multiple efforts going on.

In September we just awarded our FY '19 and FY '20 advanced procurement and advanced construction contract to Electric Boat, which then flowed down to our other shipbuilding partner at Newport News. For those of you out there, we processed the funding two days ago to Electric Boat. So if they're here, which they are, look at them, not me. They now have the money, so you can go bother them.

If you look at the supplier development, Congress has been extremely supportive of our program, which has been very helpful. We got additional funding in '19, so you can come bother me about that because



I haven't got that quite there yet to the shipbuilders. We're working with them on that.

I know I'll get questions on the missile tubes, so I have to say this. I took over the program on July 12th, and we got all the details that we had a major problem on July 13th.

We are aggressively working with the shipbuilder as well as the vendor base to be able to address this issue. Obviously when you haven't done something for about 30 years, like building missile tubes, it's something you've got to be able to learn and get back up on and operate efficiently. We built margin into the program, and to add to what Mr. Drakeley said, we originally had 23 months of margin in the schedule for the first article quad pack and the Common Missile Compartment, and we've consumed 10 months of that.

So 13 months of margin is what we have now. We are guarding that vigorously and we are looking at the rest of the ship's schedule to ensure that we have margin as we go through, because we cannot miss the delivery of this ship. We purposely planned for that, and so as we go forward, we will continue to aggressively work that.

So, I'm looking forward to continuing to work with the shipbuilders, the industrial base, as well as all the government team, across our workforce. To help work across the PEO and with CAPT Hanson, we've established certain leadership programs within the government to develop our workforce and to get that cross-functional experience so that we can take the younger people and get them up on the governor quicker so they understand what to do, not just within their small silos.

ADM. DONNELLY: Thank you. Commander Mark Parrella is the principal assistant program manager for the Columbia-class. Can you say a few words about what your swim lane is?

CMDR. MARK PARRELLA: Good afternoon, I'm Mark Parrella. I work for Captain Rucker, responsible to him as construction manager for Columbia, and then through him to Mr. Drakeley and Admiral Gogins.

Captain Rucker took over in July. I got to this job in August. When I came on board, CAPT Rucker gave me the information about the mis-

sile tube issue.

So I inherited that program and that issue from the team tackling it aggressively, so that obviously is at the top of my list, to make sure I maintain the margin that we've been able to save and look for additional opportunities to get that margin back. But we can't lose sight, as we focus on that, on the rest of the ship and the rest of the construction program. Mr. Drakeley mentioned a lot of the issues that keep me up, both during the day and at night, in the pursuit of maintaining the schedule for this platform and making sure we're on track, and making sure that all the various swim lanes that are all equally important to get this ship delivered on time -- both on the government side as well as the shipbuilders -- to make sure we're able to execute.

Mr. Drakeley mentioned the Integrated Enterprise Plan (IEP), which I'm intimately involved with on a day-to-day basis back at NAVSEA. It is a generational increase in the workload that we're seeing, both in the preparation and the execution of the work that we're about to see, we haven't seen since the '80s: the design and construction of Columbia, the missile tube industrial base, the increase in the workload brought on by VPM and Virginia, maintaining two per year and not sacrificing two per year construction base on Virginia, as well as the Ford program; making sure all these programs are able to move forward on schedule, work together, work efficiently; and the vendor base is very common amongst all these platforms, not just the submarine industrial base but the nuclear shipbuilding industrial base, as was mentioned before.

So the IEP was put together strictly to manage that risk and make sure we're able to execute all these programs. We are working hand-in-hand together between the government and the shipbuilders. There's not a day that goes by that the shipbuilders and the government team don't meet to ensure that we are on track with the lines of effort that are in the IEP.

It is a team sport. There is no win-lose in this business. We're all going to succeed together and win together, or we're all going to fail. That's the approach that we bring to it.

Major efforts that I'm involved with driving forward, especially with Columbia but across the enterprise plan: are facilities preparation, resources, and we've talked about the supplier base. Facilities prepara-



tion; shipbuilders have taken a lot of effort and are investing in themselves and investing in the rest of the base to make sure their facilities are ready to go. Delivery is several years out in the future, but we need to have facilities ready and ready to go on day one of construction start, to make sure that we're able to execute properly and quickly and efficiently, so we're not losing any of that schedule margin as we're getting into construction.

There is a lot of construction happening at Quonset Point. Electric Boat is moving very aggressively to increase their facility footprint there, to make sure that they have the facilities ready to handle Columbia modules alongside Virginia and VPM modules. Newport News has invested themselves in the Joint Manufacturing and Assembly Facility (JMAF) and their facilities down at Newport News, and that is continuing to make sure they will support all three programs that we've talked about. And we're in detailed design and studies at Groton with Electric Boat to make sure that the development of the South Yard Facility, which is the Columbia assembly facility, is on track and ready to support. When those modules are ready to leave Quonset, they need to be ready to be received in Groton and hit the ground running in Groton. So, we're focused on those facility improvements and making sure that they're ready to go.

For resource preparation we've talked, and I think there was some discussion in the earlier panel, about workforce development. We need to make sure that both the shipbuilders and the industry at large are ready for both the work that's coming as well as dealing with the departure and retirement of the highly experienced workforce that we have today in dealing with the trough that we mentioned before. So shipbuilders, along with the government team, we've been looking at that trade pipeline, as well as other critical skills. It's not just the trades, it's also engineering, it's also planning, it's also program management, a lot of other trades that need to be ready to go so we can be ready to receive that workload and also replace the experience that we're losing in the near future.

In the past year there has been a ton of effort to evaluate and assess the state of our readiness in the supplier base. We've identified approximately 329 critical suppliers through our assessments with the ship-

builders, across the breadth of industry as well as going down multiple levels in the supplier base to make sure we understand where the risk is, really looking at capacity, capability and risk. Those are the three areas that we really need to take a look at to make sure we understand and are very honest with ourselves about where that risk is. To the point Mr. Drakeley mentioned before, making sure that we have a candid evaluation of ourselves to make sure that we're not surprised when we get this new work and get this new workforce, and need to be able to execute on day one.

So both the shipbuilders and the rest of the industry team are investing in themselves and the trade and training pipelines. We're taking the lessons that we've learned from the past year, as well as the lessons that we've learned with the missile tube issues and rolling them into another round of assessments and engagement with the supplier base. We're going to keep this effort moving. I think there's no end. This continued search for risk to try to buy down and maintain the margin for Columbia and for the rest of the programs will continue.

ADM. DONNELLY: Okay, I've gotten a good response from the audience and I've got some good hardball questions loaded up. The first one I think I'll direct to Captain Rucker. We heard earlier Admiral Richard talk about how General Patton handled roadblocks. If you could shoot one donkey, what would it be?

CAPT. RUCKER: That's a pretty tough question. First of all, I don't shoot animals, so I'll try and get that out there. I think at this point, looking at it, I think the alignment that we need to have, and the communications is one that I would try to shoot.

When I say that, it's a team sport, and we need to ensure that we address the issues together. I think one issue, as soon as that issue is addressed, another one pops up, like whack-a-mole. So to me, it's ensuring that the flow of communications from the suppliers, with the shipbuilders and across the government team, both programmatic, technical and contractual for that matter, is we're all talking together. If someone is hiding information or is not sharing it, it becomes a bigger problem that we cannot address.



As a group, we can address, I believe, any problem if we all work together as we do it. So, I think the donkey I would shoot is the people that don't openly work to communicate and ensure that we work together to address the issues. Frankly, where we are today, shipbuilding is hard, it's not easy. So the challenges will keep coming, and the way we do that is we elevate them to the right level and we address them together as a group to get them fixed.

ADM. DONNELLY: The next one is Virginia-class related, so I'll direct this to Captain Hanson, With the Virginia Payload Module, can we finally solve the lack of berthing for our fast attack crews, or at least plan a rack for every sailor for future SSN builds?

CAPT. HANSON: On that note, the baseline plan on berthing is virtually the same between the two classes, so it will basically be the same between the two ships. We are looking -- one of the items that is being looked at for Block VI is SOF optimization, which would obviously have a berthing piece of it, specifically for the SOF piece, but it could also help with that going forward.

ADM. DONNELLY: Do you expect the VPM submarine crew will be the same as the non-VPM Virginia-class?

CAPT. HANSON: There is a few persons increase in it.

ADM. DONNELLY: Okay, so the same number of bunks but three more people.

CAPT. HANSON: Correct.

ADM. DONNELLY: That answers the question, problem not going away. I guess going back to Mark Parrella, can you say a few more words about the nature of the Columbia-class tube welding issue and how it's being resolved?

CAPT. RUCKER: I'll take this one. I'm not going to have Com-

mander Parrella get into too much trouble. If you look across the issue that we've got, this is one of those that if we would look back in hindsight when we did our initial risk assessment with the vendors, you assess what a vendor is going to be able to do, you determine where you think they lie and where you want to go after in terms of managing that risk.

In terms of welding, based on the history of the vendors that we had, certain ones we didn't feel that welding would be a challenge. As they moved into this, since it was a type of weld that had not been done for a while, that's where we frankly mischaracterized -- with our shipbuilding partners -- mischaracterized where that risk was. So today we are dealing with the welding challenges that we've had and we're working through those with increased oversight and basically going back through re-proficiency programs with the welding workforce associated with the vendor.

In addition, we've found that our nondestructive testing programs -- that's basically ultrasonic testing -- the industrial base has gotten to where they aren't quite as proficient as they used to be at doing some of these larger complex problems. So we have found that Electric Boat, after we learned this, has gone out with quality advisories to the industrial base to basically say, here are the lessons learned we have and here's what we need to work on as a group to improve going forward. So I would say until we get up on the governor and get through it, we have increased oversight with a lot of our vendors we have found challenges with and will continue to do that as we re-train and get re-proficient going forward so that these lessons learned are incorporated where we need to.

ADM. DONNELLY: Okay, great. Another Virginia-class program question. With the Virginia VPM ship being 84 feet longer than the sister ships without VPM, what actions have been identified to enable these ships to be moored and dry-docked? Are the piers in New London too short?

CAPT. HANSON: Actually, a while ago, 2007 I think was the initial plan, and we're finalizing the updated plan to that, there was a combined survey. My program office was involved along with the Naval



Facilities Command, and that's precisely what they do. There are two components to that.

There's just a general condition, as we normally have to deal with overtime in the Navy, and then there's also the other changes necessary for new capabilities. We have that all phased in in terms of when VPM hulls will arrive in specific ports. There are MILCON projects initially scoped out and identified, and those are being layered in through the POM process to address those issues.

ADM. DONNELLY: CAPT Arnold, maybe you could field this question. Are you feeling constrained by the length of time it takes to get new security clearances for new workers?

CAPT. ARNOLD: Right now, I'm not really constrained by that. We are looking at other issues where I have existing workers increasing their security clearance to meet some of the demands of moving things as we should to more classified settings. I think that will be a challenge.

But I would like to go back to the donkey question.

ADM. DONNELLY: You can shoot the donkey.

CAPT. ARNOLD: I will shoot the donkey. It's not the person, but quite frankly it's a thought process. It's the way we manage contracts metrics at NAVSEA, and it's taking a look at making sure if we ever have a protest, we never lose a protest.

That's one metric, but that creates a culture where we're very risk adverse. Anybody gets to slow down the process. There are some cases where we've had 4.5 years to award a small business set-aside. If we change the dynamic and look at the throughput, instead of saying I will take no risk, let's take appropriate risks. We can do things like the large vertical array contract and get that out in about 11 months. That would be the donkey that I would shoot.

ADM. DONNELLY: This is a Columbia-class question, and John I'll let you either answer it or defer it to CMDR Parrella. If you had 23 months of margin built into the missile tubes, what other examples can

you give of major systems and how much margin they have and how you're protecting that margin?

CAPT. RUCKER: If you go back to what Mr. Drakeley showed on his slide, I can't get into the specifics of every slide, but I'll give you a couple of examples. That chart that he showed that was the green, yellow, red, we target to be able to support most of those. If you looked at it from the top-down, it's the various phases of design. So it starts with preliminary design, you work out a detailed design, planning, initial construction, detailed construction and then delivery.

That's kind of going down the left slide. The goal is, as you walk down that, you want everything to start in the green and you want to walk down that trying to stay in the green as much as you can. Depending on where you go, you have things that slowly walk into the yellow. If it hits that yellow, it's immediately brought to my attention. No one is allowed to change the schedule margin for Pre-Overseas Movement (POM) that goes into that yellow without my permission. We do component level reviews so if you ask me, there's 101 components that are on that so I can tell you today we have about eight of them that are in that yellowish-red column. I won't go to the specifics of what they are, but I'll tell you the goal is to get -- and if they're there, we work with the shipbuilders to aggressively figure out, including one of the two of us might be making a trip to a vendor, which neither one of us wants to go there because of where it's located. It's out in the middle of nowhere, but one of the two of us will do it.

CAPT. HANSON: You can do it.

CAPT. RUCKER: You can tell which one of us will probably go, based on rank.

It's one of those, in all seriousness, that we actively consider the vendors partners, and so when they're struggling, we want to go help in any way we can. If the shipbuilders need our assistance or we are privately working with them, we go there. So out of that 101 that's on there, there's about eight or so, and it fluctuates, that we work with to maintain that margin. That kind of gives you an idea, but it is a detailed



effort.

This is the first time that we've ever gone with that level of, I'll say proactive management from the shipbuilding partners and the Navy down to the level of components to understand everything that drives that vendor, whether it's a contractual delay, they have a vendor that decides to not make something anymore, or they find out there's a material that has become unobtainable for some reason and we have to quickly address it. It is elevated immediately so that we can then, as a group, go aggressively after it and figure out what we're going to do to mitigate it.

ADM. DONNELLY: Great, thanks. I think this one probably also goes to you, John. Because the Columbia-class is right in the middle of a major design effort, there are concerns that the submarine design base is also experiencing the same demographic pressure that we heard about earlier today due to retirements. What is being done to preserve that submarine design base after we finish with the Columbia's design?

CAPT. RUCKER: This is probably a question for both Chris and I, because it's kind of a team effort between the two of us. One, I've got the Columbia aspect, which is the largest design right now. Captain Hanson has got the Virginia Payload Module.

What falls into that is what you heard talked about, the Tactical Submarine Evolution Plan, or TSEP, and where we're going to be moving on to the next generation tactical. So if you look at the time span it normally takes to design one of these, it's figuring out as we transition down and the workforce starts finishing up on both the Columbia and the Virginia Payload, where we start those advanced design efforts so that the workforce can efficiently and smoothly, depending on where they're expertise is, whether it's structural, piping, electrical, we can transition them over to other efforts. I don't know if you want to talk about SSN(X) stuff, because really Chris is managing that part of it.

CAPT. HANSON: Sure, I think there was kind of two parts to that question. The first part was on the retirement. I don't have the numbers all written down in front of me, but I can definitely tell you from going out to where they're designing submarines and walking around and

seeing all the young, energized people out there, we're kind of through that part. The building up of the experience base has been ongoing, and what we don't want to do is lose that national asset as the design work decreases.

Also, while I'm smaller numbers on VPM, we're also somewhat in the same area in terms of peaking and then coming down on a design. But that also meshes perfectly with the TSEP plan that I talked about. As I also mentioned, we're off to the races on what are the opportunities in Block VI and what is that going to look like? We'll carefully manage balancing the capability that the nation needs and can afford, and then manage that carefully to also ensure that we protect the national asset of the new generation of submarine designers that have gotten a lot of experience in the last few years.

ADM. DONNELLY: Thank you very much. That concludes the panel. We're out of time but thank you to our program managers.



**Naval Submarine League
36th Symposium and Industry Update
Junior Officers Panel**

LT Evan Christman, USN; LT Sean Cruz, USN; LT Colter Hanson, USN; LT Christian Mineur, USN; and LT Andrea Weiss, USN

VADM DONNELLY: Kind of the highlight, I think, of the annual symposium is the junior officer panel. It's an opportunity to get the unvarnished truth from the deck plates, or slightly removed from the deck plates. All these officers are on their post-JO short tour right now. As we've done before, I'll leadoff and moderate and will introduce the panel. I'll floor a few questions, but if you have a question for them jot it down on one of the cards and we'll have the audience participation that way.

I'd like to start with Lieutenant Weiss, and then we'll move to her right and go down. I'd like each of you to introduce yourselves. Tell us what school you went to, what your commissioning source was, what boat you served on, what jobs you've had on that ship, and where you are currently. We'll start with Andrea.

LT. ANDREA WEISS: Good afternoon, I'm Andrea Weiss. I graduated from Columbia University in 2013. I commissioned through NUPOC, and I was on the USS OHIO home ported out of Bangor. During that time I was Reactor Control Assistant and Tomahawk Strike Officer, as well as the Special Operations Forces Officer throughout my time there. Currently I am a watch officer at the President's Emergency Operations Center in the White House Military Office.

LT. CHRISTIAN MINEUR: Christian Mineur, commissioned through the Naval Academy, USS Nebraska for JO tour and the reactor tool assistant, tactical systems officer and assistant engineer. After that I did a SECNAV tour industry fellowship at GE Digital in software business for a year. I came back and now I'm at the Digital Warfare Office on the OPNAV staff.

LT. COLTER HANSON: Lieutenant Colter Hanson. I served on the

Ohio with Andrea Weiss. I graduated the Naval Academy in 2013. On the Ohio I was the electrical assistant, tactical systems officer, damage control assistant, and assistant engineer. Now I work at OPNAV in 31 Global Force Management and Plans.

LT. SEAN CRUZ: Sean Cruz, Naval Academy class of 2012. I was on the Providence out of Groton. I was the Torpedo Officer, the MPA, the DCA, the CRA and the AOPS. I'm currently stationed at USCYBERCOM where I'm the Executive Assistant to the Deputy Director of Future Operations.

LT. EVEN CHRISTMAN: Lieutenant Evan Christman, Naval Academy class of 2012 as well. I was on the USS Pasadena out of San Diego. While there I was the main propulsion assistant, the CRA, the assistant operations officer, and then another little stint at CRA at the end. I'm currently assigned as a nuclear fluid systems engineer at Naval Reactors Headquarters.

VADM DONNELLY: Okay, great. We have four Naval Academy grads, two Ohio crew members. Were you in the same crew on Ohio?

LT. HANSON: Yes, sir.

VADM DONNELLY: Let me start with a question for Andrea. Ohio was a mix-gendered crew with both officers and enlisted?

LT. WEISS: Only officers.

VADM DONNELLY: How did you feel as a female crewmember in the ward room of Ohio? Were you treated as a little sister, as a complete equal peer, or as a foreign body?

LT. WEISS: When I first showed up to the Ohio we had three women onboard, myself and one other division officer and then our supply officer was a female the entire time. Throughout my tour, at the most we had five women, and those were all, again, one supply officer and the



rest being division officers.

Within the ward room the dynamic was really great. They were all supportive. There was no real difference that I noticed or anything like that.

I was not the first female to integrate. I was not in that first wave of women, but you could still feel there was some work to do with the crew. So it was more learning how to operate with the crew, and that came with little things.

One of the things I became known for was that the crew would try and tell an inappropriate joke. So one day I walked into maneuvering while training as EOOW, and they said, "Ma'am, ear muffs".

I said, "ear muffs?!" This poor EM2 really got a piece of my mind for trying to isolate me or get me to leave, and over time it became known throughout the boat that you would never tell me that, because that had become a common thing to try and create different environments around the female officers. So one of the things I stressed with the crew -- it was not a problem within the ward room -- was that it's a professional work environment independent of gender.

Yes, we happen to live in here, but also when you're standing watch it's a professional work environment and there are things you can say and there are things that are unprofessional. So it took a bit of time, but by the time I left there it was a really great environment and I was continually impressed with the professionalism of the ward room and of the crew.

VADM DONNELLY: One of you said you were the operational safety officer.

LT. : Yes, sir, I was.

VADM DONNELLY: We didn't have that when I was on active duty. Can you explain what that is? Is it your full-time division officer assignment, and what impact did you have on operations safety?

LT. HANSON (?): Ideally it's your full-time division officer job, but that doesn't usually work out because there's so many other respon-

sibilities. By the time you get there you're a senior JO and contribute a lot. Most of my time was spent in the shipyard. I had a three stint transiting from Pearl Harbor back to Puget Sound Naval Shipyard where I was able to.

So most of my efforts were spent trying to define the program. The officers brought into it pretty well. The crew didn't really understand what operational safety officer was in terms of sonar and fire control and stuff like that, so that was a challenge. Most of my time was spent really in the shipyard trying to both act as a safety officer and then continue to define the program.

VADM DONNELLY: Good. We don't have any midshipmen in the audience. Often we do for this panel. But we do have some officers at the Naval Academy responsible for recruiting midshipmen into the submarine force. Lieutenant Cruz, if you could give a midshipman some advice as to their service selection, if they're sitting on the fence, what would you tell him about the submarine force?

LT. CRUZ: I think like many people, when I got to the Naval Academy I wanted to be a pilot. I got PRK as soon as I could and got everything all lined up for that. But as I progressed through my years at the Naval Academy I realized that I wanted to lead sailors and wanted to deal with the best people there were.

Through my experience on Providence, at least, that was really who I was dealing with every single day. Of course, everyone says don't do it for the money, but that certainly didn't hurt either. It's just the quality of the people that you get to deal with is quite remarkable, and I very much enjoyed it.

VADM DONNELLY: Keep the questions coming in. For Lieutenant Christian, can you describe in an unclassified forum what your most exciting operational experience was on your ship?

LT. CHRISTIAN: I had the privilege of doing two deployments while I was on Pasadena. The first was back aft. I didn't really get to experience much of what was going on in the front of the submarine. But



there are evolutions that we practice extensively for during our pre-deployment workups which, at the time when you've practiced it for the 10th or 12th time on the OBT or anything like that to get ready for real life, when you actually get to execute it and it goes flawlessly, it leaves you with an immense sense of pride and all the hours of hard work in port, the many hours spent in the trainer, and countless days underway, made it all seem worth it.

VADM DONNELLY: Good. Lieutenant Mineur, I'll throw this question out for you, but anybody else that would like to answer it. If you had the submarine force commander in the room -- and he just left -- or COMSUBPAC in the room, what advice would you give them as what you would like them to order you to do? How would you have them impact the submarine force with one order that they could give?

LT. MINEUR: For me it would be to really learn down to the level we understand nuclear power, computers, networks and the electromagnetic spectrum. Going from my tour with industry, I really didn't know computers when I first started. Seeing how much can be done in that space and what we could potentially do if we really understood what that was, I think that's something we really need to explore and really bring into our core competencies as line officers.

VADM DONNELLY: Great, anybody else want to field that?

LT. : Maybe not so much an order, but I would say that as the force is changing, as the number of submarines dwindle with both the SSBN fleet winding down here in the near future and the fast attack fleet approaching its lowest number in years, I don't think there's been a hard re-evaluation of all the requirements that we impose, all the pre-deployment training requirements, all of the nuclear requirements. A lot of those things, especially for a fast attack on an 18 month operational cycle that gets compressed into a year; in terms of managing the morale at the lowest level, at kind of the junior enlisted, the junior officer level, it gets more difficult when those requirements haven't changed and the operating posture most assuredly has.

VADM DONNELLY: Good. Let's put one of you in the role of JO detailer at PERS-42. Andrea, how would you sell a junior officer on seeking a billet in Guam?

LT. WEISS: I love Guam. The OHIO is forward deployed to Guam, so I'd have some actual ways to explain to them that it's a beautiful place. With families, I think it's a little bit more difficult for some people, depending on who they are, but it is a great operational area.

I think the mission structure out there is fascinating. If I were to go back and do a department head tour, I think those areas are really interesting. So that's what I would really focus on selling them on, the operations out there.

VADM DONNELLY: You know this is being recorded. I can practically guarantee where she's going for department (tour ?).

LT. WEISS: They don't have any boats for women in Guam.

VADM DONNELLY: Yet.

LT. CRUZ: Speaking of detailing, there's another thing that I wanted to bring up. When I got to the Providence it was on the watch list, towards the end of its time on the watch list. We got a slug of exceptionally intelligence and smart JOs, myself possibly not included. In the boat itself, through the FRTP, through our deployment, we won the Battle E.

But as we got off the watch list -- and this is somewhat anecdotal -- it certainly felt like we were getting driven back to fleet average in terms of tech numbers and quality, to some extent. If you take the mean of everybody, that works out fine. But if you have a slug of higher tech number of officers that means that in order to get back to fleet average you get some lower tech number officers.

That makes things excruciatingly difficult towards the end of our 15 months PIRA when we were trying to train a bunch of people that have very limited sea time and maybe not the strongest academic background. So one thing that concerns me is how that process is managed. I feel like we ended up over-correcting, and then as I was leaving the boat I had



some concerns about the future of the boat.

VADM DONNELLY: Lieutenant Hanson, did you do any SOF ops while on Ohio?

LT. HANSON: Yes.

VADM DONNELLY: When the SSGNs go away in 2033, what will be the biggest detriment to the submarine force special operations force support mission, given that we still have dry-deck shelters and we'll still have SSNs doing that?

LT. HANSON: When the GNs are decommissioned, you're saying, what will they lose?

VADM DONNELLY: Yes.

LT. HANSON: Probably the biggest advantage of the GNs is the sheer amount of people that you can carry. We had upwards of 250 people on the boat at one time. So you could have many, many people and specialists and intelligence and sonar experts and submarine special ops people and people that support them and divers. So I don't think even an extended hull Virginia will be able to have that number of people onboard, so you won't be able to have the mission execution and the diversity of qualifications that you have on the submarine.

VADM DONNELLY: Here's a question, and I'll let (Sean ?) jump on the hand grenade. We have heard occasionally that the administrative burden on our submarines is excessive. True or false?

LT. CRUZ (?): Very much true.

LT. : One hundred percent true.

VADM DONNELLY: What one thing would you do to eliminate some of that administrative burden? What's the first thing, the first re-

quirement that you would eliminate?

(?): I did some time as the ship's quality assurance officer, which obviously quality assurance, SUBSAFE, is an immensely important program. But really the jobs that we're asking -- there's some work out there, there's some standardization, but in terms of preparation work that you can do to help the ship out, whether that's FWP's for nuclear work or quarterly torpedo tube maintenance items, there is some standardization out there, but I feel like that is one area where there's a huge burden on both the preparation side, the review by the chain of command, the close-out review by the chain of command, and then the storing of those records long-term that could definitely be automated and lift a huge burden on the ship.

VADM DONNELLY: Anybody else have an idea?

LT. : There's so many things that we do that could be done by an algorithm. At some point I think we're going to have to trust algorithms to do some of those things. And there's things that were not even set up from an infrastructure perspective that algorithms could and should be doing, that we could gain huge administrative efficiencies. So if all your wiring diagrams are in mission readable format, why can't you have isolation set up by a machine and then one human review it instead of (multiple ?) reviews. Things like that could significantly reduce the administrative burden.

VADM DONNELLY: More applications of artificial intelligence. I would have said log reviews. That's the one thing I used to waste a lot of time doing.

Are any of you members of the Naval Submarine League currently?

LT. : No, sir.

VADM DONNELLY: What would entice you to become a member? We offer full membership to students, but you didn't bite then. The cost of membership is insignificant compared to your extremely high



salaries, so it's not a financial thing. But what would you look for in the Naval Submarine League that would be of value to you.

LT. : I talked to a couple of people so I'm planning on joining after this.

VADM DONNELLY: Good.

LT. : The networking opportunities seem like a pretty good one. You could advertise that a little bit more. There's currently the Nuclear Officer Power Conference, I think. I forget the name of the JO who set that up, but he brings in a bunch of industries and stuff and uses it specifically for nuke officers to get in. So maybe not necessarily because I understand the force needs to have people retained, but talking to industry experts and stuff like that, and giving different opportunities for perspectives.

VADM DONNELLY: Okay, great. We'll keep that in mind. On a related note, a lot of the audience here are members of industry, and it is a good networking opportunity. I have one question that is, what advice would you give to businesses looking to recruit talent from your demographic?

LT. : Offering grad school. If you want to get the top talent you have to -- most people my age they're getting out and they're kind of deciding between whether they want to go to grad school or whether they want to go straight to the job. You could bridge the gap and offer them some type of incentive to go part-time or online to get the degree that they want while still working full-time so they don't have to make the decision. That's a pretty nice incentive.

VADM DONNELLY: Lieutenant Weiss, I know you're going to graduate school on your own time. None of the five of you have a graduate degree yet. Was that an option in the discussions of your post-JO shore tour. Was your detailer, was grad school on the slate, for any of you?

LT Cruz: It was, but as a tier 2. If we fill everything else here, we'll send somebody to PG school. You almost had to cut a drug deal to get there.

LT. : One of the problems I had -- they send out the PERS-42 drumbeat now, which is they send out a letter about every quarter or whatever saying, these are the opportunities, these are the opportunities. It is command-based, but I would say as a whole I know for the Woodbridge scholarship to MIT it went unfilled my year because no one applied. So I think there's an education piece that needs to go out there to the junior officers.

I don't think they're getting the memo that there's all these opportunities out there. It's not something that your CINC comes out and then you say, I want to go there. There's a whole long application process that you really have to time it right and hit the window.

So you should start grooming people about the time they qualify. You should identify the top talent when they qualify and start telling them you're eligible for this. You'd be a good candidate for this Woodbridge scholarship.

LT. : The other thing I would tack onto that is there's two issues that I saw, which was there's a program you might be interested in but you either need to extend six months on the ship to get it, or convince the command to let you leave six months early to be available the previous year, which with all the detailing constraints that's very difficult for a commanding officer. So you either need to make the choice for yourself to extend because that means that much to you to extend six months, or you convince your commanding officer to let you leave before your (peer D ?), neither of which are great options.

The other part, which is irreconcilable with the submarine force is, there are some of these programs that have long application processes that require you to take admission exams. If you're under water and on deployment for six months, taking those exams and getting applications in and preparing for interviews is not exactly easy, which is what I encountered.



VADM DONNELLY: Lieutenant Cruz, you're the only one here I see with a wedding band. You're married, right?

LT. CRUZ: Yes, sir.

VADM DONNELLY: Are you, also? So for the two of you that have a spouse, is geographic stability a growing priority for you? If so, how should the submarine force deal with that fairly and equitably?

LT. CRUZ: My first five years of commissioned service I moved nine times. But I didn't get married until I was halfway through that. But even during my JO tour I moved twice, two change of home ports, once from Groton to Portsmouth and then back. I now have a 10-month old, so yes, geographic stability is a greater concern for me. But at the same time, I'm a Navy brat. My wife was a Navy brat. We're used to moving frequently, so I'm not particularly concerned about our ability to do that and be successful as a family. But obviously it's a lot easier on the family if you're not moving as frequently. But I'm not the home-steady type, either.

LT. : I would like to add in for me, because I'm getting married in January, it's actually a huge problem for my family because my fiance definitely wants to have a career. I've already asked her to move four times in the last three years, and then there will be a six month move up to Connecticut and all that kind of stuff. So we're exploring options of like, can I leave her here and maybe I'll (geo back ?) to Connecticut and then try and get a boat out of Norfolk so she can stay here for an extended period of time. It's a challenge for us because she definitely want to have her own career, and moving every two to three years may be when the Navy says so doesn't help.

VADM DONNELLY: Not all of these five have made the final decision whether to go on to department head or not. Some have, some haven't. But I would ask this question, I'll just throw it out, what are the main reasons why junior officers in the submarine force choose to stay and go on to be a department head? Anybody want to take that?

LT. : I would say the reason that people kind of get told to stay in, and the fact that it's true about the people, right now I sit at a cubicle and don't find that particularly interesting all the time, because I don't get to work with people. I don't have people working for me that look to me for guidance to make decisions, leading a watch team on deployment, things like that. Those parts were all very rewarding.

VADM DONNELLY: Okay, anybody else?

LT. : I would say the possibility of command. Commanding officer of a CO is the last truly autonomous command you have when you're under water and no one is really telling you what to do. So I think that's pretty appealing, to be the lone guy in charge making the decisions.

VADM DONNELLY: That's a wise answer. Spot on. That's a (4-0 ?) answer.

For the SSN sailors, what requirements do you see as most important for our next fast attack submarine, which will follow the Virginia-class? Any ideas?

LT. : I'll take it. To me, I would be looking at it more from like an options trader perspective than I would from a value perspective. The pace at which technology has changed, and the timeline that that's on, I think we're going to be well into the acquisition process before that, before we could have any idea what we might want to be doing with that. So to have the ability further and later in the design cycle to take a rapid shift into what that platform would be doing is probably first and foremost in my mind.

LT. : The contract flexibility to build boats with at least relatively recent fire control systems that aren't six to 10 years out of date by the time the boat commissions -- some of the audits, some of the attack centers, you go into a Virginia-class attack center and deal with a six year old fire control system. We're at a 10 and it could be an 11. So there's some big changes in there. Going backwards is a huge negative training value, especially with IBAL.



VADM DONNELLY: This one is for Lieutenant Weiss, a question about your graduate education program that you're on. Where are you going, how is that financed, and what is the curriculum you're studying there?

LT. WEISS: I'm currently stationed in D.C., so I'm going to the School of Foreign Service at Georgetown. They have a Masters in Security Studies and they have concentrations in things like U.S. national defense policy, counterterrorism, all those kinds of things. I haven't chosen my concentration yet, but it will be two years going part-time and is currently self-financed with a little bit of merit scholarship from Georgetown. It works well with my schedule so that I can basically take two classes each spring, summer and fall for the remainder of my shore tour and complete the degree that way.

VADM DONNELLY: Great. Later today we're going to have the chief of naval personnel come and speak to us. If we can pull him aside, what is your ideal next assignment?

LT. WEISS: Fast attack and Pearl.

VADM DONNELLY: Alright, it's done.

LT. WEISS: I was on a guided missile submarine. We were in the shipyard for the second portion of my junior officer tour. I got my fish the day we pulled into Guam for the last time, so I did not get a lot of operational time as an Officer of the Deck. I got just enough to realize that it's challenging and really interesting, and to love that leadership aspect, but I did not get enough to become what I would say really proficient and get that experience.

So right now, for women in submarines, there are only the four ports: fast attacks in Groton, Virginias out of Hawaii; and then BNs and GNs out of Kings Bay and Bangor. With a BN, I don't feel would give me the opportunity to have as much of that mission structure, Officer of the Deck experience that I would really like out of a department head tour if I were to do it. And no disrespect, but I do not enjoy Groton.

VADM DONNELLY: You're in the majority there. Lieutenant Hanson, if you were CNO for a day, what would you change? What uniform change would you make as CNO?

LT. HANSON: I would probably change the mental health standards in the Navy. Me and Andrea were talking about this a little bit earlier, but I think the pendulum has definitely been swinging towards better, but it's still not good yet. Too many sailors still kill themselves. We push people to the point of them breaking. Before we could take intermediate steps and have them get help along the way, possibly antidepressants, possibly seeing a counselor. But there's still a very negative stigma associated with that at the deck plate level where sailor Timmy does not feel comfortable going to talk to the mental health specialist because he's passionate about being a submariner and he doesn't want to lose what defines him and his defining trait. So I would say that we need to take a hard turn and possibly some senior leadership needs to possibly go see the mental health person to set the example on the boat, to show that it's okay to go talk to the person, you're not going to get fired.

LT. WEISS: I would just like to add to that it's not just that you can go talk to the person, but I think there's also a perception that if you go talk to the person it creates unnecessary administrative burdens. You're going to end up having additional conversations with your chief or your division officer or the captain, when it could just be, okay, you need someone to talk to – great, let me know if you need anything from me as opposed to this idea that if I go talk to someone that's going to raise red flags up and down the chain of command. It shouldn't raise those flags, necessarily.

VADM DONNELLY: That's good, it's an interesting answer. I appreciate that .

I think we're almost out of time. I have one more, and I'll just throw it out there for whoever wants to jump on this one. If you considered your ship to be combat ready, prepared for battle as Admiral Richard said at this change of command, what were the most important things that made it that way?



Was it the weapons? Was it the equipment? Was it the people? Was it the training?

LT. : It's got to be the people. The ship is so vast and so complex and there's so many small things. The ability of a good crew to exponentially impact the operational effectiveness on the ship or decrease it far outweighs what the actual technology and capability you have on-board.

LT Cruz: It's all about the training together as a watch team. Personnel are not plug and play into their watch stations. It was a huge difference if I ever had to stand by for someone in a different watch section. Yes, everybody was using the same things, but just the non-litany low level buzz that's encouraged in control as you're trying to solve problems, figure out solutions, resolve ambiguity, what have you; the connection between you and your FTOW, you and your Sonar Supe, is not easy to make, and that is really what contributes to combat effectiveness.

Things are going to break. I was on a boat older than I am, things broke all the time. It's your ability to work with your watch team that allows you to work past that and be combat effective.

VADM DONNELLY: Perfect. Well, it's always really refreshing to get the view from your perspective. Thank you, all. That was great. I appreciate it.

(Applause).

**Naval Submarine League
36th Annual Symposium and Industry Update
Industry Panel**

**Jennifer Boykin, President of Newport News Shipbuilding
Jeffrey Geiger, President of General Dynamics Electric Boat
Todd Schurra, General Manager of Curtiss-Wright
Thomas Spock, Vice President of P&L and Lead for Global Defense
Sales at Circor
Edward Walker, of W International**

ADM. DONALD: Our next event, this is something that's pretty special, is our industrial leaders panel.

We have Ms. Jennifer Boykin, who is the president of Newport News Shipbuilding; Mr. Jeffrey Geiger, president of General Dynamics and Electric Boat; Mr. Todd Schurra, a general manager in Curtiss-Wright; Mr. Thomas Spock, general manager of P&L Lead and global defense sales for Circor; and Mr. Edward J. Walker of W International. We're going to be moderated by Vice Admiral J. Donnelly our president.

ADM. JOHN DONNELLY: This is the first time we've done a panel like this, and I think it should go really well. I'd like to start off by thanking our chairman, Admiral Donald, for filling in for me this morning. I picked up a little bit of food poisoning yesterday, and I'm operating on a half power lineup. But I've got a positive start, and I think I'm healing quickly.

Admiral Donald introduced our panel, and I've asked them each to make brief introductory remarks, and then I have some questions that I'll ask. If you have questions, if you'd write them down, we'll get to that as well. We have the two shipbuilders, and I'll start with them.

I've asked them in their opening remarks to make comments about what their company has done to incentivize the supplier base to meet the expected growth in the demand for submarine construction. As we've heard already this morning, we are ramping up significantly from two per year Virginia-class to two a year Virginia-class with Payload Module



and Columbia-class. That's a significant step jump in the workload for our submarine shipbuilders.

I'll start with Ms. Jennifer Boykin, the president of Newport News Shipbuilding.

MS. JENNIFER BOYKIN: Thank you, Jay. Good afternoon. We heard this afternoon, as Jay said, from all the speakers relative to the amount of work that's coming into the nuclear industrial base, the criticality of it, the criticality of the affordability, quality and meeting the schedule just to make sure that we support the Navy's mission needs.

Clearly as a shipbuilder, as a prime, we can't do this alone. I do believe we have strong partnership with our industrial base, many of you for many years on all of our programs. What we're trying to do, by leveraging a lot of the assessment that went into the executive order industrial base study, is to make sure that we're communicating what the capacity is. We're spending a lot of time looking at what the needs are from a capacity standpoint, capability standpoint, across all of the programs at Newport News, and we're trying to be more thoughtful and forward thinking with the industrial base relative to timing of the material needs for all of those programs.

We're also spending a lot of time looking at our own capacity and making sure that as we look out 10-20 years, we're making investments in our workforce, our facilities, we recognize that the industrial base is making investments in their facilities, that we're doing that with an eye towards what the right core/non-core view of what we make and how we best leverage the abilities of the industrial base, smartly. We've gotten plenty of feedback from the industrial base relative to what we can do to make their work more efficient, and we're working to do this in everything that we do.

I think the other thing that's critical that we all share is the need to make sure that we're thinking about our workforce and the workforce development longer term. Admiral Caldwell was talking about the training pipeline for the nuclear workforce. I think we need to look at the pipeline for the industrial workforce in the same way. We've actually stood-up something regionally with local suppliers with the private small yards who are doing repair work, and with the Navy, to collective-

ly leverage our workforce development programs with the universities, with community colleges, so that we can think about how we don't compete with each other, but leverage what we have together to develop the pipeline well beyond the incoming workforce. Ultimately, we're doing all of these things with cost in mind so that we can all be successful, and we can all make sure that we capitalize on the investments that we are making.

ADM. DONNELLY: Thank you, Jennifer. Mr. Geiger, what has Electric Boat been doing to incentivize the supply base?

MR. JEFFREY GEIGER: First I'd like to thank the Naval Submarine League for providing an opportunity, a forum like this, during this meeting to allow a little bit of focus and energy on the supply base. It's very much appreciated. It is an important component of what we all do, to state the obvious.

Our suppliers are obviously vitally critical to being able to build the nation's submarines. I think it's a base that is not particularly well understood, nor sufficiently supported. So the opportunity to have this kind of discussion with all of you is really important.

Many of our suppliers, much like the shipyards over the last couple of years, have been working very hard and have been able to double the amount of submarine volume going on in our various facilities. We're all facing, as everybody well knows, a significant ramp-up in demand in the future, a challenge not to be underestimated. We are very, very focused on what is necessary to be able to accomplish that.

One of the most important things I would expect the supply base would say to help prepare for the future is, keep work in the supply base. Electric Boat, obviously working with the Navy and the support of Congress over the last two years, has been able to put over a billion dollars of additional purchase requirements into the base in support of Block V, a fiscal year '19 authorized program, and Columbia a fiscal year '21 construction authorized program. We expect to put about \$3 billion into the base over the next year as the fiscal year '19 dollars get released to us. So getting good work going in these facilities is obviously important.

That spending is spread over about 450 different suppliers, so it's



not just a small number of suppliers that are getting engaged in these activities well ahead of the construction contracts. Additionally, we're very fortunate this year, in the fiscal year '19 budget, that Congress appropriated an additional \$225 million specifically for supplier development. This is to fund initiatives that can take the form of capacity increase, facility development, workforce training and other initiatives that allow suppliers to be able to get a lead angle and a build-up on future needs. We're currently working with the Navy right now to finalize what are the target areas where we want to apply those funds.

Beyond all of that, a couple of the other things Electric Boat has been working on over the last couple of years with the supply base is one, we have offered improved financial terms on contracts that encourage capital investments. We can do some things with the terms with cash flow in these contracts that make it favorable for suppliers to invest in their facilities. We've partnered and supported a number of suppliers in pursuing either Title III or industrial base analysis and sustainment funds, IBAS funds, again to make facility investments, skill development and address other challenges that the supply base is facing.

We also provide letters of intent to suppliers to support their efforts to secure capital financing to do improvements in their facilities. On the non-financial front we have engaged, in a number of instances, in performing pre-qualification efforts with different suppliers. A good example would be weld procedure qualifications on a timeline well ahead of an actual proposal solicitation such that the suppliers are positioned to be able to compete for that business on the schedule when it comes out.

And then lastly, specifically in Rhode Island and Connecticut, we have worked very hard to develop some significant trade training pipeline programs to support the shipyard with the state governments and the training providers in those areas. We've also leveraged those programs to be open and available for the area suppliers to take advantage of to help build their workforces in support of the increased volume. So that's a number of the things that we're doing today. To be sure I think more needs to be done, and I'm anxious to hear from the suppliers and anybody else on thoughts on how we can get this very vital component of our entire community online and able to support the needs of the future.

ADM. DONNELLY: Thank you, Jeff. For the suppliers, it's a similar question. I asked them in their opening remarks to address what their company has done to meet the challenges that they face in growing their capacity to meet the future demand. We'll start with Mr. Thomas Spock, who is the vice president of Profit and Loss Lead and global defense sales for Circor, which makes some of our pumps and valves that we use on the submarines.

MR. THOMAS SPOCK: Thank you. My plant is located in Warren, Massachusetts. Warren is a very rural area, located between Worcester and Springfield. We employ about 150 people. As was mentioned, our division was acquired by Circor International in December of last year, and we're still going through that integration.

For over 80 years we have provided highly engineered pumps under the IMO and Warren Pumps brands, and Portland valves to Electric Boat, Newport News and many of the other shipyards. For many years our defense business cycle was very stable with minimal turnover and moderate growth. However, about four years ago at our program review meeting with Electric Boat, we discussed the need to increase our capacity to accommodate the combined production from Virginia and Columbia submarine programs.

As a response to that we developed a rate readiness plan for both our pump and valve businesses. Each business had different operational constraints, but both plans addressed human resource needs, which we viewed as absolutely critical to our success. To deal with the operational capacity we invested over \$8 million of our own money in the past three years in machining equipment for the valves, which was primarily driven by the need for more volume; and test equipment for the pumps, which was driven by the need for higher technology. We also invested about \$1 million in our IT systems to meet cyber security requirements.

The new equipment requires highly trained technicians, engineers, CMC programmers, and machinists with new skills. As we began our migration to this new equipment, we quickly identified training as a critical bottleneck. In conjunction with the capacity increase, we were also facing a large turnover in our highly tenured workforce due to retirements. We are experiencing four to five retirements per year, and with



each departure we lose 35 to 40 years of experience. To give you some idea of the demographics, about 75 percent of our machinists are over 50, and 30 percent are retiring in the next four to five years.

The new equipment does reduce our dependence on tribal knowledge, but it is absolutely critical we capture all the know-how before it goes out the door. The \$3.5 million of new machining equipment has advanced capability to reduce setup times and dependence on operator knowledge. Our typical lot sizes are quite low, less than 10 pieces, and the equipment we acquired is ideal for this environment.

The initial cost and time to set up the new parts is significant, but it pays off down the road when subsequent runs are made. In some cases, we were able to eliminate three different machines, replacing it with one, to get the component off. All these improvements will help us reduce lead times, improve quality, and move toward our goal of 98 percent on-time delivery.

The \$4.5 million investment in testing allows us to complete tests in shorter timeframes while complying with the stringent acoustic requirements for submarine applications. Our new lab was dedicated earlier this year and is fully automated, so we can move from one test to the next without extended down-time. We also invested in instrumentation data collection equipment and software to speed the testing and to shorten the time to prepare test reports.

These investments we made come with no guarantees of increased business but are necessary to position us for future growth. We would like to make additional investments to automate some of our welding procedures but are holding off now as we assess the Block V valve award profile. We've also identified other investments necessary to reduce schedule risk and are working with Electric Boat on options to pursue these as well.

Thank you for the opportunity to speak and I look forward to the discussions.

ADM. DONNELLY: Thank you, Tom. Next is Mr. Todd Schurra, who is a general manager at Curtiss-Wright. Curtiss-Wright makes air compressors, steam turbines and steam valves for our submarines.

MR. TODD SCHURRA: Thank you. First of all, I'd like to say that it's a real honor for us to be up here today and to support the Navy program, submarines in general, and those in uniform specifically. It's nice to get to do something that really matters, and I think you all understand that.

I am the GM of a couple of different business units within Curtiss-Wright; the Engineered Pump Division (EPD) in Bethlehem, Pennsylvania, as well as two new recently acquired business units. Earlier this year we purchased Siemens Government Technologies' steam turbine, valve, and air compressor Government product lines out of Wellsville, New York (renamed Steam & Air Solutions), as well as their service and repair centers located in Chesapeake, VA, Chula Vista, CA, and Mayport, FL (collectively renamed Fleet Solutions).

First, I'll talk specifically about EPD. Four years ago, we exited an end of life facility and built a brand-new, custom-designed, state-of-the-art facility in Bethlehem, Pennsylvania. This project required an investment of roughly \$25 million for the factory and an additional \$10 million in upgrades, dedicated test loops and test facilities. We also built the factory with lean manufacturing and flow in mind. The focus there was to reduce the overall cycle time of delivery by a magnitude of several months.

I will also note that the acquisition of Steam and Air Solutions in Wellsville, New York requires us to build a brand new brand-new factory in the Southeastern United States. This requires another significant investment in a new facility as well as equipment recapitalization and test capabilities. Our new facility will be opening in late 2019.

We also implemented an integrated master schedule, which was the catalyst for some of that cycle time improvement. Our schedule goes from order placement all the way to the day of shipment. Perhaps most importantly, we have a very robust formal succession planning and knowledge transfer program. We've identified, and every year closed, critical succession gaps with very purposeful actions.

EPD has a dedicated formal future leader program to get our young leaders ready for the next generation's requirements. This program, among other things, provides comprehensive training and exposure programs, identifies mentors and gives opportunities for stretch roles. Ad-



ditionally, we have really ramped up our onboarding program to make sure that those we are bringing into the program understand what we do and why it matters.

Lastly, I'll mention we've spent a tremendous amount of time in the last four years with sub-tier supplier oversight and management. We learned from our customers, like Electric Boat and Newport News, and have adopted some of their program review processes. Now, many of our key suppliers conduct program reviews for us. We have yearly supplier conferences where we are primarily teaching, guiding, and supporting program requirements. We have also implemented a supplier quality liaison program, which is intended to improve communication and performance between our business and our sub-tier suppliers.

I think those are the major four elements to wanted to share today. Thank you.

ADM. DONNELLY: Finally, is Mr. Ed Walker, chief executive officer for W International, and I think your company does large engineering structures.

MR. EDWARD WALKER: That's correct.

ADM. DONNELLY: What are you doing to meet the demand?

MR. WALKER: Well thank you all in advance for your time. I'd like to thank the Naval Submarine League for the opportunity to participate on this panel. I believe it is very important for all of us to share our experiences to help all of us be prepared for this this critical buildup.

W International is a large structural fabricator located in Michigan. We are currently planning to expand operations into South Carolina to support the Navy's 30-year shipbuilding plan, which is over a \$60 million investment on our part.

I was asked to talk about what we as suppliers have done to meet the challenges of growing our capacity to meet future demand. The first thing was to listen to our customers' needs. What we heard in the niche business that we're in is that there's a great need for capacity that can support the fabrication and assembly of large non-truck-able structures.

So we searched the East Coast for the best facility to support their needs, and found an ideal site in South Carolina. The facility is a very high base structure with heavy cranes, a large paint facility, plenty of land for parking and expansion, and most importantly a deep-water barge slip that can accommodate the largest ship-borne structures and fixtures.

Our next challenge is to attract and retain a large workforce of skilled trades and experienced professionals to perform the critical work at this facility. We've been working with South Carolina, Brooke County, to create a pipeline of trade and skilled employees to accomplish this monumental task. We're also utilizing eight specialized placement companies, four college local programs, local vet programs, five high school programs for our evening course, programs for the under-employed, and a nationwide solicitation for talent and onsite training.

Our next new challenge was to determine the most effective equipment needed at this facility. Working closely with our naval customers and consulting retired shipbuilders with many years of naval processing and fabrication experience. We intend to invest in state-of-the art equipment that will significantly improve our production capacity, quality and delivery schedule, while reducing our overall cost to the Navy. We're also hiring retired naval shipbuilders to assist in transferring critical shipbuilding knowledge, standard procedures, and helping instill the very demanding shipbuilding culture to all of our facilities.

The greatest challenge that we as suppliers are facing is the immediate work required to support the ramp-up of capacity, and the significant training required. It is also critical that we receive long term agreements, LOIs, and access to supplier development funds so that we can make the significant investments, CAPEX and training, required to support the Navy's upcoming needs.

So the road for us has not been easy, as I'm sure many of you are experiencing as well. But I believe it is a worthwhile journey. We will continue to work hard with our shipbuilding partners in the Navy to ensure the success of this critical program that is essential for the national security of our country that we all love and would do anything to protect. Thanks again for your time and I look forward to answering any questions you may have.



ADM. DONNELLY: Great, thank you very much. I've got questions that I can ask each of the panel members, but if you have some from your cards, start passing those up and we'll certainly get to those. I'd like to start with Jeff Geiger. Last month the White House released its industrial base assessment that highlighted the fragility of the ship-building industrial base. That report cited one area of concern, that there is only one U.S. source for manufacturing and refurbishment of propeller shafts for submarines. Is that impacting Electric Boat and are there other critical suppliers that you're concerned about?

MR. GEIGER: First, on a general level we certainly agree with the general characterization in the report that talked about the fragility and the challenges facing the industrial base. Maybe just to give a little bit of context, about 75 percent of our supply base for submarines is either a single or a sole source supplier. I think by that very statistic you can kind of sense that these areas need to be watched and they need to be protected, because these businesses are vital and there's not a lot of alternatives.

Another statistic that puts that in context is about 40 percent of our suppliers are companies -- smaller companies, companies of less than 50 people. So you've got a supply base that's generally pretty small, and they are single providers for particular products. And so they require constant attention and support to be able to be relied upon going forward.

As it relates specifically to submarine shafts, I don't think the report -- I'm not really sure how they reach that conclusion. We have two providers of submarine shafts, both forging blanks, and two providers to do machining capabilities. So that particular example may not be the best one. But the generic point that this is a challenged base, that really needs to be worked with, is absolutely very valid.

A couple of areas we are particularly focused on; high yield castings is a very, very difficult area in the industrial base. We're watching that very closely. Large diameter copper-nickel tubing is another example, and also ball valves. So those are three particular areas right now that we're quite focused on to make sure we have adequate capacity and alternative sources, should they be required.

ADM. DONNELLY: Thank you. This one from the audience I'll direct to Jennifer, but any of the suppliers could jump on as well. Can you discuss your ability to attract the skilled labor that you need? What are the challenges and/or barriers to doing that?

MS. BOYKIN: Sure. We have been hiring over 400 people per month, at the peak, for almost a year. Generally speaking, because we have invested for a very long time in a strong workforce pipeline in the Hampton Roads and the broader three hourthree-hour radius area, we've been fairly successful. But I will say that's in general and on average.

We are also experiencing similar shortages that the rest of the nation is, in some specific skills like welding and non-distinctive inspectors. At this point I think finding the engineering and design and IT workforce is becoming a bit more challenging. So that's really what led many businessbusinesses in Hampton Roads to start to work with the other companies and the other organizations there.

There's a lot of investment that we make. We spend about \$80 million a year on workforce training. Partnering with the universities, partnering with the community colleges, the high schools, and even the junior high schools is a critical part of that.

When you think about it, if you're not actively involved in really leading workforce development and even STEM programs in your high schools, your junior high schools and your elementary schools, you're missing the Columbia-class workforce. So making sure that we think about that as a long-term need -- you know, we can have the material but if we don't continue to have people who want to come into this industry, we're going to find ourselves in trouble before we know it.

So partnering with the community colleges and the state is key -- I don't think there's one state that's not talking about workforce development. The challenge is in making sure our industry influences how to spend that money to best affect time to talent. So we're partnering with the state and partnering with the other organizations so that we can collectively make sure that we're not competing for those limited resources, that we're working together to grow the numbers, and working hard to really touch the students and the teachers to make sure that people want to go into manufacturing or go into STEM fields because



they understand the opportunities. This is a never endingnever-ending effort iof we want to make sure we don't find ourselves in trouble in the long-term. I think these partnerships, Jay, are really the bottom line.

Just one more thing. Fifty percent of the population is women, and we must all invest in girls in STEM in middle and junior high schools, or we're going to lose a large part of our talented future workforce and this is not something we will be able to correct later.

ADM. DONNELLY: Thank you. Turning to our vendor base, both shipbuilders have made the conversion to 3D computerized drawings. How do those drawings get conveyed to the vendors? Is that a problem with making the right information available to any of you who may not have the 3D support?

MR. WALKER: I can take that. There's no issue with transferring the data to us. I think its still kind of in its early stages. We're still getting a lot of the work flow not through 3D models. I think that's something that both our naval shipbuilder partners and we are really trying to work for to create this digital shipbuilding platform. I think that we'll see a lot of progress, especially on Columbia-class, as we move forward. But as far as I see, I think the supply base is ready for that transfer in 3D models. In fact, I think it's a much more efficient way for us to handle data and to have a more accurate workflow to our whole organization.

MR. SCHURRA: If I could just add to that, one of the things that we've done at Curtis-Wright EPD is that we moved over to all solid models a number of years ago. This has been a significant benefit for us and our business, specifically with our supply base. They're getting 3D models from us on castings and prototyping and patterns and the like. This has really sped up that front end of the piece as well. The challenge that we have is that there is a strong legacy of drawings; we are trying to get a historical database up to speed. Today, whatever we do is done with solid models and they are shared with the vendors. It works out very well.

ADM. DONNELLY: Mr. Geiger, this one will be the last question,

I think. I'm getting the hook here. Recently there were some press reports about weld flaws in the Virginia Payload Module tubes. I guess it was really the Columbia-class missile tubes. What is the status of those faulty tubes for Columbia, and what steps has EB taken to improve the quality control to prevent a repeat?

MR. GEIGER: Indeed, we've been working very hard with our suppliers for missile tubes, both for Columbia and the VPM. At this point I think we well understand the causes of the welding defects, and we've developed with the suppliers the right protocols to repair them as necessary and minimize any potential impact to the schedule as a result. I would also say on the more general question about what are we trying to do to ensure we can prevent such problems in the future; again, we're working closely with the supplier and the Navy, we have changed inspection and quality control practices at the supplier, also in terms of Electric Boat's oversight and participation, the kinds of things we review, the way we are represented in the facilities of our suppliers, to prevent future occurrences of similar things.

ADM. DONNELLY: One lesson learned is we need a little more than 30 minutes for this sort of panel, and we'll make those adjustments the next time around. I'd like to thank each of our panelists here. Not only did they agree to do this, but as you can see, they're the lifeblood, as our corporate sponsors are the lifeblood of the Submarine League.

Thank you very much.



The Original Tautog at Pearl Harbor CDR Ronald H. Reimann, Sr., USNR, Ret.

One day while *TAUTOG* was still under construction, a pipefitter asked if I would like to hear a WWII story of the original *TAUTOG* (SS 199). One of my collateral duties was Public Affairs Officer, so it seemed to me that a good story would be a welcome addition to our ship's newspaper. He had been a member of *TAUTOG*'s crew at the time of the attack while she was moored at the Pearl Harbor Submarine Base. His surface battle station was as a member of the gun crew. This is the story he related to me:

After *TAUTOG* was commissioned in 1940, the fears of war in the Pacific created a rush to move her to Pearl Harbor. Consequently, she had an abbreviated shakedown with very little opportunity to correct some of the inevitable issues in a new construction submarine. One of those issues was a proclivity for the bearings of the three-inch deck gun to seize up after submerged operations such that the gun would be stuck on zero elevation upon surfacing. Because this problem was not corrected, the gun crew discovered that firing the gun at while still at zero elevation would loosen up the bearings and enable it to be elevated. It became a standard practice at battle stations drills when manning the gun to crack the bearings loose by firing a round as a first step.

On the morning of December 7th, 1941, when battle stations was sounded, the gun crew responded in the fashion to which they had become accustomed. Given the combination of the many previous gun drills, the grogginess some experienced from being awakened on a Sunday morning, and the fury of the attack, the duty gunners rammed home a round and fired it off while the gun was still at zero degrees—flat horizontal. The crew quickly engaged the enemy and eventually *TAUTOG* was given credit for assisting in bringing down a Japanese aircraft—her first kill of the war. (She was eventually credited with sinking 26 enemy ships, the largest bag in terms of enemy hulls for a US submarine.)

Below decks after the action topside, the crew began to reconstruct the activity of that morning. With a burst of alarm, they realized that, without thinking, they had fired a three inch round ashore from the deck gun without so much as a thought as to where it was pointed. They raced

topside to see what damage that they might have done with this round. The men were shocked to see that the three-incher was pointed at an enlisted barracks building. Panicked that they might have unknowingly been responsible for a friendly fire incident, they worked their way over to the barracks. When they arrived, they found a neat hole punched through the exterior walls of the barracks where the projectile had entered and exited without detonating. Where it ended up, no one seems to have known.

Later, according to scuttlebutt heard aboard *TAUTOG*, the battle damage assessment group, spent a good bit of time speculating about what weapon of the Japanese navy could drill a flat trajectory hole of large caliber through a target at sea level. Only a few sailors knew the real answer, according to my pipe fitter friend. "Now," he said to me, "you are one of the few."



Reimann and his five sons, all qualified submarine officers



CINDERELLA LIBERTY

RADM T. J. Robertson USN, Ret.

The September 2018 *Review* included an anecdote related to Submarine Squadron TEN's 1972 Mediterranean deployment to set up the advance refit site at La Maddalena, Italy. After a rather shaky start, and the beer crisis chronicled therein, came somewhat normal execution of submarine refits. For the crew of USS *FULTON* (AS 11) the high point surely came with a mid-deployment port visit to that gem of the Balearic Islands, Palma de Mallorca.

As things developed, this writer (Squadron Eng) was riding one of our submarines out of the Med to assist in preps for an inspection. Flying to Palma after debark in Holy Loch, it was time to catch up with liberty call. Afloat there was moderate confusion. With the Commodore and division commanders on travel, our first-of-kind nuclear Chief Staff Officer, CDR Lew Yarger was acting. Only he was nowhere to be found! By reputation Lew was a consummate seaman and submariner, and world class liberty hound. Query of our protective stewards revealed that he had indeed cycled aboard a few times in prior days, but only to refuel with fresh clothing and pesos. After review and quick disposal of the rather limited operational business at hand, all staff hands were back off on the joys of liberty in fragrant and beautiful Palma.

Underway was early Sunday morning. The stewards checked on CDR Lew and offered the rather guarded report "Commanda' Yaga' still sleeping." Later the skipper asked for the Chief Staff Officer so they could make some preps for the Monday morning arrival in La Maddalena. This time the steward came back yelling "Commanda' Yaga' gone." The lump in his rack turned out to be piles of clothing. The skipper wasn't amused when told that the Chief Staff Officer was not aboard, and suggested somebody better do something. Query around the ship revealed that CDR Lew had last been sighted near midnight Saturday in a splendid horse-drawn carriage, fully into a festa mode. When reminded of the morning underway he reportedly smiled, replying he was "going to the bullfight," apparently unconcerned that bullfights in Spain started at 4 PM on Sunday afternoon. Papers were quickly drafted to put him on leave, and the cracker-jack yeomen went to work figuring out

what commercial travel options existed to get from one remote island to another in less time than our 24 hour transit. There were none even close.

During the mooring at La Maddalena I was called to the quarterdeck and to my surprise found myself talking to CDR Lew Yarger on the two-way radio. He was all business, in uniform ashore and in full charge of shore patrol forces and Italian guards quelling a political riot threatening the fleet landing and Italian naval base. It had been a volatile year in local politics, with local fervor leaning socialist, abetted by the local Monsignor. While the commotion was political, the crowd was happy to make it anti-military as well. But there was CDR Lew in the breach, armed and in full command of a hostile situation. In the end, the day was won and calm reestablished.

CDR Lew Yarger was heralded as a hero and the Italians were generous in their gratitude, as Italians can be. As for Lew, he wasn't talking. All in a day's work! No amount of questioning ever revealed how he got from Palma to La Maddalena faster than any combination of travel options could deliver. All one got was a wink and that famous twinkle of his eye.

Lew Yarger died several years ago but lived a long and productive life, his later years in the Jacksonville Beach area. He routinely attended Navy League and Submarine League affairs with his typical social gusto. Those of us that had enjoyed his friendship and leadership style always looked forward to such encounters. Different techniques were used at times to quiz him about pulling off that magic journey from Palma to La Maddalena. He never broke, only responding with wink and engaging smile. It must have been a truly memorable liberty run. In a moment of nautical fancy one imagines Lew transforming Cinderella liberty into a magic carriage journey from Palma, depositing him in harm's way, where only a true man-of-action could fill the day.



A Holy Loch Duty Day **LCDR Steve Kurak, USN, Ret.**

In 1990 I was serving in USS *SIMON LAKE* (AS-33) anchored out in the Holy Loch, near Dunoon Scotland. In addition to *SIMON LAKE*, there was A YNFB Barge (a Steel Covered Lighter) which housed the Tug and Boat Ops crew, a floating dry dock and a floating crane. COM-SUBRON 14 was embarked on *SIMON LAKE*. Collectively, we were referred to as "Site One".

The mission of Site One was the refit of Ballistic Missile Submarines. We were anchored out in the Loch due to British political sensibilities about US Nuclear Submarines touching the Homeland. Because of this, Site One personnel had short ride on a "Mike Boat" to transit between site and shore.

I stood in-port duty as Command Duty Officer (CDO) for *SIMON LAKE*. One day when I left home to assume the duty, it was windy and rainy. The official Navy forecast out of Norfolk called for 25 - 35 knot winds gusting up to 45. The BBC called for much higher winds - Force 9 gales to last 2 - 3 days.

The daily routine started off normally. The ship was scheduled for a general quarters drill, which would include "pulling fires" in the boiler room. The engineers would use this opportunity to perform "cold iron" maintenance. The ship and the submarine alongside were both to go on emergency diesel generator from 1500 to 1800.

By noon, the winds were sustained at 30 knots and we secured operation of fiberglass bottom boats. The alongside sub (T-1) was unhappy with their moor and requested a tug alongside so that they could adjust their mooring lines. During this evolution, they parted the tattletale on number 4 line due to excess strain. As a result, they contacted the tender and requested line handlers to "triple" #4 line. Because of *SIMON LAKE*'s configuration, line handling a sub requires putting a man over the side in a bosn chair to put the line over the bollard.

By this time the winds were gusting to 40 knots, so I ensured that we had a good crew, led by a BM2. Shortly after tripling line #4, the T-1 Duty Officer called me and said that the after fender was "not doing its job". They were concerned that the fender was too low in the water and

that the separation between sub and tender was not enough to keep the sub's stern planes from hitting the tender. Despite our protestations that submarines had been moored in the same manner for 30 years, they continued their complaint and finally won squadron over to their side, and we made preparations to adjust the height of the fender by lifting it with a crane and shortening the strap by which it was hung from the tender.

The winds now sustained at 40 knots and I had to get CO's permission to use a crane. Just as we were about to raise the fender, T-1's engineer came up to the main deck and asked me how knew we wouldn't lift the fender too high. I told him "because we know what we are doing, and this is the only way it is going to get done. He stomped off and we completed the evolution.

The sub was still unhappy with the moor and was lobbying for a third fender to be placed in the water. The wind was gusting to 50 knots and by rights all cranes should have been cradled. We agreed in principle to give them a third fender, but it was now 1430 with loss of ships power schedule to occur in thirty minutes, our electric cranes would be unable to provide.

The next few hours were relatively quiet. 1800 came and went and we were still operating on emergency diesel. At 1900 the EDO told me that they would be lighting fires in #1 boiler and the ship would be back to normal power approximately one hour later. At 1930 I received the word - "pulled fires in #1 boiler due to cracked atomizing steam strainer cap. ETR 20 minutes. At 2030 I was told that we were again lighting fires in #1 boiler.

Shortly after, I was making a tour on deck. This was becoming difficult, as the winds were now sustained at 50 knots and gusting to 60. While checking the forward anchor chain, I noticed a geyser of water shooting out from the mooring buoy. A check of the potable water line confirmed my guess. Our potable water line from the local water works had parted from the motion of the mooring buoy. I notified the waterworks, secured the onboard fill valves, and got CO's permission to light off evaporators.

About this time, I was receiving frequent calls from the OOD recommending that we secure all small boat operations. I was reluctant to do this because the 1st Lieutenant did not deem it necessary and also



because of the overall disruption to the ship caused by securing boat ops. I was down at the quarterdeck discussing this when a frantic voice came over the radio saying that there was fuel oil spilling out of the YNFB-31 (31 Barge).

We tried to talk to the voice on the radio, but he was panicked. I went down to the barge into the boat dispatch office and talked to the Petty Officer, but he was freaked and couldn't tell me anything. I went around to the side of the barge and saw what had happened. The boat landing pontoon, which is chained to the barge had rocked so violently that the padeye on the side of the 31 barge had been ripped out. This particular bulkhead happened to be part of a fuel oil storage tank. Suitably impressed at the volume of fuel oil pouring out of the hole, I ran back up to the ship, secured boat ops and called away the duty fire party.

In a short time, I had a large number of people mustered on the fantail. Someone ran down to the barge and pounded DC plugs into the hole and stopped the spill. About this time the CHENG arrived on the scene and took charge. The 1st Lieutenant was close on his heels and I left it for them to resolve.

About this time, the wind shifted direction a little, which kicked up the seas even more. One of the results was that the garbage barge started to beat fiercely against the side of the ship. We talked of moving it but decided it was too dangerous to put someone on the barge to untie it from the tender.

Shortly after that, it was reported that there was a CONEX box adrift in the lock and it was pounding against Arnandam pier, where we pick up and discharge people coming out to Site One. The shore based Naval Support Activity (NSA) CDO expressed concern that the CONEX box was doing damage to the pier and secured the pier to traffic. We again discussed getting a tug underway to tow the container way from the pier but realized the water was too shallow. We instead got an LCM-8 boat underway, but the water was too shallow for even that.

We secured boat ops and made arrangements with NSA that any personnel stranded ashore would be put up in the club for the night. By now it was almost 2300. The banging of the garbage barge against the ship was getting worse and my Greek chorus of Repair Officer, CHENG, and 1st Lieutenant kept telling me to move the garbage barge. The 1st LT fi-

nally came up with the scenario that if the barge parted its lines it would wind up on the front of the sub. That sold me. I carried that thought to the squadron Duty Officer who carried it to the Commodore. He agreed that it was sufficient reason to get a tug crew underway.

Even before the tug was underway, I got the word that the YC (flat) barge on the port side of the tender had parted its forward mooring line. Sure enough, it had given up fighting, had broken the forward line and was now righting straight into the sea (probably a good move).

I then spent the next ninety minutes with my heart in my throat while the tug crew moved the garbage barge and then put guys on the YC barge to re-secure the forward mooring line. This was a tough evolution. The sea was crashing over the forward end of the barge and sending huge sprays over the surface. At one point I thought that the line handlers were simply going to quit, they all huddled behind the nearest break. From the main deck I could sense their fear and bewilderment. To their credit they made a made a bight out of the line that was left on board the barge, got it over the bollard and got back on the tug - in 70 knot winds.

Once this evolution was over, I thought that I could call it a night. I was walking aft with the duty Bosn to check the after anchor. When I got to the QDeck the OOD said "I just got word of a medical emergency in CIC, I have no other details." I ran up there and found that a female Sailor had fainted while talking to her Marine boyfriend. There was a Doctor in attendance, so I left it alone.

It was 0230. I went to bed. I got up at 0530 and briefed the CO by phone. NSA inspected the pier and decided it was safe. I restarted boatops. By 0720 it was business as usual at Site One.



What Color is Your Rudder? **CAPT Jay Ransom, USN, Ret.**

Ray Wyatt and I were sympatico -- professionally and personally. For most of the time in '69 – '72 that I was CO of Nuclear Power School in Mare Island, Ray was the Director of the Officers Department. His tour was close to two years, whereas mine was three, so he wound up getting his orders to submarine command about three months before I did, even though he was a year junior to me.

During our tour at Mare Island, we began the practice of pulling little tricks on each other. For example, when I gave him the news that he had been selected for promotion to commander, I did so as part of an inspection he was holding of the officer students and staff. I called him forward, reached into a paper bag, and proceeded to dump scrambled eggs on the visor of his cap. We wound up trading these little tricks back and forth over the years, but I will have to admit that he pulled off the best one.

As background, I was the person to inform Ray, as his tour at Nuclear School was winding down, that he was getting orders to go to command of USS *PARGO*. *PARGO* was a 637-class boat out of New London. It was a plum assignment. He was unabashedly happy, and I was happy for him.

On the wall in my office, there were about half a dozen ships plaques. As it happened, one of them was of USS *PARGO* (SSN-650). It was a very attractive plaque -- antiqued bronze, not cheap metal, plaster, or plastic. I took it off the wall, gave it to Ray at his going-away party, patted him on the fanny and sent him off to be Commanding Officer of *PARGO*.

Fade out, fade back in a couple of weeks later. I got the long-awaited call from my detailer, Captain Arne Johnson, and I knew it was to tell me what ship I was going to command.

I had, months earlier sent a long letter to Arne, listing in priority order my specific choices. I think *PARGO* was down in about fifth or sixth place -- most of my priority choices being in the Pacific. All were fast attacks -- no boomers. Operational boats were near the top, those in or soon to enter overhaul were near the bottom. As I waited for Arne to

come on the line, I was fumbling through my desk trying to get my copy of the preference letter out.

Suddenly I heard Arne's voice on the line. "Congratulations, Jay. We're writing you orders to go to command of *PARGO*."

"*PARGO. PARGO*," I muttered to myself as I ran my finger up and down the list trying to find where I had placed it in priority.

Then it hit me.

"Wait a minute!" I interjected. "I JUST SENT RAY WYATT OFF TO BE CO OF *PARGO*!"

Then Arne went on to tell me that things had changed, and, yes, I was going to get *PARGO*, not Ray Wyatt. There had occurred an event such as in the past had often resulted in one of those daisy chains of revised orders. Frank Kelso, who had recently reported as CO of FINBACK (Norfolk) had suffered a back injury of some sort. His place as CO FINBACK was being taken by Connie Stevenson, currently in New London preparing to take command of BERGALL. Ray Wyatt was going to be shunted over to take command of BERGALL (also a New London boat), and I was going to take Ray's place as relieving CO of *PARGO*, albeit three months later than the originally scheduled relief.

As the situation began to sink in on me, I asked Arne, "Does Ray Wyatt know about this?"

"No," he said, voicing a little frustration. "I've been trying to reach him all day."

"I know his folks' number in Illinois. He may be there. Want me to call him?"

"Yeah. Let me know how you make out."

I called Illinois, and got Ray on the phone.

"Ray," I said, "Give me back my goddam *PARGO* plaque!"

He was stunned, of course

I then explained what had transpired, and -- given our relationship and history of tricks -- he refused to believe me! Well, he had his doubts, so I advised him to call Arne Johnson, which he did. And then he believed me.

And I got the plaque back! Still have it.

But the best of all stunts was pulled off by Ray and his exec, Jack Maurer while both BERGALL and *PARGO* were deployed south to



Mayport and Port Everglades, Florida for a series of operations including taking PCOs to sea. We were in port together at Mayport

During our afternoon in port, my exec Tom Robertson and I made a "courtesy call" on BERGALL and its captain. Actually our visit masked an ulterior motive. Tom carried in his breast pocket a *PARGO* decal, the familiar horseshoe logo in living color. As Ray and I talked in the wardroom, Tom excused himself to take care of some unspecified "other business", and planted the decal firmly onto the mirror on the CO's state-room medicine cabinet. Tom returned to the wardroom to say that he had taken care of his other business, and we finished our cup of coffee, thanked our host, and departed, chortling under our breath.

We got 'im. Good one!

We should have known that it wasn't the last shot.

Both submarines were scheduled to get underway early the next morning, BERGALL about twenty minutes before *PARGO*. The morning was crisp and clear as we stationed the maneuvering watch.

The obligatory skipper's routine was to wait below (twiddling thumbs, usually) while the crew went about readying the ship to get underway, and to go to the bridge only when the OOD reported readiness, usually five or so minutes before underway time. Who was I to break tradition? I climbed to the bridge when the OOD announced the ship's readiness. As I poked my head up into the fresh morning air, I noted BERGALL underway abreast of us, having been twisted around by the tug and ready to head seaward.

I waved to Ray. And in return, we received a more-than-effusive wave from all of BERGALL's topside personnel, Ray Wyatt and Jack Maurer smiling and waving especially eagerly.

"Nice guys," I thought.

Until one of the *PARGO* sailors detailed to throw off the lines from the pier came rushing over the brow and looked up at me on the sail.

"Captain, you'd better come over on the pier and look at something."

Grumbling, I went.

And clearly visible from the pier (but not from the topside of the ship, because of the angle of view) was spray painted in large, bright orange strokes on both sides of our rudder the numerals "667", the hull number of USS BERGALL!

I owe you BIGTIME, Ray!

What Was I Thinking?

CTTC(SS) Mike Varone, USN, Ret.

What was I thinking? I was on only my fourth deployment. My second diesel boat. As a DIRSUP [Direct Support] rider we normally would board in port just prior to deployment. This time I managed to wrangle boarding before we deployed to Japan. I used the excuse for riding the boat across the Pacific for underway training. We definitely got ahead of the deployment curve.

It was a marvelous trip snorkeling our way to Japan. The Electronic's Techs (ET) and Sonar Techs with whom I worked were the best. I felt at home and assimilated into the everyday workings of the crew.

We tied up in Yokosuka for a few days before deploying while waiting for the remainder of the team to arrive on the day we got underway.

It was a marvelous trip. The only thing that kept it from being perfect was the weather didn't cooperate with us very well.

Sometime during the deployment, while standing watch with the ET at his station, I was talking to the Chief of the Watch (COW). Now, I was in Control every day working with the ETs, sitting with or standing by him. Naturally, I was there in the evenings when the Officer of the Deck (OOD) would order the COW to rig for red, to change the lights to red to allow people to get around at night, and prepare to snorkel at first call to the relieving watch.

What was I thinking? I asked the COW if I could pass the word when the OOD gave the order because I had been hearing the word passed every evening for some time during the deployment. He smiled, as did the OOD and approved me passing the word. I indicated to COW that I wanted to practice passing the word once or twice before I actually passed the word.

What was I thinking? It was then the prank came together in my head. I hadn't fully worked up the nerve to do it, ergo practicing passing the word gave me the courage. Be assured that had I not been with the crew during transit, in port and on liberty, and finally underway, I would not have done what I did.

Finally, the time came to pass the word. The COW handed me the mic to the 1MC. I took it. It was dark by then in the Control Room. I



held the mic in my hand but had my finger behind the button so they could not see that what I was about to say would never happen. I received the nod to pass the word. . . . I took a breath and said, into a dead mic, "Surface, surface." I was not able to get the third "surface" out when the OOD grabbed the mic from my hand. The COW fell back in his chair in disbelief. I began laughing and then all realized that the word never went over the 1MC (announcing circuit). Ultimately, all in the Control Room realized the practical joke and enjoyed it. Word flashed through the boat and got to the Maneuvering Room in just a few seconds after the incident. I still ask myself, "What was I thinking?" more than 50 years later.

My practical joke came with a price. A few days later, the sonar techs, ETs, and OOD put together a payback that had me totally set up. One of the things I enjoyed doing during times when things were a bit slow was to sit on the sonar and "drive" for a while. I was not aware that one by one the sonar techs left the room and watched me through a small window in the door. Over the "white rat" we had installed between our spaces and Control, the ET was reporting information critical for me to be immediately available. I couldn't just jump up from Sonar and go to investigate the situation. I had no idea of the plot that was afoot and began pacing while being on the stack. Didn't notice the sonar techs were all laughing hysterically at my plight. Finally, after a few very nervous minutes, the sonar techs came strolling back and asked what was going on? I tossed them the earphones and bolted out of Sonar and made my way to the ET on watch. When I arrived, the ET began chuckling and it dawned on me there was no emergency. I looked around and everyone in Control was laughing like crazy. Then I knew I had been had.

I keep asking myself, "What was I thinking? Let me just say that I made ten more deployments and any thoughts of any kind of practical joke never, ever again entered my mind.

You Can Support the Mission of the NSL While Reducing Your Taxes!

If you are over the age of 70 and you have an Individual Retirement Account (IRA) you may be able to make a Qualified Charitable Distribution (QCD) to support the Naval Submarine League and reduce your taxable income.

Starting the year you turn 70 ½ you are federally required to withdraw a portion of your IRA every year, called a Required Minimum Distribution (RMD). This RMD amount is considered income for tax purposes. If you decide to transfer all or part of your RMD directly from your IRA administrator to a Qualified Charity (like the NSL) you will not be required to pay income taxes on that amount.

A direct gift to the Naval Submarine League counts toward your RMD for the year but is not included in your adjusted gross income. This can provide tax relief on your RMD, and it's a great way to support the mission of the NSL. Keeping your taxable income lower may reduce the impact to certain tax credits and deductions, including Social Security and Medicare.

Can I make a Qualified Charitable Distribution?

While many IRAs are eligible for QCDs—Traditional, Rollover, Inherited, SEP (inactive plans only), and SIMPLE (inactive plans only) —there are requirements:

- You must be 70½ or older to be eligible to make a QCD.
- QCDs are limited to the amount that would otherwise be taxed as ordinary income. This excludes non-deductible contributions.
- The maximum annual amount that can qualify for a QCD is \$100,000. This applies to the sum of QCDs made to one or more charities in a calendar year. (If, however, you file taxes jointly, your spouse can also make a QCD from his or her own IRA within the same tax year for up to \$100,000.)
- For a QCD to count towards your current year's RMD, the funds must come out of your IRA by your RMD deadline, generally December 31.

Note that funds distributed directly to you, the IRA owner, and then given by you to charity do not qualify as a QCD.

If you have any questions about this process or if you would like to make a QCD to the NSL, contact the NSL's investment manager.

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2019 NAVAL SUBMARINE LEAGUE CORPORATE MEMBERS

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1 STAR LEVEL

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Mr. Lewis W. Crenshaw
Mr. Glenn Estes
CAPT Ken Garber, USN, Ret.
Mr. Christopher Jackson
CAPT Stephen G. Mack, USN
Mr. Raymond Meloche, Jr.
Mr. Melvin Moraway
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Mr. Matthew Slatter
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CMDCM Josh Sturgill, USN
CAPT Brian Taddiken, USN
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STCM(SS) Lawrence A. Woodworth, USN, Ret.
Mr. Hsin-Fu Wu

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CAPT Robert Magnus Brown, USN, Ret.
CDR Thomas R. Conrey, USN, Ret.
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THE SUBMARINE REVIEW

Articles will be accepted for consideration on any subject closely related to submarine matters and may be submitted by anyone interested in submarines. The views expressed by the authors are their own and are not to be construed to be those of the NSL. Articles accepted for publication become the property of the NSL. All articles published in *The Submarine Review* will be considered for NSL Literary Awards.

A stipend of \$200 will be paid for each major article selected for publication. A major article should be at least 2000 words, exclusive of footnotes and bibliography. Shorter articles and opinion pieces are welcome. Previously published articles may be considered for publication but will not receive a stipend.

All articles should be submitted in Microsoft Word, as an attachment to an email to both editor@navalsubleague.org and review@navalsubleague.org.



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NOTES FROM HEADQUARTERS

NEW LOOK FOR OUR LOGO

The Naval Submarine League will be introducing our new logo this summer. It will feature one silver dolphin and one gold dolphin, rather than two gold dolphins. We have received feedback that enlisted submariners thought the Naval Submarine League was for officers only, and we want to make it clear that NSL membership is open to all submariners, as well as all U.S. citizens.



GET INVOLVED

The NSL would like to encourage our members to get involved with submarine commissioning committees, sub clubs, and namesake visits by submariners. We would like to help coordinate with the boat you're interested in supporting. The transcript of the Submarine Club Panel from the 2018 Annual Symposium is on page 54 of the March 2019 issue. It has more information on the capabilities and the impact of a Sub Club.

Please contact outreach@navalsubleague.org to indicate how you would like to get involved.

UPCOMING SUB REUNIONS

To see all reunions that are posted on the NSL website, click on the CALENDAR button in the homepage THIS WEEK'S HEADLINES section. To see all reunions as a list, on the left, above the calendar, choose Reunions in the CATEGORIES box; then, on the right, change Month display to Agenda.

If your reunion isn't listed, send your information to

communication@navalsubleague.org

We are looking for NSL members who could present a complimentary Submarine Evolution poster and share information about the Naval Submarine League. Check the biweekly NSL Update email to see which reunions need someone. Talking points are provided.

NROTC AWARDS

Thank you to all our members who presented the NSL's RADM Frederick B. Warder Award for Outstanding Achievement. Presentations were made at 40 NROTC units across the country! We have received heartwarming notes of thanks from both presenters and awardees. As a reminder, all students can sign up online for a one-year free membership!

LINKEDIN

Connect with us on LinkedIn to join community discussions and stay informed regarding upcoming NSL Events.

www.linkedin.com/company/naval-submarine-league/

CALLING FOR STORIES

The Submarine Review is always accepting submissions. We are especially interested in hearing your sea stories. Please email Word document attachments to editor@navalsubleague.org and review@navalsubleague.org.

THE SUBMARINE REVIEW JUNE 2019