

American Submariners Inc.
4370 Twain Ave.
San Diego, CA 92120-3404



The Silent Sentinel December 2018



Our Creed and Purpose

To perpetuate the memory of our shipmates who gave their lives in the pursuit of their duties while serving their country. That their dedication, deeds, and supreme sacrifice be a constant source of motivation toward greater accomplishments. Pledge loyalty and patriotism to the United States of America and its Constitution.

In addition to perpetuating the memory of departed shipmates, we shall provide a way for all Submariners to gather for the mutual benefit and enjoyment. Our common heritage as Submariners shall be strengthened by camaraderie. We support a strong U.S. Submarine Force.

The organization will engage in various projects and deeds that will bring about the perpetual remembrance of those shipmates who have given the supreme sacrifice. The organization will also endeavor to educate all third parties it comes in contact with about the services our submarine brothers performed and how their sacrifices made possible the freedom and lifestyle we enjoy today.



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The Silent Sentinel via Email

To all of my Shipmates and families who currently receive our Great newsletter via the mail who would like it sent via email or continue to receive it via mail, please fill out the form and mail it to the base or myself. We are trying to cut the cost of the newsletter down from \$3700 to about \$1900 a year. By receiving the Silent Sentinel via email will cut down the printing and mailing cost. The other plus to receiving it via email is you can save it on your computer and not have the paper lying around the house.

A subscription to the Silent Sentinel newsletter will be available to surviving family members via internet email, at no charge, upon notification of the Membership Chairman. If a printed hard-copy is preferred, via US Post Office delivery, an annual donation of \$5.00 will be requested to cover costs.

NAME: _____

ADDRESS: _____

CITY/STATE/ZIP: _____

EMAIL: _____

TELEPHONE: _____

Would like the SILENT SENTINEL emailed: YES _____ NO _____

USSVI Base Commander
c/o VFW Post 3787
4370 Twain Ave.
San Diego, CA 92120-3404

DUE TO LOGISTICS CONSTRAINTS, ALL INPUTS FOR THE SILENT SENTINEL MUST BE IN MY HAND NO LATER THAN ONE WEEK AFTER THE MONTHLY MEETING. IF I DO NOT RECEIVE IT BY THIS TIME, THE ITEM WILL NOT GET IN. NO EXCEPTIONS! MIKE

December Meeting

Our monthly meeting is held on the second Tuesday of the month at VFW Post 3787, 4370 Twain Ave., San Diego. Our next meeting will be on *December 11th*. The post is located one-half block West of Mission Gorge Road, just north of I-8. The meeting begins at 7 p.m. The E-Board meets one hour earlier at 6 p.m.

Check us out on the World Wide Web
www.ussvisandiego.org

BINNACLE LIST

Chris Sultana has finished his first round of in hospital treatment. He is currently at home undergoing a 2nd round of chemo-therapy. Shirley Williamson, Associate member of Bonefish Base, wife of Willie Williamson, current WRD 6, passed away. Hadara Hyman, wife of Michael Hyman (Sentinel Editor), is currently in Sharp Hospital recovering from surgery.

Submarine Losses in December

Originally Compiled by C J Glassford



USS Capelin (SS-289)

Lost on Dec 2, 1943 with the loss of 76 men. She was on her 1st war patrol, but her exact location, date and cause of loss remain a mystery. She may have been lost to mines or an operational casualty.

USS Sealion (SS-195)

Lost on Dec 10, 1941 with the loss of 4 men. To prevent her from falling into enemy hands, she was scuttled in Manila Bay after incurring severe bomb damage during the initial Japanese attack. One other Sealion man was later captured and died in POW camp.

USS F-1 / Carp (SS-20)

Lost on December 17, 1917 with the loss of 19 officers and men when it was sunk after collision with the USS F-3 (Pickerel(SS-22)) off San Clemente, CA.

USS S-4 (SS-109)

Lost on December 17, 1927 with the loss of 40 officers and men when it was sunk after being rammed by USCG Paulding. Salvaged in 1928 and recommissioned.





***San Diego Base, United States Submarine Veterans Inc.
Minutes of Meeting - 13 November 2018
At VFW Hall, 4370 Twain Avenue, San Diego CA 92120***

1914 - Base Commander Warren Branges called the meeting to order.

Conducted Opening Exercises - Pledge of Allegiance lead by Chief of the Boat Bob Bissonnette

Chief of the Boat Bob Bissonnette lead the opening prayer.

Chief of the Boat Bob Bissonnette conducted Tolling of the Boats for boats lost in the month of November.

Junior Vice Commander Manny Burciaga recognized Past Commanders, dignitaries and guests.

Base Secretary Jack Kane announced 21 members and 3 Guests present.

Base Treasurer Joe Peluso presented the Treasurer's report. A copy of the Report will be filed with these minutes. Minutes of the October meeting were published in the Sentinel.

Base Commander Warren Branges called for Committee Reports

Binnacle List - Chief of the Boat Bob Bissonnette reported Chris Sultana on Binnacle. Chris has finished his first round of in hospital treatment he is currently at home undoing a 2nd round of chemo-therapy. Shirley Williamson Associate member of Bonefish Base, wife of Willie Williamson, current WRD 6 passed away.

Parade Committee - Chairman Jack Kane announced the next parade is Linda Vista on Saturday, 27 April 2019. We are tentatively scheduled to attend. Last Parade was San Diego Veterans Day on 10 November. We had 8 members in attendance.

Membership Committee - Chairman Ray Febrache. We have 247 members. Down 2 from last month.

Scholarship Committee - Committee Chairman Paul Hitchcock. Scholarship packages are due on 15 April 2019. The Commissary has a Scholarship Program. Anyone sending in a Base Scholarship package should also send at package to National. National will give out nearly 40 scholarships next year ranging from \$500 to \$3500.

Storekeeper - Paul Hitchcock. See Paul if you have anything you need to buy. We have 2019 Calendars. See Bob Bissonnette. Calendars are \$10.00 each

Breakfast Committee - Chair Base Commander Warren Branges. The next Breakfast will be 30 December 2018. We needs servers. The kitchen will not be renovated until January 2019. We have Breakfasts scheduled for March, June, September and December in 2019.

52 Boat Memorial - Chair Base Commander Warren Branges - The next All Flags Day will be Friday, 7 December 2018 (Veterans Day).

We will put up flags at 0900 and take them down at 1600. We will do a special Flag and Wreath Ceremony in conjunction with the Point Loma Association at 0900. Further details in Unfinished Business. There are three memorials out for repair.

Float Committee - Base Commander Warren Branges for Chair David Kauppinen. We are looking for a new home for the float. Contact the Base Commander if you have any ideas. The Point Loma Base RV parking will close soon.

Eagle Scout Program - Co Chairs Nihil Smith and Glenn Gerbrand. NO Report

1936 - Base Commander called for a break. 50/50 Raffle held. Bob Farrell won the raffle and donated his winnings to the Scholarship Fund.

1950 - Unfinished Business

Christmas Party. Will be held at VFW Hall on Twain on 8 December 2018. See Base Commander Warren Branges for tickets @ \$20.00 per person. COMSUBRON ELEVEN has a scheduling conflict but CSS 11 plans on attending. We have invited Terry Ulmer and his wife. We will present Terry a submarine photo for this collection.

Float Storage. We will need a new storage location for the float. The RV Storage at Point Loma will close in December or January. If you any ideas, solutions for storage please contact the Base Commander.

All Flags/Wreath Laying on 7 December 2018. Point Loma Association will provide wreaths for each memorial at 52 Boats. We will lay wreaths at 0900 on 7 December 2018. All Hands are encouraged to attend. COMSUBRON ELEVEN and Commander Naval Base Point Loma will give brief remarks. On-line fund raising is at \$600+ - Base fund raising is at \$285. Cost of a wreath is \$15. Any funds raised over the cost of the wreaths will be donated to the 52 Boat Memorial for maintenance of the memorials.

1956 - New Business

A Nominating Committee was appointed to put forth a slate of Candidates for this springs Base Elections. Paul Hitchcock Chairman, Immediate Past Base Commander Bob Bissonnette were appointed. Shipmate Mert Weltzien volunteered to serve on the Committee. One

more volunteer is needed. The Committee will nominate candidates at the December meeting. Nominations will taken from the floor at the January meeting.

2016 - Good of the Order

Out Year Conventions - 2019 will be in Austin TX - 14-20 August 2019. Details are at: <http://ussviconvention.org/2019/>

2020 will be in Tucson and 2121 will be in Orlando at Rosen Shingle Creek.

VFW 3787 will be hosting a Legal Clinic on 17 November at 0900. All a welcome to attend.

Navy Retirees - Tri-Care Dental through Delta is ending 31 December 2018. Make sure you have looked into signing up for Federal Employees Dental and/or Vision Care during the open season that ends 10 December.

The Series "Silent Service" is available at olgoat.com.

A DSRV/DSV Deep Submergence Reunion is in the planning stages for 2020 - to be held in San Diego, 25-27 October 2020 at the Bayside Hilton.

2018 NATIONAL CONVENTION report from Chief of the Boat Bob Bissonnette, Base Commander Warren Branges and Former Base Commander Fred Fomby. 520 USSVI members and family attended. All had a good time - Food and drinks were fantastic. Each port had well attended tours/outings. Fred ended up doing a face-plant while taking the obligatory wave on the beach photo. Several bikini glad young ladies volunteered to assist his recovery. Fred's wife declined their kind offers.

Shipmate Ray Febrache noted that a new version of Blind Man's Bluff is available at bookstores now.

T-Shirts on the side table are available for the taking. A small donation to the Base would be appropriate.

The Meeting was adjourned at 2020

/s/ Jack E. Kane

Jack Kane, Secretary

Sailing List for 13 November 2018

Members

Jose Acay
Bob Bissonnette
Warren Branges
Matt Baumann
Manny Burciaga
Nicholas Dirx
Joel Eikam

Ed Farley
Bob Farrell
Ray Febrache
Fred Fomby
Jim Harer
Paul Hitchcock
Mike Hyman
Jack Kane
David Martinez
Dennis Mortenson

Joe Peluso
Phillip J. Richeson
Mert Weltzien
John Zinich

Guests

Julie Biewer
Glenn Shern
Jessie Chang Farley

Silent Sentinel EXCLUSIVE!



Judith and Gary Murphy have graciously consented to allow the Silent Sentinel to republish their collection of USS Whale, SS-239, ship's newspaper, "THE RAG," from the WW-II era! Gary's father, Rex Murphy, served as Whale's Engineering Officer. The Silent Sentinel will now include a copy of The Rag in each issue. The Murphy's and I hope that you will find it an interesting reading experience. The date is March 19, 1943. Whale is patrolling the shipping lanes between the Mariana Islands and Japan. "The Rag" No. 5

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ELEVENTH EDITION

MARCH 19, 1943

THE PLEASANTEST THINGS IN THE WORLD ARE
PLEASANT THOUGHTS: AND THE GREAT ART OF
LIFE IS TO HAVE AS MANY OF THEM AS POS-
SIBLE.-----Montaigne.

NEW DOMINO CHAMPION CROWNED-----

Today, a new champion in the field of dominos was crowned with all the pomp and glory of a newly crowned king. The championship game was played off in that part of the ship known as Cox's diner. STOCK, the new champ, handed NASH his clever apponent, a well timed shelacking in two out of three games. Well done, me lad, and may your reign as king of the domino players be as long and eventful as possible. The grand prize of 16 iron men was presented to the winner.

The Acey-Ducey tournament drew near the end today when that clever lad from the Asiatics, known as Stacy Roberts, slipped the chances of contesting in the finals away from Shaky Jake Lewis in three fast games. Lewis was very fortunate to win the first of the series, with Roberts, but to your wandering reporter, it looked like the old come-on. Could be. Anyhoo, Stacy Roberts now has to play the winner of the coming Buckheim, Remely contest. Mrs. Remleys son, David, is the favorite over Bones Buckheim. Odds at the present are 6-2.

What noted Momblo smiles and creams like a jersey, when the electricians drop the load and it seems that a stop is imparative, and then howles, rants and raves like a maniac when they again assume the load. While at the other end of the engine room in the concealing gloom of the head door, stands Shaky Jake Lewis and small stoker laughing at the silly antics he pulls.

This last statement does not include the views of the editor of the RAG.

What chicken farm did Shaky Jake Lewis come from. It seems that while marking the course for quarter gasket beckey, Shaky Jake cakelates the course as 270 and about a berry over.

As I went about my own little way this morning, tendin' to my own damn business, I thought I heard a whispered name. I turned expecting to find some one, but, there wasn't anyone near me.

This whispered name was the SHADOW. Whoever this insipid, unscrupulous, contemptable, inane half witted individual is, I don't know for sure but, he sure is doing me dirt. First my reporters refuse to gather information vital to the life of the RAG, then, I begin to receive small notes here and there, enscribed with sayings such as: "The Shadow knows" or "The time has come to destroy the Rag." Anyhoo, whoever the dope is, I sure wished that he would come out in the open. How in the hell am I going to compete against a guy that I don't even know for sure. SO, come on Shadow what say you either quite haunting me or something. For your own benifit, I think I know who you are, but, I'm not sure. Never the less, the RAG, still goes on bringing you all the latest dope there is if there is any dope to bring.

The latest information received regarding the Saipan, Whale incident, is very little. Nothing of any interest has as yet happened to speak of so-----hang on.

As Tommy Thompson, aged four, was dressing himself one morning he discovered that one of the side buttons of his play suit was missing.

We overheard him say, "Hummus, Button off! Right in the buisnest place, Dosh."

FER-RET---A kind of weasel used to hunt rats and rabbits.

It would be duly appreciated for all members of the crew who, have any tall tales or screwy incidents to write them down and see that the editor of the rag gets them.

Some times it is rather hard to fill in the excess space.



Computer Corner

If you become a victim of ransomware, then all hope is not lost. Recently a friend told me about website <https://www.nomoreransom.org/en/index.html>. It was created by the good guys and they provide free decryption tools for 14 different types of ransom malware. In addition, they are continuing to add tools for new malware threats. So if you become a victim, don't pay the ransom before checking out the tools at No More Ransom. As a matter of fact, maybe you should check out the website now while your computer still works. Importantly, see the section titled Prevention Advice. David Kauppinen, Webmaster, USSVI San Diego Base, 11/1/18

Current News

**"Plataginet, I will; and like thee, Nero,
Play on the lute, beholding the towns burn" (*Henry VI*, Shakespeare)**

Photos show submarine "imploded" on seafloor, but Argentina can't reach it (Argentina) Staff, The Associated Press, November 19

<https://www.cbsnews.com/news/argentina-unable-recover-submarine-ara-san-juan-photos-imploded-atlantic/>
Photo's and other info at the above link.

Hours after announcing the discovery of an Argentine submarine lost deep in the Atlantic a year ago with 44 crew members aboard, the government said Saturday that it is unable to recover the vessel, drawing anger from missing sailors' relatives who demanded that it be raised. . . .

Defense Minister Oscar Aguad said at a press conference that the country lacks "modern technology" capable of "verifying the seabed" to extract the ARA San Juan, which was found 2,975 feet deep in waters off the Valdes Peninsula in Argentine Patagonia, roughly 373 miles from the port city of Comodoro Rivadavia.

Earlier in the morning, the navy said a "positive identification" had been made by a remote-operated submersible from the American company Ocean Infinity. The company, commissioned by the Argentine government, began searching for the missing vessel Sept. 7.

It remained unclear what the next steps could be.

In a statement to The Associated Press, Ocean Infinity CEO Oliver Plunkett said authorities would have to determine how to advance. "We would be pleased to assist with a recovery operation but at the moment are focused on completing imaging of the debris field," he said.

Navy commander Jose Luis Villan urged "prudence," saying that a federal judge was overseeing the investigation and would be the one to decide whether it was possible to recover a part or the entirety of the ship.

Without adequate technological capabilities, however, Argentina would likely need to seek assistance from foreign countries or pay Ocean Infinity or another company, potentially complicating its recent commitment to austerity. Argentina is currently facing a currency crisis and double-digit inflation that has led the government to announce sweeping measures to balance the budget and concretize a financing deal with the International Monetary Fund.

Any move to recuperate the vessel would also be a logistically large and challenging undertaking based on the submarine's distance from the coast, its depth, and the kind of seabed upon which it is resting.

Relatives of crew members were determined to fight for it to be quickly surfaced.

Isabel Vilca, the half sister of crewman Daniel Alejandro Polo, told the AP that the discovery was just the beginning.

She said families need to recover the remains of their loved ones to know what happened and help prevent similar tragedies.

"We do know they can get it out because Ocean Infinity told us they can, that they have equipment," said Luis Antonio Niz, father of crew member Luis Niz. "If they sent him off, I want them to bring him back to me."

The sub's discovery was announced just two days after families of the missing sailors held a one-year commemoration for its disappearance on Nov. 15, 2017. The San Juan was returning to its base in the coastal city of Mar del Plata when contact was lost.

On the anniversary Thursday, Argentina President Mauricio Macri said the families of the submariners should not feel alone and delivered an "absolute and non-negotiable commitment" to find "the truth."

On Saturday, Aguad said that the vessel was found to be in an area that investigators had deemed "most likely."

Officials showed images of the submarine, which was located on a seabed with its hull totally deformed. Parts of its propellers were buried and debris was scattered up to 230 feet away.

The German-built diesel-electric TR-1700 class submarine was commissioned in the mid-1980s and was most recently refitted between 2008 and 2014. During the \$12 million retrofitting, the vessel was cut in half and had its engines and batteries replaced. Experts said refits can be difficult because they involve integrating systems produced by different manufacturers, and even the tiniest mistake during the cutting phase can put the safety of the ship and crew at risk.

The navy said previously the captain reported on Nov. 15, 2017, that water entered the snorkel and caused one of the sub's batteries to short-circuit. The captain later communicated that it had been contained.

Some hours later, an explosion was detected near the time and place where the San Juan was last heard from. The navy said the blast could have been caused by a "concentration of hydrogen" triggered by the battery problem reported by the captain.

Macri promised a full investigation after the submarine was lost. Federal police raided naval bases and other buildings last January as part of the probe, soon after the government dismissed the head of the navy.

Argentina gave up hope of finding survivors after an intense search aided by 18 countries, but a few navy units have continued providing logistical support to Ocean Infinity.

On Saturday, Plunkett tweeted: "Our thoughts are with the many families affected by this terrible tragedy. We sincerely hope that locating the resting place of the ARA San Juan will be of some comfort to them at what must be a profoundly difficult time."

He also said: "This was an extremely challenging project and today's successful outcome, following the earlier search operations, firmly endorses our technology."

The company unsuccessfully searched for the Malaysia Airlines plane that disappeared in 2014 over the Indian Ocean.



Why INS Arihant Gives India An Edge Against Its Neighbours (india)

Rakesh Krishnan Simha, Business Insider, November 20

<https://www.businesstoday.in/top-story/why-ins-arihant-gives-india-an-edge-against-its-neighbours/story/292710.html>

On November 5, 2018 India's first indigenous SSBN (ship submersible ballistic nuclear) INS Arihant completed its maiden deterrence patrol, meaning that the submarine is fully ready for its role as a strategic deterrent. Deterrence patrol refers to a submarine

disappearing into the depths of the ocean, carrying its deadly cargo of nuclear-tipped missiles. The Arihant's month-long deployment compares favourably with submarines of the US Navy which go on patrols from 30-70 days.

With the completion of the patrol, India's strategic planners have finally achieved their longstanding ambition to have a nuclear triad, giving them multiple options if it comes to a nuclear confrontation. A nuclear triad refers to the three components of atomic weapons delivery: strategic bombers, intercontinental ballistic missiles (ICBMs) and submarine launched ballistic missiles (SLBMs).

Of the three elements of the triad, the SLBMs are considered the most important because the nuclear powered ballistic missile submarine - also known as a boomer in the colloquial language of seamen - is the hardest to detect, track and destroy. "No navy can be considered a force to reckon with unless it has nuclear submarines to control oceans," says former Vice Chief of Naval Staff, Admiral K.K. Nayyar.

Why India needs nuclear armed subs

According to Undersea Warfare, the Official Magazine of the US submarine force, each leg of the triad contributes unique attributes that enhance deterrence and reduce risk, such that the whole is greater than the sum of the parts. ICBMs provide a prompt response, the potential to launch under attack, and a hardened, geographically-dispersed target base. Strategic bombers provide great flexibility in force posturing, signalling intentions, route planning, and recall-ability. Missile submarines provide survivable, assured response and the mobility to adapt missile over-flight to targets. "Together they comprise a robust deterrent capability that complicates a potential adversary's offensive and defensive planning and a synergistic force that provides protection against the failure of a single leg."

The 6,000 tonne Arihant - which means Slayer of Enemies in Sanskrit - takes India to an elite league. The 367 feet submarine - which is longer than a soccer field - is the first SSBN to have been built by a country other than one of the five permanent members of the United Nations Security Council.

According to Richard Sharpe of Jane's Fighting Ships, a nuclear submarine will give India a "colossal advantage" over its neighbours. "Facing a nuclear submarine is a nightmare; it has unlimited endurance and mobility and there's no place for a surface ship to hide," he writes.

Until now India has blissfully carried on without a credible second strike option. This means if China - or for that matter any other country - launches a surprise first strike and decapitates the land based Agni missiles and nuclear capable aircraft, there's very little India can do except throw in the towel.

Having an SSBN changes the equation. It guarantees a nuclear first strike will not destroy India's ability to strike back. Lurking at the bottom of the oceans and constantly moving, even a handful of SSBNs can sow doubt in the enemy's mind that some of India's sea-launched strategic missiles will be launched in retaliation.

Stunted development

While the Arihant's first deterrence patrol has received global attention, the reality is that India is the only country in the world that has built an SSBN without first building a long range SLBM. The Arihant is equipped to carry twelve K-15 ballistic nuclear missiles with an abysmally short range of 750 km. This means before launching its missiles, the sub will have to venture close to enemy waters, endangering its own security.

A 3,500 km range missile named the K-4 is currently in development, but one wonders why it takes so long for the Indian defence establishment to achieve incremental increases in missile range. India tested its first nuclear capable ballistic missile in 1989, after nearly three decades of development its longest ballistic missile, the Agni V, has a claimed range of 5,000 km. It could take several years before Indian SSBNs are equipped with missiles having intercontinental range. Still, even a rudimentary SSBN force is enough to create uncertainty among the likes of China and Pakistan to desist from reaching for the launch buttons.

Search for second strike

The entire process, from steel cutting in 1998 to the completion of deterrence patrol, has taken 20 years. In the meantime, China has built 10 nuclear-powered submarines and is building an equal number of bigger, faster and deadlier submarines. India has a long way to go before it can match China's SLBM fleet.

The reason for the two-decade delay is that boomer technology is a closely guarded secret. In fact, in the entire history of nuclear submarines, there are only two known instances of one state actively helping another acquire a boomer. In the 1960s the Americans passed on SSBN and SLBM technology to their British cousins as a token of their special relationship. (Strategically, however, it is of no significance because the British fleet is not only tiny but it reportedly cannot fire its missiles without American approval.) The only other instance is Russia providing assistance to India in building the Arihant.

The approval of the construction of an SSBN dates back to 1970, but as is usual with Indian defence projects, nothing came off it. The project was revived in 1985 and in 1989 DRDO sought design assistance from former engineers and defence workers of the former Soviet Union. By 1996, when India had spent \$285.7 million on the nuclear submarine - codenamed Advanced Technology Vessel - work on the project came to a crawl because of US pressure.

However, with the exit from the Kremlin of pro-American elements, the Russians returned in full strength. While Russian designers assisted in building the vessel, its nuclear-powered 80MW pressurised water reactor was developed by the Bhabha Atomic Research Centre with assistance from a design team from Rubin, the Russian submarine-design bureau.

It is worth mentioning that because there is more science packed into an SSBN than any other weapons platform, it is for the faint hearted. The USS Nautilus took 16 years to build - from authorisation in 1944, sea trials in 1955 to fleet induction in 1960; Russia took 16 years to build its first second generation SSN-093 submarine. "The Arihant achievement must be judged as such, and lauded," says Commodore Rai, a former Director Naval Intelligence.

How many SSBNs are needed?

According to the US Navy Institute, only the US, Russia, France and the UK (which uses US Trident missiles) can sustain continuous-at-sea deterrent patrols, providing continuous launch capability of an SLBM by maintaining at least one SSBN on station at any one time that could fire a nuclear missile. "A continuous patrol requires a minimum of four SSBNs," it says. This assumes one submarine is on patrol for, say, two to three months; another is in port on standby; while the third and fourth may be undergoing repairs or refits.

A second SSBN has reportedly completed sea trials. Named INS Arighat, the boat is due to be delivered next year and is expected to be double the Arihant's displacement at 12,000-13,000 tonnes, with a complement of eight K-4 missiles. Another two boats after Arighat are planned to be commissioned by 2023. "Following from these first four Arihant-class boats, another batch of even larger SSBNs is expected," says the Maryland, US, based institute. These new vessels will be equipped with brand new SLBMs having ranges up to 7000 km, allowing them to strike Chinese and Pakistani targets from well outside the Indian Ocean.

At the same time, India will require a complementary fleet of ship submersible nuclear (SSN) submarines - these are fast, hunter killer subs that will be required to detect and track Chinese and Pakistani undersea activity and warships. They are also likely to patrol the western Pacific Ocean and the South China Sea where they will play cat and mouse with Chinese SSBNs and warships - as a quid pro quo for PLA Navy activity close to Indian shores. The Indian Navy plans to acquire as many as six SSNs, and discussions are on with shipbuilders from France and the US for participating in the project.

Plus, as an indicator of how seriously India is taking the safety of its undersea assets, the Indian Navy has commenced Project Varsha - the construction of a massive nuclear submarine base south of Visakhapatnam. Reportedly costing Rs 30,000, the base will house India's SSBN fleet in concrete pens blasted out of the hills at Rambilli 50 km south of the strategically located city. The first phase of the project will be completed by 2022.

Never again

In the 1971 India-Pakistan war, after the Indian Army defeated the Pakistan Army in the east, the political leadership had drawn up a secret plan to attack Pakistan in the west and destroy its army so that Pakistan would never ever present a threat to India. However, US got wind of it. In order to protect their vassal state, the US and British fleets made a threatening pincer against India. While the nuclear armed US Seventh Fleet from Southeast Asia sailed towards Kolkata, a British flotilla from Madagascar steamed towards the west coast. The Indian Air Force was on alert after receiving intelligence that American warplanes might attack the Indian Army's communications in the west. However, the Russian Pacific Fleet sailed into the Indian Ocean and threw a cordon around India, forcing the American and British warships to retreat.

Once a fleet of Indian boomers and nuclear attack subs start patrolling the oceans, India can ensure no foreign navy will threaten it again.

Navy eyes new missile modules for stealthiest submarines

Ryan Pickrell, We are the Mighty, November 19

<https://www.wearethemighty.com/news/navy-missile-modules-stealthiest-submarines>

The US Navy is getting creative with the weapons payloads of the Virginia-class submarines, one of the deadliest and most technologically advanced subs in the world.

The Virginia Payload Module (VPM), a weapons system intended to give the late-block Virginia-class attack submarines (SSNs) a bit more punch, was initially viewed solely in the context of giving these submarines the kind of firepower seen on the aging Ohio-class guided-missile submarines (SSGNs).

"We were only really allowed to talk about it as a replacement for SSGN strike," Program Executive Office for Submarines Executive Director George Drakeley said at November 2018's Naval Submarine League symposium, USNI News reported Nov. 15, 2018. "The handcuffs are off now, and lately we've been talking about other capabilities," he said at the event.

The US Navy awarded BAE Systems a contract in 2018 to develop new payload tubes - the new VPMs - for two Block V Virginia-class submarines, Defense News reported in June 2018. One of the four VPM tubes reportedly has the ability to carry and launch up to seven Tomahawk land-attack cruise missiles (TLAMs). This technology can triple the sub's payload capacity, significantly boosting its firepower.

There are also opportunities to innovate and apply this technology to new missions, a necessity as the US refocuses its efforts on preparation for high-end conflict with rival powers. "We're in a great power competition now, and so we need to be focusing on other potential capabilities," Drakeley told those in attendance.

Both Russia and China are increasingly advancing their undersea warfighting capabilities. "In the undersea domain, the margins to victory are razor thin," Adm. James G. Foggo III, the commander of US Naval Forces Europe-Africa, told Pentagon reporters in October 2018.

A new report evaluating the National Defense Strategy, which also highlights the threat posed by great power competition, recommended the US bolster its submarine force. But numbers are not everything, as capability is also key.

"We have to get past the days of just ADCAP (advanced capability Mk 48 heavyweight torpedo) and TLAM (Tomahawk land-attack missile) as being our two principle weapons," Rear Adm. John Tammen, the director of undersea warfare on the staff of the chief of naval operations, explained to attendees.

Tammen told USNI News that the surface warfare community is looking into a next-generation land-attack weapon, and the undersea warfare directorate would then look at ways to adapt it to the VPM, giving the Virginia-class subs an alternative to the Tomahawks.

At the same time, the Navy is also interested in VPM-launched unmanned undersea vehicles, but the pairing process has proven something of a challenge.

This new technology, as long with new torpedo systems, could potentially be seen on the Block VI and VII Virginia-class SSNs.

Navy asks Lockheed Martin to build additional Trident II D5 submarine-launched nuclear missiles

John Keller, Military Aerospace, November 19

<https://www.militaryaerospace.com/articles/2018/11/trident-ii-d5-submarine-nuclear-missiles.html>

Strategic weapons experts at Lockheed Martin Corp. will build additional UGM-133A Trident II D5 submarine-launched ballistic nuclear missiles and support deployed D5 atomic weapons under terms of two orders announced Friday collectively worth \$90.4 million.

Officials of the U.S. Navy Strategic Systems Programs (SSP) office in Washington are asking the Lockheed Martin Space Systems segment in Sunnyvale, Calif., to provide new procurement of Trident II (D5) missile production and D5 deployed systems support. One order is worth \$41.3 million, and the second order is worth \$49.1 million.

Navy leaders have put a substantial amount of time, money, and resources into Trident D5 missile production over the past two years. President Donald Trump has said one of his highest military priorities is to revitalize the nation's nuclear forces.

Over the past eight months Lockheed Martin received contracts and orders collectively worth \$139.3 million for Trident II D5 missiles and support. Over the same period the Charles Stark Draper Laboratory Inc. in Cambridge, Mass., won a \$58.6 million order for Trident D5 MK 6 guidance system production.

In July 2016 Lockheed Martin won a \$21.8 million contract for long lead items to support the fiscal 2017 Trident II D5 missile production schedule, and around the same time the company won an \$8.3 million order for a cyber-security update to information technology (IT) applications unique to fleet ballistic missile systems such as the Trident D5.

In March 2016 Draper Lab won a potential \$163.6 million contract to build, test, verify, and recertify Trident missile inertial measurement units, electronic assemblies, and electronic modules.

The Trident II D5 is one of the most advanced long-range submarine-launched nuclear missiles in the world. It is the primary U.S. sea-based nuclear ballistic missile, and is deployed aboard U.S. Navy Ohio-class ballistic missile submarines.

The U.S. Navy operates 14 of these ballistic missile submarines, each of which can carry as many as 24 Trident II missiles. Although the Trident II is designed to carry as many as 12 multiple independently targetable reentry vehicle (MIRV) warheads, current treaties reduce this number to four or five.

Each Trident II missile has a range of 4,000 to 7,000 miles. The Trident II D5 was first deployed in 1990 and is scheduled to remain in service until at least 2027.

The Navy started the D5 Life Extension Program in 2002 to replace obsolete components using as many commercial off-the-shelf (COTS) parts as possible to keep costs down and to enhance the missile's capability. Draper Lab is in charge of upgrading the Trident II's guidance system, and has been working on this project since 2005.

In practice, the Trident II missile's inertial measurement system receives targeting data from computers aboard the submarine. The inertial measurement unit then transmits signals to the D5 flight-control computer and converts them into steering commands to keep the ballistic missile on target.

The missile's post-boost control system maneuvers the missile in flight to observe stars for the missile's celestial navigation subsystem, which updates the inertial system in flight.

Lockheed Martin also is integrating the Trident II onto the next-generation ballistic submarine designs of the U.S. and United Kingdom by adapting the Trident II missile and reentry subsystems into the common missile compartment for the Ohio replacement and United Kingdom successor programs.

The Ohio replacement is being designed to replace the Navy's fleet of Ohio-class ballistic missile submarines. The United Kingdom successor program, meanwhile, will replace the Royal Navy's fleet of Vanguard-class ballistic missile submarines.

The U.S. Navy today operates 18 Ohio-class submarines -- 14 of which carry the Trident nuclear missile. Four Ohio-class subs have been modified to carry conventionally armed long-range cruise missiles.

The Ohio-class submarine has been in commission since 1981, and this class is scheduled to be decommissioned and replaced starting in 2029. The United Kingdom Vanguard-class ballistic missile submarine has been at sea since 1993. The Royal Navy operates four Vanguard-class subs.

On these orders Lockheed Martin will do the work in Sunnyvale and Santa Clara, Calif.; Kings Bay, Ga.; Bangor, Wash.; Cape Canaveral, Fla. and Clearwater, Fla.; Denver; Borgo San Dalmazzo, Italy; Biddeford, Maine; Valley Forge, Pa.; and other various locations, and should be finished by September 2023.

GAO: Navy Lost 1,891 Days of Attack Sub Operations Waiting for Repairs; Spent \$1.5 Billion Supporting Idle Crews

Sam LaGrone, USNI News, November 19

<https://news.usni.org/2018/11/19/gao-navy-lost-10000-days-of-attack-sub-operations-waiting-for-repairs-spent-1-5-billion-supporting-idle-crews>

Delays in maintenance have resulted in at least 1,891 lost operational days for the U.S. attack submarine fleet and cost the Navy about \$1.5 billion to support boats that can't go to sea, according to a Monday report from the Government Accountability Office.

>From 2008 to 2018, most of the planned repairs for the Navy's fleet of about 50 nuclear attack submarines have started late and run long resulting in a combined 10,363 days of maintenance delays and idle time.

"Our analysis found that the primary driver affecting attack submarines are delays in completing depot maintenance," read the report. "For example, of the 10,363 total days of lost time since fiscal year 2008, 8,472 (82 percent) were due to depot maintenance delays."

While Naval Sea Systems Command has a \$21 billion plan to improve the four public shipyards that are responsible for repairing the nuclear fleet, the report indicated the problem of delayed attack boat maintenance is not on track to improve any time soon.

"While the public shipyards have operated above capacity for the past several years, attack submarine maintenance delays are getting longer and idle time is increasing," read the report.

"The Navy expects the maintenance backlogs at the public shipyards to continue. We estimate that, as a result of these backlogs, the Navy will incur approximately \$266 million in operating and support costs in Fiscal year 2018 constant dollars for idle submarines from Fiscal year 2018 through Fiscal year 2023, as well as additional depot maintenance delays."

Rep. Joe Courtney (D-Conn.), the ranking member on the House Armed Services seapower and projection forces subcommittee, called the report a "sobering assessment of the challenges facing our undersea forces" and called for the Navy to use private shipyards more to clear the backlog of attack boats awaiting repairs in a Monday statement.

"While demand for our undersea fleet and its unique capabilities continues to rise as reflected in the 2016 Force Structure Assessment, delays in maintaining our existing fleet are exacerbating the growing shortfall in our submarine force structure," he said in the statement provided to USNI News. "This report makes clear that the Navy must do more to fully utilize the capacity of our private shipyards to reduce the backlog in submarine repair work - something I have repeatedly urged the Navy to act on."

Monday's report provides new details to a problem that has plagued the service for years. Attack submarines have suffered repair delays in the Navy's four public yards that give priority to nuclear-powered aircraft carriers and ballistic missile submarines. The service has recently started mitigating the backlog by farming out some of the attack boat work to private shipyards.

"The Navy opted to send USS Montpelier (SSN-765) to General Dynamics Electric Boat and USS Helena (SSN-725), USS Columbus (SSN-762) and USS Boise (SSN-764) to Huntington Ingalls' Newport News Shipbuilding," reported USNI News earlier this year.

While the service is doing more to send work to private yards, the GAO found that there was a lack of consistency in how the Navy exercised those private repair options.

"Although the Navy has shifted about 8 million man-hours in attack submarine maintenance to private shipyards over the past five years, it has done so sporadically, having decided to do so in some cases only after experiencing lengthy periods of idle time," read the report. "According to private shipyard officials, the sporadic shifts in workload have resulted in repair workload gaps that have disrupted private shipyard workforce, performance, and capital investment-creating costs that are ultimately borne in part by the Navy."

Earlier this year, head of Naval Sea Systems Command Vice Adm. Thomas Moore said the private yards were having difficulty repairing the attack boats.

"They're struggling with the submarines that they have right now. Some of that is because overhauls are a heck of a lot harder than new construction so they're not really proficient in it," Vice Adm. Tom Moore said during a keynote speech at the American Society of Naval Engineers (ASNE) Fleet Maintenance and Modernization Symposium in September.

"We would like to give them work on a semi-regular basis to at least create some efficiency for submarine maintenance. so that when we have peak years at naval shipyards we can choose to source that work out to the private sector."

The Navy largely concurred with the recommendation of the report to conduct a more thorough review, "of submarine maintenance requirements and impacts across both the public and private shipyards."

A Navy spokesperson acknowledged but did not immediately respond to a USNI News request for comment on the report.

Monday's report is an unclassified version of an overall attack submarine readiness report that went into greater detail on the shortfalls of the force. At the request of the Navy, details of attack submarine readiness goals, wartime requirements and several other details were omitted from the unclassified portion of the report.

US Navy ramps up development of naval unmanned systems

Michael Fabey, Jane's Navy International, 14 November

<https://www.janes.com/article/84566/us-navy-ramps-up-development-of-naval-unmanned-systems>

The US Navy (USN) is accelerating its development of naval unmanned systems through programmatic changes and contractual tools meant to field such systems as soon as possible, according to Captain Pete Small, programme manager for Unmanned Maritime Systems.

For example, the (USN) has started the Payload Integration Group (PIG), Capt Small noted on 8 November during the Naval Submarine League Annual 36th Symposium and Industry Update.

The PIG is tasked with developing, maintaining, and overseeing and "a standard, rapid and cost-effective process" for determining what the best payloads may be for the various naval unmanned platforms, Capt Small said.

"We want to streamline efforts across multiple organisations," he said, and find ways to enhance commonalities for unmanned surface and underwater systems, as well as develop modular payloads for those systems.

The navy wants to develop interface standards, he said, to integrate unmanned and manned platforms.

The USN also has developed an unmanned underwater vehicle (UUV) family-of-systems contracting tool to provide "wide access to key industry providers" for prototyping and technology development across the portfolio of systems to be inserted in hot production lines.

Companies can be awarded contracts for various developmental tasks, he said, in areas such as payloads, hull, propulsion, sensors, and storage or conversion of energy.

While the USN looks to enhance its future naval unmanned systems development, the service remains on course for a current portfolio of programmes, Capt Small said.

For example, the service in 2018 kicked off a stronger medium unmanned surface vehicle (USV) effort to leverage programmes already being operated by the Defense Advanced Research Projects Agency (DARPA), such as the Medium Displacement Unmanned Surface Vehicle (MDUSV) prototype Sea Hunter, which arrived at Joint Base Pearl Harbor Hickam 31 October - demonstrating the MDUSV can deploy for bluewater operations.

Senators, advocates push for USS Thresher disaster memorial Adam Sexton, WMUR9 (New Hampshire), November 12
<https://www.wmur.com/article/senators-advocates-push-for-uss-thresher-disaster-memorial/25022139>

A renewed effort is underway to memorialize the 129 sailors and civilians who were lost aboard the USS Thresher, a submarine that sank off the New England coast in 1963.

In the deadliest submarine disaster in U.S. history, the USS Thresher went down on April 10, 1963, during deep-diving tests, sinking in 8,000 feet of water about 200 miles off Cape Cod.

None of the 129 men aboard the Portsmouth-based vessel survived.

"It was a national event," said Kevin Galeaz of the USS Thresher Arlington Memorial Foundation. "It was bracketed between the Cuban Missile Crisis of November 1962 and President John F. Kennedy's assassination that following November of '63."

A memorial stands at the Albacore Museum in Portsmouth, but for years, there have been efforts to erect a monument on the grounds of Arlington National Cemetery.

This month, five New England senators, led by U.S. Sen. Jeanne Shaheen, D-N.H., are encouraging the secretaries of the Army and Navy to allow the project to move forward.

"There are precedents that other memorials of specific incidents have been honored, and we think it's very important to recognize those lost on the Thresher," Shaheen said.

The Navy responded to the Thresher disaster by revamping submarine safety and quality assurance standards during construction, a legacy that would be honored on the proposed monument.

"It also recognizes what happened because of that horrible accident, that we made changes to our submarine program that have saved so many lives," Shaheen said.

"Family members of the men lost aboard the Thresher have been trying to build a memorial for decades. They're now calling on veterans and civilians to write letters to military officials in support of the effort.

"Myself and other submariners who have served since, we owe our lives to these men," Galeaz said.

Navy Wants to Use Virginia Payload Module to Deploy New Missiles, UUVs

Megan Eckstein, USNI News, 14 November

<https://news.usni.org/2018/11/14/navy-looking-use-virginia-payload-module-deploy-new-missiles-uuv>

The undersea warfare community wants to boost attack sub lethality by providing new payloads for the Virginia-class SSNs, especially ones that can be leveraged through the Virginia Payload Module missile tubes that will be added to new-construction boats beginning this year.

Program Executive Office for Submarines Executive Director George Drakeley said at the two-day annual Naval Submarine League symposium last week that, when the Navy was first pitching the idea of adding the VPM missile tube capacity to SSNs, "we were only really allowed to talk about it as a replacement for SSGN (Ohio-class guided-missile submarine) strike; we weren't able to talk about other missions. And most of you here as submariners and warfighters could think of a lot of things you could do with a VPM. Well, the handcuffs are off now, and lately we've been talking about other capabilities."

"We're in a great power competition now, and so we need to be focusing on other potential capabilities," he said, citing Russia and China as adversaries that needed to be kept in mind while developing these new payloads.

Rear Adm. John Tammen, director of undersea warfare on the chief of naval operations' staff (OPNAV N97), said at the event that "we have to get past the days of just ADCAP (advanced capability Mk 48 heavyweight torpedo) and TLAM (Tomahawk land-attack missile) as being our two principle weapons."

Also addressing the Russian and Chinese advancements in the undersea warfare realm, Tammen said, "there will be no adversary that gets a free ticket to hunt us. ... We brought back Harpoon (anti-ship missile) so we can give the commanding officers this engagement-breaking weapon that they have in case they're being hunted by a surface vessel. That said, we're looking at all domains to make sure no one gets that free ticket."

The Navy is looking at both new missiles as well as unmanned undersea vehicles being potential payloads that could be deployed from the VPM tubes.

On the weapons side, Tammen told USNI News after his presentation that the surface warfare community is developing a next-generation land-attack weapon (NGLAW) that is currently going through an analysis of alternatives. Though the surface warfare directorate (OPNAV N96) is overseeing the program, the undersea warfare directorate would look at adapting the weapon to be used from the VPM, providing another land-attack option beyond TLAM.

UUVs are another attractive option to deploy from the VPM, but Tammen told USNI News the Payload Handling System that would move the UUVs from inside the submarine into the VPM tubes is still a challenge and funding has not yet been secured.

The admiral said the UUV-VPM pairing relies on "a payload handling system, which will allow you to take a UUV vertical and then into the tube. Now the challenge right now is with chemical batteries you can't take some of our vehicles vertical, so we have to get lithium ion or some other technology to allow us to go vertical, and then that should coincide with when we have the payload handling system." He said funding for the handling system is pre-decisional and in the works now.

Tammen told the crowd during his presentation that "when we originally sold the Virginia Payload Module it was to reconstitute the TLAM strike inventory that we're losing with Ohio-class SSGNs. We have to make sure that [U.S. Pacific Command] and [U.S. European Command] have the TLAMs they need to carry out their war plans," but he added OPNAV N97 will "continue to give options to the commanders in terms of payloads for those tubes."

Drakeley noted during his speech that, in addition to talk about using VPMs for innovative purposes, PEO Subs is also continuing to work on new torpedoes to add new capability to attack subs.

The PEO is “doing a whole lot of work on lethality. We’ve had the same torpedoes, both heavyweight and lightweight, in the inventory it seems like forever. We haven’t really had any new torpedoes since before I came into the submarine community, so we’re working on that,” he said.

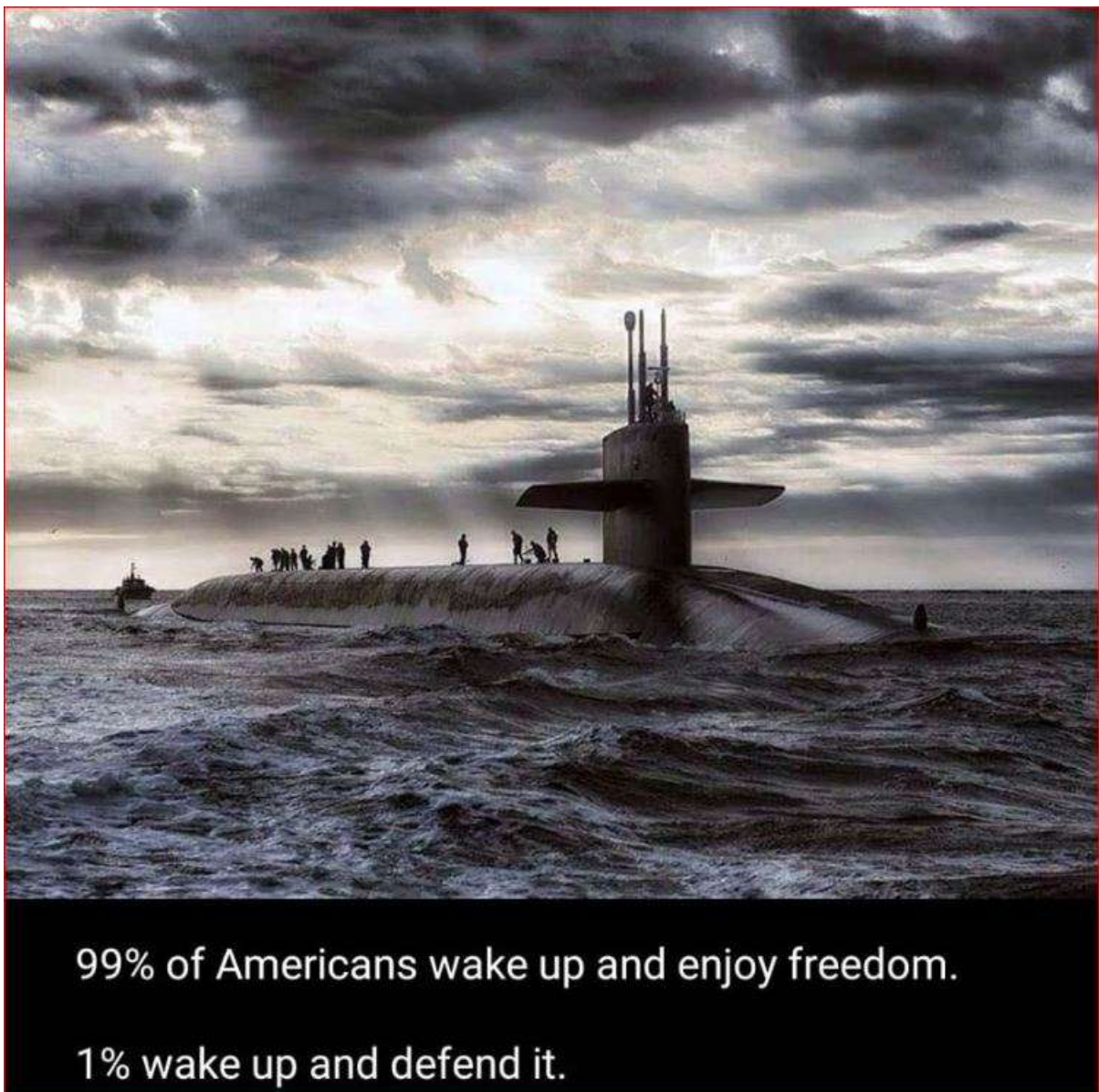
In the longer term, Block VI and VII Virginia-class SSNs will have a chance to bring in more capability, as well as the eventual “New SSN” program, which the submarine community had previously called SSN(X).

“One of the items that’s being looked at on Block VI is SOF (Special Operations Forces) optimization,” Virginia-class program manager Capt. Chris Hanson said during a panel discussion.

“We look for capabilities to help the synergy with unmanned undersea vehicles, and it will also give us the ability to move forward in the realm of seabed and subsea warfare,” Tammen said of Block VI and VII boats.

After Block VII, Tammen said, there will be no margin left for added speed or acoustic management, and “we’ll have to transition to the next block, which is New SSN. New SSN is going to be where we put the fast back in fast attack.” The Navy is currently thinking about how much capacity the sub will need to carry various payloads, how big to make the hull, what kind of propulsion system to use, and more.

“We’ve started the intellectual pushups to make sure that we’re ready to go define the tradespace for the next SSN – hull size, ship length, diameter, what goes in that. Let’s define an envelop, we’re working on it,” Naval Reactors director Adm. Frank Caldwell said at the symposium.



99% of Americans wake up and enjoy freedom.

1% wake up and defend it.

U.S. DIESEL BOATS? NEVER AGAIN!

To properly address why the U.S. Navy doesn't buy diesel submarines, it is worthwhile to review the purpose of the Navy. From the CNO's "Design for Maintaining Maritime Superiority," The Navy is a global, forward-deployed force capable of power projection "from the sea floor to space, from deep water to the littorals, and in the information domain." This strategic guidance is consistent with our 240-year history of enabling sea control and power projection from the sea around the world to further our national interests. There are several characteristics that make nuclear-powered submarines uniquely capable to meet these global requirements. They are: speed, endurance, weapons volume and diversity, sensor capacity, stealth, sustainability, and cost.

Speed

Sun Tzu said in "The Art of War," "Speed is the essence of war. Take advantage of the enemy's unpreparedness; travel by unexpected routes and strike him where he has taken no precautions." A submarine's ability to maneuver at high speeds is the key to repositioning within a theater of interest and for maintaining the initiative in peacetime or wartime engagements. Speed is vital.

Speed gives U.S. submarines the agility to respond to contingencies worldwide. For diesel submarines, the fastest transit posture would be on the surface—an operationally unsatisfactory approach. The best submerged transit speed for a diesel submarine is around 7 knots and depends to some degree on the weather and adversary surface surveillance, which can complicate snorkeling operations to recharge the battery. Today's *Virginia*-class submarines can operate at three to four times that speed, sustain that speed indefinitely, and is unaf-

ected by weather or adversary surface surveillance. For perspective, a 2,000-nautical mile (nm) transit from Guam to the South China Sea would take about 12 days for a diesel submarine at 7 knots and about three days for a nuclear submarine operating at 25 knots.

Speed is also essential when intercepting targets, running down an evader, or escaping from a pursuing adversary. Unclassified estimates of high-end Russian or Chinese nuclear submarines and warships suggest they can operate at speeds in excess of 30 knots. By comparison, a Japanese *Soryu*-class submarine has a maximum speed of 20 knots submerged but can only maintain this speed for a brief sprint, after which it would have to disengage.

Endurance

Submarine endurance is the ability to transit far from home and then operate unsupported in a mission posture for an extended

period. For diesel submarines, endurance "on station" is limited by the fuel capacity that remains after the transit, the duration of the operation, and the transit distance required to reach a place to refuel. Endurance in a stealthy "mission posture" is limited by the need to find an opportunity to securely snorkel to recharge batteries. In addition, diesel submarines need to manage a safety margin of reserve battery capacity or fuel





to accommodate unexpected circumstances. Nuclear-powered submarines do not have these operational limitations; long transits are quick, there is no need to create snorkel windows, there is no need for fuel or battery safety margin management, and there is no need to budget fuel for the return transit.

Weapon Volume and Diversity

Because submarines operate alone far forward without logistical support, it is vital that they carry enough ordnance to make the risk involved in getting in and out worth the impact the submarine makes on station. Modern diesel submarines carry from 8 to 24 weapons, almost all of which are launched from the torpedo tubes. Nuclear-powered fast attack submarines, in contrast, carry 36 weapons that are a combination of 12 vertical and 24 horizontal weapons. *Virginia*-class submarines equipped with the Virginia Payload Module will be able to carry an additional 28 Tomahawk-sized

“A submarine’s ability to maneuver at high speeds is the key to repositioning within a theater of interest and for maintaining the initiative in peacetime or wartime engagements. Speed is vital.”

missiles or an equivalent volume of other payloads for a total ordnance load of 64 torpedoes/missiles. On *Los Angeles*-class submarines and the *Virginia*-class Block I and II submarines, the vertical payload volume is 12 21” tubes. Only on the Block III *Virginias* and beyond submarines does an 87-inch payload volume exist. Therefore, a nuclear submarine can carry a payload that is about three times as large as a diesel submarine payload, depending on the diesel submarine in the comparison, and can carry a much more flexible range of payloads able to support a wider range of missions.

Sensor Capacity—Space, Weight, Power, and Cooling

In addition to weapons, submarine payloads include sensor systems such as sound navigation and ranging (SONAR), periscopes, and electromagnetic warfare systems. Each of these systems imposes a structural footprint—the SONAR array, the mast arrangement, the processing and display equipment—that involves space and weight, including shock mounting, maintenance access, and repair parts storage. In addition, each of these systems places a demand on electrical power and cooling systems. Diesel

submarines are smaller and therefore necessarily must constrain the size of the sensors and support systems they can carry. Large acoustic arrays, for example, are problematic.

The design and operation of a diesel submarine necessitates the limiting or rationing of power and cooling demands, which often means shutting down systems or system components. Nuclear submarines are much less constrained on structure, power, and cooling. They are able to carry large arrays, large processing banks, long towed arrays, robust display consoles, and the necessary parts and logistic support. Nuclear submarine crews do not have to decide whether they want all of the systems operating or just some of the systems to conserve resources for a prolonged mission posture until the next snorkel opportunity. In summary, nuclear submarines have larger and more capable sensors, more flexibility on sensor options, and are able to fully employ those sensors without compromise.

Stealth and Vulnerability

A well-designed diesel submarine that is professionally operated, submerged and running on the battery, and lying in ambush is perhaps the stealthiest and most capable maritime threat today. This particular posture plays directly to the strengths of a diesel submarine. U.S. Navy submarines have other missions to carry out that are not so well suited to diesel submarines as is the above scenario. And even in this ideal ambush mission, there are other phases of the operation that must be performed, and in those phases the weaknesses in stealth and vulnerability of diesel submarines come into play. The submarine must transit to its ambush location, it must periodically recharge while lying in wait, and it must return home. In general, these are not strengths of a diesel submarine.

That said, there are countries whose only submarine mission is local defense. For such countries, there would be no transit and the mission location would be in home waters. This also means that there would be

no surface or air threats to the diesel submarine while recharging. These countries should buy diesel submarines because they are a perfect match for their mission and circumstances. The United States is not in this situation. We will not have submarines lying in ambush in our local waters waiting for a threat to arrive. We have global responsibilities and a broad range of missions. We have to transit long distances quickly, and we need the best stealth that can be achieved to support this mission set.

When a submarine is operating far forward, the crew must carefully manage the risk of detection. All submarines are designed to limit their acoustic signature and can further limit their visual and radar vulnerabilities by not operating at periscope depth or, when they are at periscope depth, by minimizing the signature produced through good operational discipline. The signature produced by a diesel submarine snorkeling is much greater than the signature of a prudently exposed periscope.

Even with Air-Independent Propulsion systems, which also depend on consumables with limited onboard supply, non-nuclear submarines remain more operationally constrained in speed and flexibility. For nuclear submarines, the ability to produce essentially unlimited electricity and propulsion while submerged enables limiting mast exposure to the bare minimum needed for sensor effectiveness. When a nuclear submarine accepts detectability risk to gain information or conduct an operation—for example, exposing a periscope or launching a missile—it is a deliberate choice made as a calculated risk in pursuit of an operational gain. It is not a step imposed on the crew due to a limitation in the platform's performance, as is the case with a diesel submarine forced to snorkel.

Sustainability

Sustainability refers to how effectively the Navy's support infrastructure is able to provide for the needs of the submarine. This includes food, repair parts, repair equipment and training, crew training, and the availability of fuel and other consumables. As a forward-deployed Navy, our surface and air forces have mature supply lines and a developed expeditionary sustainment capability. Some of our sustainment capability comes from allied and partner-nation support. In a

Comparative Analysis at a Glance

	<u>Diesel Submarine</u>	<u>Nuclear Submarine</u>
Speed	Surface: 17 knots Submerged: ~20 knots (max) Transit: 7 knots	Surface: >15 knots Submerged: >25 knots (max) Transit: >25
Endurance	Limited by fuel capacity	Unlimited
Weapons	Torpedoes Cruise missiles	Cruise missiles Ballistic missiles Torpedoes SEAL Delivery Vehicle
Sensors	Limited due to space	Full array
Power	Limited	Unlimited
Cooling	Limited	No limitations
Stealth	Limited by battery	No limitations
Sustainability	No infrastructure for support	Self-sustaining & existing global infrastructure
Cost	>\$600M	~\$2.7B

contested environment, this regional support may be unavailable due to political sensitivities or physical destruction of infrastructure.

To compensate for this possibility and to add operational flexibility, Military Sealift Command has a fleet of ships that provide underway replenishment. There is no sustainment infrastructure for diesel submarines in the U.S. Navy: a large percentage of the equipment on diesels would be specialized and unique, and so too would be the support. This entire infrastructure would have to be built up from scratch, requiring investment in a separate independent support network compared to nuclear submarines. Nuclear-powered submarines are largely self-sustaining while forward deployed and, for the work that must be done while forward, the infrastructure already exists and is finely tuned.

Cost

The most common argument in favor of diesel submarines is that they cost less to build than nuclear submarines. For perspective, a German Type 212 diesel submarine sold to Norway for delivery in 2019 cost 560 million Euros (~US\$623M) while today's Block III *Virginia*-class submarines cost ~US\$2.7B. Based on these numbers, proponents for diesel submarines argue that the United States could get four diesel submarines for the cost of one *Virginia*-class submarine. However, this is not an apples-to-apples comparison because the four Type 212 submarines cannot do all the things that the one *Virginia*-class submarine can do.

A closer but still imperfect comparison would be to analyze Australia's most recent contract with French shipbuilder DCNS for 12 *Shortfin Barracuda* Block 1A submarines (to be modified from nuclear to diesel). This contract was \$50B Australian dollars (~US\$38B) for 12 submarines, which averages to about US\$3B per submarine including engineering costs for modification, materials, and infrastructure to build the submarines in Australia. This includes costs for Lockheed Martin's Submarine Warfare Federated Tactical Systems (SWFTS) advanced fire control and SONAR system, which is used by both the United States and Australia.

When thinking about cost, it is prudent to remember that we are not purchasing submarines—we are purchasing a

set of operational capabilities. Imagine a swim-off between the four Type 212 submarines and a *Virginia*-class submarine in Hawaii. Assume a contingency develops in the Western Pacific that requires a flexible response and a 4,000-nm transit. The *Virginia*-class submarine would be there in six days, the diesel submarines in more than three weeks. The diesel submarines would be vulnerable to tracking and interdiction in transit due to frequent exposure. When they finally arrive on station, their remaining endurance would be a small fraction of that of the *Virginia*-class submarine. The four Type 212s would bring twice as many torpedoes as the *Virginia*-class submarine but would have very little mobility to run down adversaries to administer a torpedo attack.

They would bring no strike weapons. They would have a limited sensor suite. They would not be able to transit in the company of a carrier strike group due to speed constraints. They would not be able to do high speed acoustic searches to clear an area. Any repositioning of the diesels would depend on the plan for refueling them—a risky operation when operating far forward.

All this is not to criticize diesel submarines outright, it is to criticize them as a poor match for the operational environment and requirements facing the U.S. Navy. Type 212 submarines would be excellent for local operations in European littoral waters as part of the German or Norwegian navy. They would be ineffective, however, in supporting the missions of the U.S. Submarine Force due to their slow speed, limited endurance, limited payload size and mix, and their stealth vulnerabilities. It should be clear to see why diesel submarines do not meet the U.S. Navy's operational requirements.

Industrial Base

Another aspect to consider is how the Navy would build diesel submarines. The cost of a single diesel submarine is most appealing when it is available for purchase off an already operating production line, but the United States has not produced a diesel-powered submarine since 1959. Today, U.S. nuclear shipbuilders are designing and producing *Virginia*-class Blocks III, IV, and V submarines and designing the *Columbia*-class SSBN, and there is not sufficient indus-

trial capacity to take on additional projects without detracting from the Navy's current shipbuilding plan. In fact, the Navy would like to accelerate production of fast attack submarines beyond two *Virginia*-class submarines per year to more quickly reach a total of 66 fast attack submarines but current industrial capacity limitations prevent immediate acceleration. A new design and build effort would detract from existing efforts and would require significant capital investment in the public and private shipyards to produce, design, and maintain diesel submarines and their equipment.

Real-World Training

One other argument for the U.S. Navy to have diesel submarines is to be able to train with them. Some argue that the procurement of diesel submarines would enable more realistic training for the U.S. Submarine Force. The U.S. Navy acknowledges the benefit of training with diesel submarines at sea. To accomplish this, the Navy has existing avenues through bilateral and multilateral training exercises with our allies and through the Diesel-Electric Submarine Initiative, which holds Fleet pre-deployment exercises and bilateral tactical development events. While this training is effective, it does not require purchasing diesel submarines.

The U.S. Navy not only has no compelling reason to abandon its nuclear-only Submarine Force policy, it has every incentive to stay the course. In a world beset by powerful competitors, rogue nations, and violent non-state actors, there is no question that the United States has an obligation to ensure the safety and freedom of Americans as well as other less powerful partner states and allies. Our national requirement to operate far forward and quickly respond to crises worldwide requires the speed, stealth, and endurance inherent in our current and future fast attack and ballistic missile submarines.




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