



## Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-444



### **SSBN 826 COLUMBIA Class Submarine (SSBN 826)**

As of FY 2020 President's Budget

Defense Acquisition Management  
Information Retrieval  
(DAMIR)

This document contains information that may be exempt from mandatory disclosure under the FOIA.

## Table of Contents

<del>(U//FOUO)</del> Sensitivity Originator .....	3
Common Acronyms and Abbreviations for MDAP Programs .....	4
Program Information .....	6
Responsible Office .....	6
References .....	7
Mission and Description .....	8
Executive Summary .....	9
Threshold Breaches .....	14
Schedule .....	15
Performance .....	17
Track to Budget .....	19
Cost and Funding .....	20
Low Rate Initial Production .....	35
Foreign Military Sales .....	36
Nuclear Costs .....	36
Unit Cost .....	37
Cost Variance .....	40
<del>(U//FOUO)</del> Contracts .....	43
Deliveries and Expenditures .....	46
Operating and Support Cost .....	47

**~~(U//FOUO)~~ Sensitivity Originator**

**Organization:** Naval Sea Systems Command Program Executive Officer Submarines (PEO SUB)  
**Organization Email:**  
**Organization Phone:** 202-781-5225

The Aggregate Report Sensitivity has been defined as ~~(U//FOUO)~~ with the following explanation: Contract variance information provided by contractor in Contracts section is marked "EB Proprietary"

## Common Acronyms and Abbreviations for MDAP Programs

Acq O&M - Acquisition-Related Operations and Maintenance  
ACAT - Acquisition Category  
ADM - Acquisition Decision Memorandum  
APB - Acquisition Program Baseline  
APPN - Appropriation  
APUC - Average Procurement Unit Cost  
\$B - Billions of Dollars  
BA - Budget Authority/Budget Activity  
Blk - Block  
BY - Base Year  
CAPE - Cost Assessment and Program Evaluation  
CARD - Cost Analysis Requirements Description  
CDD - Capability Development Document  
CLIN - Contract Line Item Number  
CPD - Capability Production Document  
CY - Calendar Year  
DAB - Defense Acquisition Board  
DAE - Defense Acquisition Executive  
DAMIR - Defense Acquisition Management Information Retrieval  
DoD - Department of Defense  
DSN - Defense Switched Network  
EMD - Engineering and Manufacturing Development  
EVM - Earned Value Management  
FOC - Full Operational Capability  
FMS - Foreign Military Sales  
FRP - Full Rate Production  
FY - Fiscal Year  
FYDP - Future Years Defense Program  
ICE - Independent Cost Estimate  
IOC - Initial Operational Capability  
Inc - Increment  
JROC - Joint Requirements Oversight Council  
\$K - Thousands of Dollars  
KPP - Key Performance Parameter  
LRIP - Low Rate Initial Production  
\$M - Millions of Dollars  
MDA - Milestone Decision Authority  
MDAP - Major Defense Acquisition Program  
MILCON - Military Construction  
N/A - Not Applicable  
O&M - Operations and Maintenance  
ORD - Operational Requirements Document  
OSD - Office of the Secretary of Defense  
O&S - Operating and Support  
PAUC - Program Acquisition Unit Cost

PB - President's Budget  
PE - Program Element  
PEO - Program Executive Officer  
PM - Program Manager  
POE - Program Office Estimate  
RDT&E - Research, Development, Test, and Evaluation  
SAR - Selected Acquisition Report  
SCP - Service Cost Position  
TBD - To Be Determined  
TY - Then Year  
UCR - Unit Cost Reporting  
U.S. - United States  
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)  
USD(A&S) - Under Secretary of Defense (Acquisition and Sustainment)

## Program Information

**Program Name**

SSBN 826 COLUMBIA Class Submarine (SSBN 826)

**DoD Component**

Navy

## Responsible Office

CAPT Jonathan Rucker  
1339 Patterson Ave SE  
Building 176  
Washington Navy Yard, DC 20376

[jonathan.rucker@navy.mil](mailto:jonathan.rucker@navy.mil)

**Phone:** 202-781-2582

**Fax:**

**DSN Phone:** 326-2582

**DSN Fax:**

**Date Assigned:** July 12, 2018

## References

### SAR Baseline (Development Estimate)

Under Secretary of Defense (Acquisition, Technology & Logistics) Approved Acquisition Program Baseline (APB) dated January 04, 2017

### Approved APB

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated February 25, 2019

## Mission and Description

The COLUMBIA Class Submarine Program (SSBN 826) will design and construct a replacement for the OHIO Class Fleet Ballistic Missile Submarines (SSBN) which begin retiring in 2027 at a rate of one per year. The program goals are to provide an affordable platform capable of executing the strategic mission while remaining survivable through 2080. The mission of the COLUMBIA Class Submarine is strategic deterrence which will be enabled through the integration and deployment of the TRIDENT II D5 Life Extended Strategic Weapon System (SWS) on a new submarine class that satisfies the Sea Based Strategic Deterrent Initial Capabilities Document and Chief of Naval Operations approved Capabilities Development Document attributes.



## Executive Summary

### Program Highlights Since Last Report

Since the previous submission, the COLUMBIA Class Program has been executing detail design, component development, and construction readiness efforts to support construction start in October 2020. COLUMBIA Class has implemented several Lines of Effort (LOE) to implement Integrated Enterprise Plan (IEP) Initiatives to reduce COLUMBIA Class schedule risk through Design, Construction, Material & Supplier Base, Government Furnished Equipment, Acquisition, and Cost Reduction across the nuclear shipbuilding industrial base enterprise. While risk areas remain with the Industrial Base, Government activities (Naval Foundry and Propeller Center, etc) and recently discovered Missile Tube welding issues, the Program is proactively managing these risks and is confident it will achieve planned COLUMBIA Class Lead Ship design, construction, and delivery schedules.

The Lead Ship schedule remains on track to start construction in October 2020, with design and planning efforts ongoing. Design progress is slightly behind schedule with improving trends, and the Program executes vigilant oversight to continue progress towards 83% design completion at construction start. The Program's focus is on finishing arrangements, and driving disclosure completions to maintain the required rate with high quality. To date, General Dynamics Electric Boat (GDEB) has completed 95% of Arrangements (96% planned), 40% of Design Disclosures (43% planned), and 15% of Work Instructions (14% planned). The Navy and GDEB continue to work towards validating the Integrated Product Development Environment (IPDE) and business process functionality to support design progress. The Technical Authority (TA) portion of the IPDE tool validation is anticipated in May 2019, and the next major Build Authority (BA) software drop is scheduled for March 2019.

Construction readiness efforts are in progress with Advance Construction beginning in FY2018, and procurements for critical Long Lead Time Material (LLTM) that began in FY 2019. The IEP initiatives execute industrial base risk mitigation, procurement and production efficiencies across the Submarine Enterprise, and manpower and facilities planning efforts. COLUMBIA Class currently implements Missile Tube Continuous Production, Advance Construction, Multi-Program Material Procurement (including Production Backup Units), and material ordering to support Shipyard Manufactured Items Continuous Production to realize construction efficiencies and cost savings consistent with authorities provided by 10 USC 2218a: National Sea-Based Deterrence Fund. COLUMBIA continues to conduct Critical Supplier Assessments in FY 2019 to analyze attributes such as capacity limitations, workload efficiencies, first-tier and sub-tier cross dependencies, strategic sourcing, and supplier quality. In FY 2019, the Navy is investing in supplier improvement and facilitation to de-risk COLUMBIA construction schedules by improving the sub-vendor industrial base health. However, the industrial base remains a top program risk. Other construction readiness efforts include prototype construction/advance construction and component development of the Missile Tube Module (MTM), Reactor Compartment Bulkhead (RCB), Propulsor, and Advanced Carbon Dioxide Removal Unit (ACRU). GDEB and Huntington Ingalls Industries Newport News (HII-NNS) are investing in facilities to support the COLUMBIA construction schedule and VIRGINIA Class production requirements.

GDEB identified welding issues on subcontracted Missile Tubes, conducted their initial assessment, and is executing recovery actions. GDEB and the Navy reviewed and re-validated the weld design, and are working to minimize cost and schedule impacts. The updated schedule assessment for the Missile Tube impacts was completed in January 2019. While the recovery plan consumes some schedule margin, 11 months of schedule margin remains in Super Module 3 (the Common Missile Compartment) and no delay to COLUMBIA lead ship delivery is anticipated.

The Program awarded the Integrated Product and Process Development (IPPD) contract in November 2017 to execute COLUMBIA Class Design Completion, Component Development, and Prototype Manufacturing of the MTM and RCB. Subsequent contract modifications in FY 2018 and FY 2019 support Advance Construction, LLTM procurements, and Missile Tube Continuous Production. COLUMBIA is executing a new contracting approach coordinated with GDEB to shorten the traditional proposal/negotiation timeline to award the Block I construction contract in October 2020, which is required to meet the planned delivery schedule. The program is funded, and COLUMBIA continues to aggressively pursue cost reduction efforts through IPPD contract incentives and the Cost Control Management Board (CCMB).

### Government Efforts

- Delivered 450V AC Switchboards to the Compatibility Test Facility (Jan 2018)
- Completed installation of upgraded measurements arrays for Large Scale Vehicle testing at the Naval Surface Warfare Center Carderock Division's Acoustic Research Detachment in Bayview, ID (Feb 2018)
- Held Propulsor Production Readiness Reviews #5-7 in Philadelphia, PA (Jan, May, Oct 2018)
- Completed testing of candidate lead ship propulsor designs at Large Cavitation Channel's Very Large Test Apparatus from Jun – Sep 2018 and completed overall testing in support of FY19 fixed assembly down selection in December 2018
- Prototype Main Propulsion Drives, Prototype Main Propulsion Controllers and alternate motor were delivered and installed at the Compatibility Test Facility (CTF)
- Completed assembly and started qualification of Advanced Carbon Dioxide Removal Unit (Jul 2018)
- Completed first phase of Large Scale Vehicle testing of candidate lead ship propulsor designs (Sep 2018)
- Completed 100% pre-final design review for MILCON P-106 project at the Naval Foundry and propeller Center (Nov 2018)

#### Design Efforts

- Completed bow dome critical feature shock testing (Jul 2018)
- Completed prototype manufacturing and commenced qualification testing of the Ships Service Hydraulic Distribution Check Valve (Sep 2018)
- Started Reverse Osmosis Pressure Reducing Valve efforts including completed Concept Design and started Preliminary design (Sep 2018)
- Conducted semi-annual Program Design and Component Development Reviews (May, Oct 2018)
- Conducted three Program Design and Management Reviews (PDMRs) with Shipbuilders (U.S. and UK) PMS397 Program Manager, SSP, and UK leadership
- Conducted three joint Common Missile Compartment Flag Design Reviews with Shipbuilders (U.S. and UK), PEO, SSP, and UK flag leadership

#### Program and Construction Efforts

- Completed Construction Readiness Review (CRR) for First Article Quad Pack (Jan 2018)
- An Integrated Baseline Review (IBR) for the design portion of the IPPD contract was conducted 14-15 February 2018 at GDEB with a follow-on IBR on the construction efforts completed 11-13 June 2018 at GDEB's Quonset Point facility
- Conducted the IEP LOE-6 (Cost Reduction) Deep Dive (Jun 2018)
- Held a ribbon cutting ceremony at Seemann Composites for the newly constructed 25,600-square-foot building built to produce bow domes for the COLUMBIA Class (Aug 2018)
- Conducted numerous IEP LOE reviews at GDEB, HI-NNS, and the Washington Navy Yard, including LOE 2 (GD-EB Facility Master Plan), LOE 6 (Cost Reduction), LOE 2 (HII-NNS Facility Master Plan), and LOE3 (Material and Supply Base)
- Conducted a Material Readiness Review to support the FY19/20 Advance Procurement/Advance Construction efforts on 11 Sep 2018 at Groton, CT
- LOE 3 IEP Material and Supplier Interim Supplier Assessments (ISAs) held with EB/NNS supplier oversight teams. ISAs

held at W-International, Ranor, BAE, BWXT, Graham, Moog Flo-Tork, Advance Manufacturing, and two Babcock Marine sites (Rosyth & Bristol) (Oct -Dec 2018)

- Held various Manufacturing Assembly Plan (MAP) meetings with EB/NNS. Presented updates to build plan, construction network, watch items, design disclosures, fixtures, facilities plan, material and strategic sourcing plan. Following Phase III reviews held between October-December 2018: Super Module (SM) 1 Weapons and Sail, SM 2 AMR 1, SM 6 S9A/Propulsion Lube Oil (PLO), SM 4 S3B1 & S3B2, SM 5 Joining 6/7/8 and Outfitting, SM6 Motor Propulsion Module, and Communications System Test.
- Conducted an LOE 3 Checkpoint Review between the Navy and GDEB and HII-NNS to review planning and execution of Multi-Program Material Procurement (MPMP) (Oct 2018)
- Delivered the SWS-Ashore missile tube to SWS-Ashore facility at Cape Canaveral, FL (Oct 2018)
- Conducted a LOE 3 strategic sourcing checkpoint review with both Shipbuilders at Newport News, VA (Nov 2018)
- Awarded \$480,601,156 Cost-Plus-Fixed-Fee modification to GDEB to IPPD contract to support FY19-FY20 Lead Ship Advance Procurement / Advance Construction and Long Lead Time Material on 13 September 2018. (Nov 2018)
- HII-NNS vendor factory acceptance testing started for heavy press and die (used for cold forming plate components for stern and bow) (Dec 2018)
- Conducted COLUMBIA pre-construction readiness review with GDEB/NNS on 27 November at Newport News, VA to assess HII-NNS's readiness to begin advance construction in June 2019. Additionally, HII-NNS held monthly COLUMBIA readiness meetings on 11 October, 8 November, and 13 December 2018 with government working level attendance.
- Continued to manufacture U.S. FAQP and loaded U.S. Tubes 7 and 8 into the E Fixture (Dec 2018)

#### Strategic Weapons System Efforts

- Conducted a number of Strategic Weapons System (SWS) Critical Design Reviews including Fire Control System Software, Launcher Subsystem, Test Instrumentation Radio Frequency Set, Navigation Subsystem Delta, and Reentry Body Simulator Assembly (RBSA)
- Completed Surface Launch Test Evaluation Test Launches #11-21 at the Surface Launch Test Facility at NAWC, China Lake, CA (Jan-Sep 2018)
- Completed Surface Launch Test Qualification Launches #1-4 at the Surface Launch Test Facility at NAWC, China Lake, CA (Oct - Dec 2018)
- Structurally completed construction of the Missile Control Center Module at SWS Ashore (Jul 2018)
- Delivered, landed and aligned the COLUMBIA Missile Tube in Test Bay 2 at the SWS Ashore Facility (Dec 2018)

#### Testing Efforts

- Completed Survivability Assessment Report I (SAR-I). SAR-I documents COLUMBIA submarine features relevant to the three components of survivability: susceptibility, vulnerability and recoverability; and documents COLUMBIA's characteristics as compared to the analogous features of OHIO Class SSBN (Jan 2018)
- Completed OT-B1 Modeling and Simulation (M&S) survivability production runs. (Mar 2018)- Completed SWS Navigation Subsystem Software Build 1 Testing (Jun 2018)
- Whole Boat Tabletop Mission Cyber Risk Assessment (TMCRA) #3 completed (May and June 2018)
- Completed the Commander, Operational Test and Evaluation Force (COMOPTEVFOR) Early Operational Assessment (EOA) OT-B1 of the COLUMBIA Class submarine (Oct 2018)

- The Office of Naval Intelligence (ONI) and the Defense Intelligence Agency (DIA) completed and validated the USS COLUMIBA (SSBN 826) Program Validated Online Lifecycle Threat (VOLT) Report (Nov 2018)
- Completed commissioning and qualification testing of the prototype generators, main switchboards and main propulsion drives at the CTF.

#### Sustainment Efforts

- Completed Quick Disconnect Duct Demonstration at TRIDENT Refit Facility in Kings Bay (Feb 2018)

There are no significant software-related issues with this program at this time.

History of Significant Developments Since Program Initiation	
History of Significant Developments Since Program Initiation	
Date	Significant Development Description
July 2008	USD AT&L issues ADM directing entry into the Concept Refinement Phase and conduct of an Analysis of Alternatives.
October 2008	Secretary of Defense sends letter to United Kingdom (UK) Secretary of State for Defense to affirm the U.S.-UK Mutual Defense Agreement and cost sharing for the Common Missile Compartment.
September 2010	SCP approved with new design SSBN based on 12 ships with 16 - 87" missile tubes.
January 2011	Milestone A ADM issued which authorized entry into Technology Maturation and Risk Reduction (TMRR) phase to complete a new design SSBN based on 12 ships with 16 - 87" missile tubes.
February 2012	PB 2013 shifts lead ship construction from FY 2019 to FY 2021; the two year recapitalization delay removed all margin during the OHIO-OHIO Replacement (OR) transition period (FY 2027- FY2042), any delay in OR delivery or unexpected aging impact to OHIO will have significant impacts on SSBN Ao.
December 2012	RDT&E Design Contract issued to General Dynamics – Electric Boat.
December 2014	National Sea-Based Deterrence Fund established by Public Law 113-291.
November 2015	Incremental funding authority and authority to enter in contracts for Advance Construction and economic order quantity provided by Public Law 114-92.
January 2017	Milestone B APB approved (Program Initiation).
September 2017	Award of the Integrated Product and Process Development (IPPD) contract. The Navy has transitioned all design efforts from the OHIO Replacement Research & Development (R&D) Design contract to the IPPD contract.
September 2018	Award of the Two Year Advance Procurement Funding modification to the IPPD contract.
February 2019	APB updated to reflect actual award of IPPD contract (September 2017) and align affordability targets with approved CDD.

## Threshold Breaches

### APB Breaches

<b>Schedule</b>		<input type="checkbox"/>
<b>Performance</b>		<input type="checkbox"/>
<b>Cost</b>	RDT&E	<input type="checkbox"/>
	Procurement	<input type="checkbox"/>
	MILCON	<input type="checkbox"/>
	Acq O&M	<input type="checkbox"/>
<b>O&amp;S Cost</b>		<input type="checkbox"/>
<b>Unit Cost</b>	PAUC	<input type="checkbox"/>
	APUC	<input type="checkbox"/>

### Nunn-McCurdy Breaches

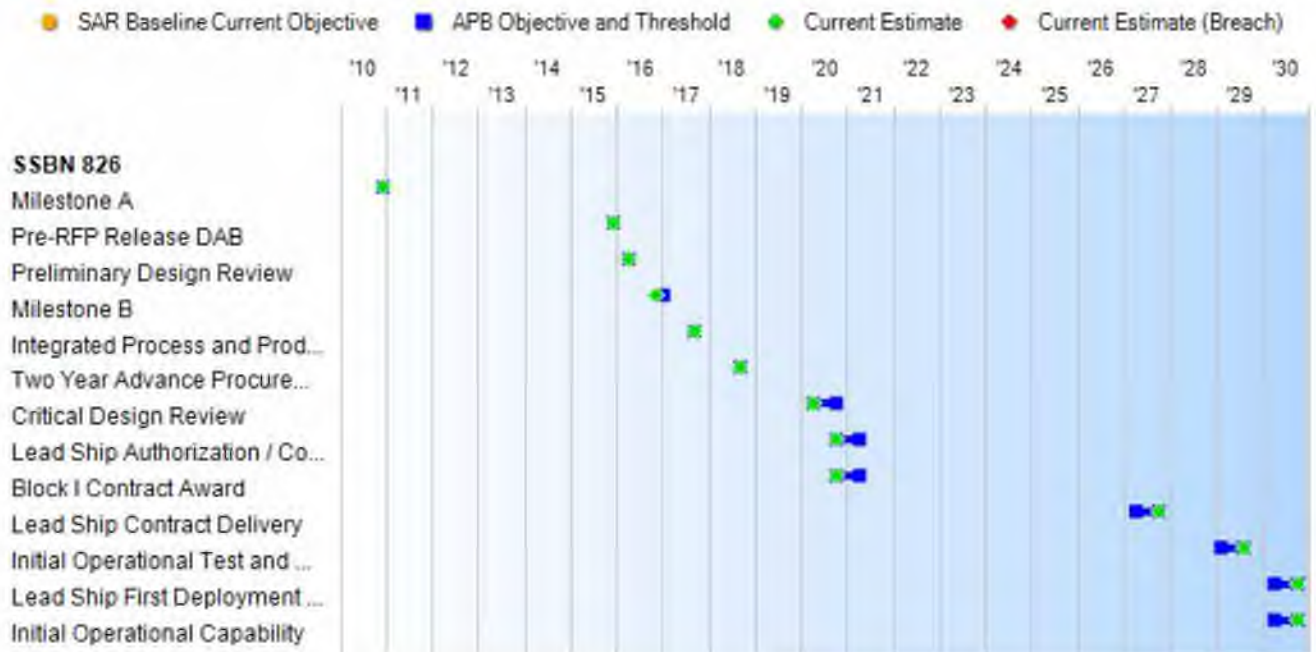
#### Current UCR Baseline

PAUC	None
APUC	None

#### Original UCR Baseline

PAUC	None
APUC	None

### Schedule



Schedule Events				
Events	SAR Baseline Development Estimate	Current APB Development Objective/Threshold	Current Estimate	
Milestone A	Dec 2010	Dec 2010	Dec 2010	Dec 2010
Pre-RFP Release DAB	Dec 2015	Dec 2015	Dec 2015	Dec 2015
Preliminary Design Review	Apr 2016	Apr 2016	Apr 2016	Apr 2016
Milestone B	Nov 2016	Jan 2017	Jan 2017	Nov 2016
Integrated Process and Product Development Contract Award	Jan 2017	Sep 2017	Sep 2017	Sep 2017
Two Year Advance Procurement Funding Modification	Oct 2018	Sep 2018	Sep 2018	Sep 2018 (Ch-1)
Critical Design Review	Apr 2020	Apr 2020	Oct 2020	Apr 2020
Lead Ship Authorization / Construction Start	Oct 2020	Oct 2020	Apr 2021	Oct 2020
Block I Contract Award	Oct 2020	Oct 2020	Apr 2021	Oct 2020
Lead Ship Contract Delivery	Apr 2027	Apr 2027	Oct 2027	Oct 2027
Initial Operational Test and Evaluation Complete	Feb 2029	Feb 2029	Aug 2029	Aug 2029
Lead Ship First Deployment Start	Apr 2030	Apr 2030	Oct 2030	Oct 2030
Initial Operational Capability	Apr 2030	Apr 2030	Oct 2030	Oct 2030

**Change Explanations**

(Ch-1) The current estimate for Two Year Advance Procurement Funding Modification changed from October 2018 to September 2018 to reflect award date of the contract.

**Notes**

## SSBN Hull Delivery / OWLD Dates

826	2027-10 / 2029-10
827	2030-10 / 2032-04
828	2032-07 / 2033-12
829	2033-06 / 2034-10
830	2034-05 / 2035-07
831	2035-04 / 2036-09
832	2036-03 / 2037-05
833	2037-02 / 2038-04
834	2038-01 / 2039-02
835	2039-01 / 2040-02
836	2039-12 / 2041-01
837	2040-12 / 2042-01



## Performance

Performance Characteristics				
SAR Baseline Development Estimate	Current APB Development Objective/Threshold	Demonstrated Performance	Current Estimate	
<b>Operations and Support (O&amp;S) Cost KSA</b>				
Average annual O&S cost per unit of \$96M (CY 2010\$)	Average annual O&S cost per unit of \$119M (CY 2017\$)	Average annual O&S cost per unit of \$131M (CY 2017\$)	TBD	\$120.2M (CY2017\$) (Ch-1)
<b>Net-Ready KPP</b>				
Meet the requirements defined within the OR SSBN PIIT of the Common Submarine Information Support Plan	Meet the requirements defined within the OR SSBN PIIT of the Common Submarine Information Support Plan	(T=O) Meet the requirements defined within the OR SSBN PIIT of the Common Submarine Information Support Plan	TBD	Meet the requirements defined within the OR SSBN PIIT of the Common Submarine Information Support Plan
<b>Training KPP</b>				
OR SSBN crews are capable of being certified proficient for strategic patrol operations by the Group Commander upon completion of the normal PDTP in accordance with Fleet instructions	OR SSBN crews are capable of being certified proficient for strategic patrol operations by the Group Commander upon completion of the normal PDTP in accordance with Fleet instructions	(T=O) OR SSBN crews are capable of being certified proficient for strategic patrol operations by the Group Commander upon completion of the normal PDTP in accordance with Fleet instructions	TBD	OR SSBN crews are capable of being certified proficient for strategic patrol operations by the Group Commander upon completion of the normal PDTP in accordance with Fleet instructions
<b>Space, Weight, Power, and Cooling (SWAP-C) KSA</b>				
Future Growth Margin: 3% of Condition A-1 weight Cooling Capacity: 10% cooling capacity over the chill water design heat load Power – 10% electrical power future growth margin for ship's electrical loads at full power while underway at delivery	Future Growth Margin: 3% of Condition A-1 weight Cooling Capacity: 10% cooling capacity over the chill water design heat load Power – 10% electrical power future growth margin for ship's electrical loads at full power while underway at delivery	(T=O) Future Growth Margin: 3% of Condition A-1 weight Cooling Capacity: 10% cooling capacity over the chill water design heat load Power – 10% electrical power future growth margin for ship's electrical loads at full power while underway at delivery	TBD	Future Growth Margin: 3% of Condition A-1 weight Cooling Capacity: 10% cooling capacity over the chill water design heat load Power – 10% electrical power future growth margin for ship's electrical loads at full power while underway at delivery
<b>Procurement Cost KCP</b>				
Lead Ship End Cost Less Plans of \$6.3B (2010\$) using Navy	APUC of \$7.3B (CY 2017\$)	APUC of \$8.0B (CY 2017\$)	TBD	\$7.18B (CY2017\$) (Ch-2)

Inflation / Deflation Indices Average Follow Ship Hulls 2-12 End Cost of \$4.9B (2010\$) using Navy Inflation / Deflation Indices				
<b>Lead Ship First Deployment Key Schedule Parameter</b>				
Third quarter of FY2030	Third quarter of FY 2030	First quarter of FY 2031	TBD	First quarter of FY 2031

Classified Performance information is provided in the classified annex to this submission.

### Requirements Reference

CDD Revision one for the COLUMBIA Class Submarine dated January 22, 2018

### Change Explanations

(Ch-1) The current estimate for Operations and Support (O&S) Cost KSA changed from \$118.8M to \$120.2M predominantly driven by updates to the Tech Foundation Paper.

(Ch-2) The current estimate for Procurement Cost KCP changed from \$7.25B to \$7.18B due to Initiatives savings and revised escalation assumptions.

### Acronyms and Abbreviations

KCP - Key Cost Parameter

O - Objective

PDTP - Pre-Deployment Training Plan

PIIT - Platform Information Integration Table

T - Threshold

## Track to Budget

**RDT&E**

Appn	BA	PE		
Navy	1319	04	0603561N	
	<b>Project</b>		<b>Name</b>	
	3220		Advanced Submarine System Development	(Sunk)
Navy	1319	04	0603570N	
	<b>Project</b>		<b>Name</b>	
	3219		SBSD Nuclear Technology Development	
Navy	1319	04	0603595N	
	<b>Project</b>		<b>Name</b>	
	3220		COLUMBIA Class Submarine Development	
	3237		Launch Test Facility	(Sunk)

**Procurement**

Appn	BA	PE		
Navy	1611	01	0101221N	
	<b>Line Item</b>		<b>Name</b>	
	1045		COLUMBIA Class Submarine	
Navy	1810	04	0101221N	
	<b>Line Item</b>		<b>Name</b>	
	5358		Strategic Missile Systems Equipment	(Shared)

**MILCON**

Appn	BA	PE		
Navy	1205	01	0703676N	
	<b>Project</b>		<b>Name</b>	
	32414106		Submarine Propulsor Manufacturing Support Facility	(Shared)
Navy	1205	01	0703976N	
	<b>Project</b>		<b>Name</b>	
	32414106		Submarine Propulsor Manufacturing Support Facility	(Shared)
Navy	1205	01	0805376N	
	<b>Project</b>		<b>Name</b>	
	32414547		Ohio Replacement Power and Propulsion Facility	(Sunk)
Navy	1205	01	0805976N	
	<b>Project</b>		<b>Name</b>	
	42237676		Trident Training Facility Phase I	(Shared)

Navy

1205 03 0901211N

Project	Name
---------	------

64482044	MCON Design Funds	(Shared)
----------	-------------------	----------

## Cost and Funding

### Cost Summary

Total Acquisition Cost							
Appropriation	BY 2017 \$M			BY 2017 \$M	TY \$M		
	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate	SAR Baseline Development Estimate	Current APB Development Objective	Current Estimate
RDT&E	12648.1	12648.1	13912.9	12646.7	13020.3	13020.3	13039.4
Procurement	87426.5	87426.5	96169.2	86117.0	115044.3	115044.3	113563.8
Flyaway	--	--	--	84275.3	--	--	111110.9
Recurring	--	--	--	79217.1	--	--	105415.6
Non Recurring	--	--	--	5058.2	--	--	5695.3
Support	--	--	--	1841.7	--	--	2452.9
Other Support	--	--	--	1841.7	--	--	2452.9
Initial Spares	--	--	--	0.0	--	--	0.0
MILCON	147.3	147.3	162.0	156.0	173.4	173.4	186.2
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	100221.9	100221.9	N/A	98919.7	128238.0	128238.0	126789.4

#### Current APB Cost Estimate Reference

SCP dated September 26, 2016

#### Cost Notes

No cost estimate for the program has been completed in the last year.

Total Quantity			
Quantity	SAR Baseline Development Estimate	Current APB Development	Current Estimate
RDT&E		0	0
Procurement		12	12
Total		12	12

## Cost and Funding

### Funding Summary

Appropriation Summary									
FY 2020 President's Budget / December 2018 SAR (TY\$ M)									
Appropriation	Prior	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	To Complete	Total
RDT&E	8934.2	782.0	596.5	412.8	256.4	228.6	241.6	1587.3	13039.4
Procurement	1635.0	3173.4	1698.9	3921.2	4204.0	3879.6	4797.8	90253.9	113563.8
MILCON	28.1	30.2	0.0	1.3	1.3	31.5	1.4	92.4	186.2
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB 2020 Total	10597.3	3985.6	2295.4	4335.3	4461.7	4139.7	5040.8	91933.6	126789.4
PB 2019 Total	10617.4	3775.4	2040.4	4608.6	4463.5	4129.1	5291.8	91948.6	126874.8
Delta	-20.1	210.2	255.0	-273.3	-1.8	10.6	-251.0	-15.0	-85.4

Quantity Summary										
FY 2020 President's Budget / December 2018 SAR (TY\$ M)										
Quantity	Undistributed	Prior	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	To Complete	Total
Development	0	0	0	0	0	0	0	0	0	0
Production	0	0	0	0	1	0	0	1	10	12
PB 2020 Total	0	0	0	0	1	0	0	1	10	12
PB 2019 Total	0	0	0	0	1	0	0	1	10	12
Delta	0	0	0	0	0	0	0	0	0	0

## Cost and Funding

### Annual Funding By Appropriation

Annual Funding							
1319   RDT&E   Research, Development, Test, and Evaluation, Navy							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2008	--	--	--	--	--	--	62.7
2009	--	--	--	--	--	--	140.3
2010	--	--	--	--	--	--	463.5
2011	--	--	--	--	--	--	627.3
2012	--	--	--	--	--	--	957.2
2013	--	--	--	--	--	--	727.4
2014	--	--	--	--	--	--	1125.2
2015	--	--	--	--	--	--	1256.6
2016	--	--	--	--	--	--	1367.0
2017	--	--	--	--	--	--	1071.5
2018	--	--	--	--	--	--	1041.1
2019	--	--	--	--	--	--	732.0
2020	--	--	--	--	--	--	533.1
2021	--	--	--	--	--	--	393.7
2022	--	--	--	--	--	--	256.4
2023	--	--	--	--	--	--	228.6
2024	--	--	--	--	--	--	241.6
2025	--	--	--	--	--	--	238.5
2026	--	--	--	--	--	--	250.9
2027	--	--	--	--	--	--	248.4
2028	--	--	--	--	--	--	245.5
2029	--	--	--	--	--	--	103.1
2030	--	--	--	--	--	--	94.7
2031	--	--	--	--	--	--	76.0
2032	--	--	--	--	--	--	80.1
2033	--	--	--	--	--	--	81.7
2034	--	--	--	--	--	--	83.4
2035	--	--	--	--	--	--	85.0
Subtotal	--	--	--	--	--	--	12812.5

Annual Funding							
1319   RDT&E   Research, Development, Test, and Evaluation, Navy							
Fiscal Year	Quantity	BY 2017 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2008	--	--	--	--	--	--	70.7
2009	--	--	--	--	--	--	156.1
2010	--	--	--	--	--	--	508.1
2011	--	--	--	--	--	--	671.6
2012	--	--	--	--	--	--	1008.1
2013	--	--	--	--	--	--	758.1
2014	--	--	--	--	--	--	1156.1
2015	--	--	--	--	--	--	1275.3
2016	--	--	--	--	--	--	1362.9
2017	--	--	--	--	--	--	1049.1
2018	--	--	--	--	--	--	998.7
2019	--	--	--	--	--	--	688.4
2020	--	--	--	--	--	--	491.5
2021	--	--	--	--	--	--	355.9
2022	--	--	--	--	--	--	227.2
2023	--	--	--	--	--	--	198.6
2024	--	--	--	--	--	--	205.8
2025	--	--	--	--	--	--	199.2
2026	--	--	--	--	--	--	205.4
2027	--	--	--	--	--	--	199.4
2028	--	--	--	--	--	--	193.2
2029	--	--	--	--	--	--	79.5
2030	--	--	--	--	--	--	71.6
2031	--	--	--	--	--	--	56.4
2032	--	--	--	--	--	--	58.2
2033	--	--	--	--	--	--	58.2
2034	--	--	--	--	--	--	58.3
2035	--	--	--	--	--	--	58.2
Subtotal	--	--	--	--	--	--	12419.8



Annual Funding 9999   RDT&E   Non Treasury Funds							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2017	--	--	--	--	--	--	44.8
2018	--	--	--	--	--	--	49.6
2019	--	--	--	--	--	--	50.0
2020	--	--	--	--	--	--	63.4
2021	--	--	--	--	--	--	19.1
Subtotal	--	--	--	--	--	--	226.9

Annual Funding 9999   RDT&E   Non Treasury Funds							
Fiscal Year	Quantity	BY 2017 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2017	--	--	--	--	--	--	44.8
2018	--	--	--	--	--	--	49.6
2019	--	--	--	--	--	--	50.0
2020	--	--	--	--	--	--	63.4
2021	--	--	--	--	--	--	19.1
Subtotal	--	--	--	--	--	--	226.9

Annual Funding 1611   Procurement   Shipbuilding and Conversion, Navy							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2017	--	13.6	--	759.5	773.1	--	773.1
2018	--	120.5	--	741.4	861.9	--	861.9
2019	--	2417.4	--	756.0	3173.4	--	3173.4
2020	--	953.3	--	745.6	1698.9	--	1698.9
2021	1	3065.5	--	855.7	3921.2	--	3921.2
2022	--	3159.1	--	1036.9	4196.0	--	4196.0
2023	--	3071.3	--	800.2	3871.5	--	3871.5
2024	1	4789.5	--	--	4789.5	--	4789.5
2025	--	5981.9	--	--	5981.9	29.7	6011.6
2026	1	8361.1	--	--	8361.1	10.9	8372.0
2027	1	8318.1	--	--	8318.1	46.0	8364.1
2028	1	8300.6	--	--	8300.6	10.0	8310.6
2029	1	8479.3	--	--	8479.3	45.4	8524.7
2030	1	8695.7	--	--	8695.7	33.1	8728.8
2031	1	8695.7	--	--	8695.7	51.9	8747.6
2032	1	8836.2	--	--	8836.2	49.7	8885.9
2033	1	7758.5	--	--	7758.5	51.9	7810.4
2034	1	6916.3	--	--	6916.3	52.0	6968.3
2035	1	6311.0	--	--	6311.0	52.2	6363.2
2036	--	181.2	--	--	181.2	52.7	233.9
2037	--	190.2	--	--	190.2	53.3	243.5
2038	--	209.3	--	--	209.3	53.6	262.9
2039	--	237.9	--	--	237.9	29.2	267.1
2040	--	100.5	--	--	100.5	20.8	121.3
2041	--	78.0	--	--	78.0	2.9	80.9
2042	--	173.9	--	--	173.9	2.3	176.2
Subtotal	12	105415.6	--	5695.3	111110.9	647.6	111758.5

Annual Funding 1611   Procurement   Shipbuilding and Conversion, Navy							
Fiscal Year	Quantity	BY 2017 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2017	--	12.8	--	717.4	730.2	--	730.2
2018	--	111.6	--	686.4	798.0	--	798.0
2019	--	2194.3	--	686.3	2880.6	--	2880.6
2020	--	848.4	--	663.5	1511.9	--	1511.9
2021	1	2674.6	--	746.6	3421.2	--	3421.2
2022	--	2702.2	--	887.0	3589.2	--	3589.2
2023	--	2575.6	--	671.0	3246.6	--	3246.6
2024	1	3937.7	--	--	3937.7	--	3937.7
2025	--	4821.6	--	--	4821.6	24.0	4845.6
2026	1	6607.2	--	--	6607.2	8.6	6615.8
2027	1	6444.4	--	--	6444.4	35.6	6480.0
2028	1	6304.7	--	--	6304.7	7.6	6312.3
2029	1	6314.2	--	--	6314.2	33.8	6348.0
2030	1	6348.3	--	--	6348.3	24.2	6372.5
2031	1	6223.8	--	--	6223.8	37.2	6261.0
2032	1	6200.4	--	--	6200.4	34.9	6235.3
2033	1	5337.4	--	--	5337.4	35.7	5373.1
2034	1	4664.7	--	--	4664.7	35.1	4699.8
2035	1	4173.0	--	--	4173.0	34.6	4207.6
2036	--	117.5	--	--	117.5	34.1	151.6
2037	--	120.9	--	--	120.9	33.9	154.8
2038	--	130.4	--	--	130.4	33.4	163.8
2039	--	145.3	--	--	145.3	17.9	163.2
2040	--	60.2	--	--	60.2	12.4	72.6
2041	--	45.8	--	--	45.8	1.7	47.5
2042	--	100.1	--	--	100.1	1.3	101.4
Subtotal	12	79217.1	--	5058.2	84275.3	446.0	84721.3

FY 2021 represents initial incremental funding of the COLUMBIA Class Submarine Lead Ship and assumes incremental funding of the first hull over FY 2021, FY 2022, FY 2023. Total end cost for the Lead ship is \$14.087B TY including plans.

Cost Quantity Information		
1611   Procurement   Shipbuilding and Conversion, Navy		
Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned With Quantity) BY 2017 \$M
2017	--	--
2018	--	--
2019	--	--
2020	--	--
2021	1	7535.4
2022	--	--
2023	--	--
2024	1	7456.6
2025	--	--
2026	1	6895.8
2027	1	6657.2
2028	1	6468.0
2029	1	6415.4
2030	1	6355.7
2031	1	6299.0
2032	1	6254.9
2033	1	6245.1
2034	1	6283.0
2035	1	6351.0
2036	--	--
2037	--	--
2038	--	--
2039	--	--
2040	--	--
2041	--	--
2042	--	--
Subtotal	12	79217.1

Annual Funding							
1810   Procurement   Other Procurement, Navy							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2022	--	--	--	--	--	8.0	8.0
2023	--	--	--	--	--	8.1	8.1
2024	--	--	--	--	--	8.3	8.3
2025	--	--	--	--	--	251.9	251.9
2026	--	--	--	--	--	320.0	320.0
2027	--	--	--	--	--	27.6	27.6
2028	--	--	--	--	--	280.3	280.3
2029	--	--	--	--	--	489.9	489.9
2030	--	--	--	--	--	84.2	84.2
2031	--	--	--	--	--	--	--
2032	--	--	--	--	--	--	--
2033	--	--	--	--	--	162.1	162.1
2034	--	--	--	--	--	164.9	164.9
Subtotal	--	--	--	--	--	1805.3	1805.3

Annual Funding 1810   Procurement   Other Procurement, Navy							
Fiscal Year	Quantity	BY 2017 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2022	--	--	--	--	--	7.0	7.0
2023	--	--	--	--	--	7.0	7.0
2024	--	--	--	--	--	7.0	7.0
2025	--	--	--	--	--	208.4	208.4
2026	--	--	--	--	--	259.6	259.6
2027	--	--	--	--	--	21.9	21.9
2028	--	--	--	--	--	218.5	218.5
2029	--	--	--	--	--	374.5	374.5
2030	--	--	--	--	--	63.1	63.1
2031	--	--	--	--	--	--	--
2032	--	--	--	--	--	--	--
2033	--	--	--	--	--	114.5	114.5
2034	--	--	--	--	--	114.2	114.2
Subtotal	--	--	--	--	--	1395.7	1395.7

Annual Funding 1205   MILCON   Military Construction, Navy and Marine Corps		
Fiscal Year	TY \$M	
	Total Program	
2015	24.3	
2016	--	
2017	1.4	
2018	2.4	
2019	30.2	
2020	--	
2021	1.3	
2022	1.3	
2023	31.5	
2024	1.4	
2025	4.4	
2026	61.1	
2027	1.4	
2028	25.5	
Subtotal		186.2



Annual Funding 1205   MILCON   Military Construction, Navy and Marine Corps		
Fiscal Year	BY 2017 \$M	
	Total Program	
2015		23.7
2016		--
2017		1.3
2018		2.2
2019		27.3
2020		--
2021		1.1
2022		1.1
2023		26.3
2024		1.1
2025		3.5
2026		48.0
2027		1.1
2028		19.3
Subtotal		156.0

Funding profile represents COLUMBIA Class Milestone B APB with the updates from PB 2020 controls, including Naval Foundry and Propeller Center requirements.

## Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
<b>Approval Date</b>	1/4/2017	1/4/2017
<b>Approved Quantity</b>	12	12
<b>Reference</b>	Milestone B ADM	Milestone B ADM
<b>Start Year</b>	2021	2021
<b>End Year</b>	2035	2035

The Current Total LRIP Quantity is more than 10% of the total production quantity in accordance with the Milestone B ADM approved January 4, 2017, which approved a LRIP quantity of 12, which is the total buy necessary due to the earliest date at which Operational Test and Evaluation could be conducted on the lead ship.

## Foreign Military Sales

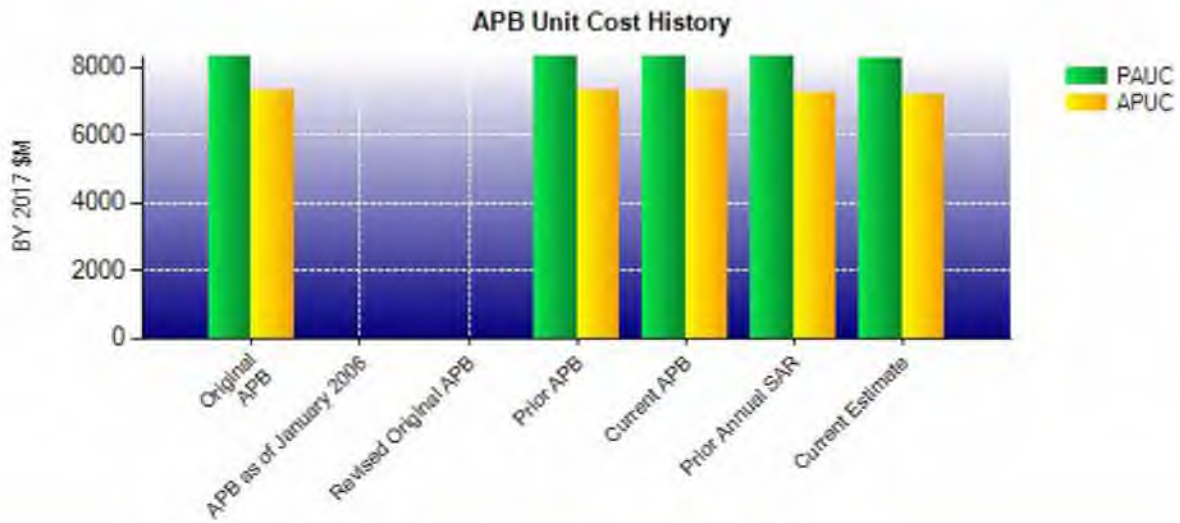
None

## Nuclear Costs

\$18,785.9 TY\$M. These costs are for reactor propulsion plant equipment. These costs are included in the Shipbuilding and Conversion, Navy costs in this report. Department of Energy costs are excluded from this report.

**Unit Cost**

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 \$M	BY 2017 \$M	% Change
	Current UCR Baseline (Feb 2019 APB)	Current Estimate (Dec 2018 SAR)	
<b>Program Acquisition Unit Cost</b>			
Cost	100221.9	98919.7	
Quantity	12	12	
Unit Cost	8351.825	8243.308	-1.30
<b>Average Procurement Unit Cost</b>			
Cost	87426.5	86117.0	
Quantity	12	12	
Unit Cost	7285.542	7176.417	-1.50
Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 \$M	BY 2017 \$M	% Change
	Original UCR Baseline (Jan 2017 APB)	Current Estimate (Dec 2018 SAR)	
<b>Program Acquisition Unit Cost</b>			
Cost	100221.9	98919.7	
Quantity	12	12	
Unit Cost	8351.825	8243.308	-1.30
<b>Average Procurement Unit Cost</b>			
Cost	87426.5	86117.0	
Quantity	12	12	
Unit Cost	7285.542	7176.417	-1.50



APB Unit Cost History					
Item	Date	BY 2017 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	Jan 2017	8351.825	7285.542	10686.500	9587.025
APB as of January 2006	N/A	N/A	N/A	N/A	N/A
Revised Original APB	N/A	N/A	N/A	N/A	N/A
Prior APB	Jan 2017	8351.825	7285.542	10686.500	9587.025
Current APB	Feb 2019	8351.825	7285.542	10686.500	9587.025
Prior Annual SAR	Dec 2017	8320.183	7251.558	10572.900	9472.300
Current Estimate	Dec 2018	8243.308	7176.417	10565.783	9463.650

**SAR Unit Cost History**

Current SAR Baseline to Current Estimate (TY \$M)									
PAUC Development Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
10686.500	58.075	0.000	0.000	0.000	-177.984	0.000	-0.808	-120.717	10565.783

Current SAR Baseline to Current Estimate (TY \$M)									
Initial APUC Development Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
9587.025	55.208	0.000	0.000	0.000	-177.775	0.000	-0.808	-123.375	9463.650

SAR Baseline History				
Item	SAR Planning Estimate	SAR Development Estimate	SAR Production Estimate	Current Estimate
Milestone A	N/A	Dec 2010	N/A	Dec 2010
Milestone B	N/A	Nov 2016	N/A	Nov 2016
Milestone C	N/A	N/A	N/A	N/A
IOC	N/A	Apr 2030	N/A	Oct 2030
Total Cost (TY \$M)	N/A	128238.0	N/A	126789.4
Total Quantity	N/A	12	N/A	12
PAUC	N/A	10686.500	N/A	10565.783

**Cost Variance**

Summary TY \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Development Estimate)	13020.3	115044.3	173.4	128238.0
Previous Changes				
Economic	-12.4	-456.5	+0.5	-468.4
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	+12.4	-934.3	+13.0	-908.9
Other	--	--	--	--
Support	--	+14.1	--	+14.1
Subtotal	--	-1376.7	+13.5	-1363.2
Current Changes				
Economic	+44.7	+1119.0	+1.6	+1165.3
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	-25.6	-1199.0	-2.3	-1226.9
Other	--	--	--	--
Support	--	-23.8	--	-23.8
Subtotal	+19.1	-103.8	-0.7	-85.4
Total Changes	+19.1	-1480.5	+12.8	-1448.6
CE - Cost Variance	13039.4	113563.8	186.2	126789.4
CE - Cost & Funding	13039.4	113563.8	186.2	126789.4



Summary BY 2017 \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Development Estimate)	12648.1	87426.5	147.3	100221.9
Previous Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	+17.7	-418.5	+10.4	-390.4
Other	--	--	--	--
Support	--	+10.7	--	+10.7
Subtotal	+17.7	-407.8	+10.4	-379.7
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	-19.1	-879.5	-1.7	-900.3
Other	--	--	--	--
Support	--	-22.2	--	-22.2
Subtotal	-19.1	-901.7	-1.7	-922.5
Total Changes	-1.4	-1309.5	+8.7	-1302.2
CE - Cost Variance	12646.7	86117.0	156.0	98919.7
CE - Cost & Funding	12646.7	86117.0	156.0	98919.7

Previous Estimate: December 2017

RDT&E	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+44.7
Adjustment for current and prior escalation. (Estimating)	-17.7	-18.4
Revised estimate reflects updated Naval Foundry & Propeller Center requirements and Advance Materials Propeller requirements. (Estimating)	+25.4	+27.0
Revised estimate reflects updated COLUMBIA Class requirements. (Estimating)	-20.3	-26.2
Revised estimate reflects updated Department-wide adjustment. (Estimating)	-3.3	-0.6
Revised estimate to reflect application of new outyear escalation indices. (Estimating)	-22.1	-26.3
Revised estimated to reflect updated UK funding requirements. (Estimating)	+18.9	+18.9
<b>RDT&amp;E Subtotal</b>	<b>-19.1</b>	<b>+19.1</b>

Procurement	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+1119.0
Adjustment for current and prior escalation. (Estimating)	-40.1	-43.7
Revised estimate and funds realignment for COLUMBIA Class Integrated Enterprise Plan construction efficiencies. (Estimating)	-88.3	-161.6
Revised estimate for updated Critical Prototype testing requirements. (Estimating)	+48.1	+54.1
Revised estimate for Industrial Base Supplier Development requirements. (Estimating)	+149.7	+166.1
Revised estimate for Department of Navy budgetary impacts. (Estimating)	-111.3	-127.3
Additional of PB2018 Naval Foundry & Propeller Center funds. (Estimating)	+17.6	+19.0
Revised estimate for updated COLUMBIA Class Program Requirements. (Estimating)	-65.6	-54.2
Revised estimate to incorporate updated escalation assumptions. (Estimating)	-789.6	-1051.4
Decrease in Other Support (Navy). (Support)	-4.4	-6.2
Decrease in Other Support (Navy). (Support)	-17.8	-17.6
<b>Procurement Subtotal</b>	<b>-901.7</b>	<b>-103.8</b>

MILCON	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+1.6
Adjustment for current and prior escalation. (Estimating)	-0.4	-0.4
Revised estimate for updated COLUMBIA Class requirements. (Estimating)	-0.3	-0.7
Revised estimate to reflect application of new outyear indices. (Estimating)	-1.0	-1.2
<b>MILCON Subtotal</b>	<b>-1.7</b>	<b>-0.7</b>

~~(U//FOUO)~~ Contracts

**Contract Identification**

**Appropriation:** RDT&E  
**Contract Name:** CLIN 1000 COLUMBIA CLASS Design Completion  
**Contractor:** General Dynamics  
**Contractor Location:** 75 Eastern Point Road  
 Groton, CT 06340  
**Contract Number:** N00024-17-C-2117/1  
**Contract Type:** Cost Plus Incentive Fee (CPIF)  
**Award Date:** September 21, 2017  
**Definitization Date:** October 01, 2017

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
3028.9	N/A	0	3028.9	N/A	1	3028.9	3028.9

<del>(U//FOUO)</del> Contract Variance		
Item	Cost Variance	Schedule Variance
(b)(4)		

~~(U//FOUO)~~ Cost and Schedule Variance Explanations

(b)(4)
--------

**Contract Identification**

**Appropriation:** RDT&E  
**Contract Name:** IPPD MTM and Reactor Compartment Bulkhead Prototype Manufacturing  
**Contractor:** General Dynamics  
**Contractor Location:** 75 Eastern Point Rd  
 Groton, CT 06340  
**Contract Number:** N00024-17-C-2117/2  
**Contract Type:** Cost Plus Fixed Fee (CPFF)  
**Award Date:** September 21, 2017  
**Definitization Date:** September 21, 2017

**Contract Price**

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
391.2	N/A	N/A	871.8	N/A	N/A		871.8

**Target Price Change Explanation**

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to Current Price reflects planned Level of Effort (LOE) CLIN 1100 modification on September 13, 2018, that added scope for Lead Ship Advance Construction efforts. The total price increased by \$480.60M. Future modifications will add scope for Lead Ship Advance Construction efforts.

**Cost and Schedule Variance Explanations**

Cost and Schedule Variance reporting is not required on this (CPFF) contract.

**Notes**

This contract is funded with both RDT&E, Navy and Shipbuilding and Conversion, Navy appropriations. EVM is not reported on CPFF LOE CLINs.

**Contract Identification**

**Appropriation:** RDT&E  
**Contract Name:** IPPD COLUMBIA Component Development and DFA  
**Contractor:** General Dynamics  
**Contractor Location:** 75 Eastern Point Rd  
 Groton, CT 06340  
**Contract Number:** N00024-17-C-2117/3  
**Contract Type:** Cost Plus Fixed Fee (CPFF)  
**Award Date:** September 21, 2017  
**Definitization Date:** September 21, 2017

**Contract Price**

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
682.7	N/A	N/A	682.7	N/A	N/A		682.7

**Cost and Schedule Variance Explanations**

Cost and Schedule Variance reporting is not required on this (CPFF) contract.

**Notes**

This contract is funded with both RDT&E, Navy and Shipbuilding and Conversion, Navy appropriations. EVM is not reported on CPFF LOE CLINs.

## Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	0	--
Production	0	0	12	0.00%
Total Program Quantity Delivered	0	0	12	0.00%

Expended and Appropriated (TY \$M)			
Total Acquisition Cost	126789.4	Years Appropriated	12
Expended to Date	10062.2	Percent Years Appropriated	34.29%
Percent Expended	7.94%	Appropriated to Date	14582.9
Total Funding Years	35	Percent Appropriated	11.50%

The above data is current as of March 11, 2019.

## Operating and Support Cost

### Cost Estimate Details

<b>Date of Estimate:</b>	September 26, 2016
<b>Source of Estimate:</b>	SCP
<b>Quantity to Sustain:</b>	12
<b>Unit of Measure:</b>	Ship
<b>Service Life per Unit:</b>	42.50 Years
<b>Fiscal Years in Service:</b>	FY 2031 - FY 2084

### Sustainment Strategy

The SSBN 826 COLUMBIA Class Submarine will operate with two crews (Blue/Gold) in two oceans under current strategic presence requirements from existing bases in Bangor, WA and Kings Bay, GA. The COLUMBIA Class Submarine SSBN will have an approximately 42.5-year service life from delivery to retirement, with the following life cycle as described below:

- Sea Trials that include Alpha/Bravo Trials and Board of Inspection and Survey
- Operational and Development test period (lead ship only)
- Two operating cycles during which the ship will conduct about 124 operating intervals
- Two Extended Refit Periods (ERPs) of about 6 months at its one-quarter and three quarter periods of life
- An extended shipyard maintenance period not to exceed 24 months at mid-life, consisting of 16 months for Engineered Overhaul (EOH) and 7 months for weapons handling operations and crew certification

Each 112 day operating interval includes:

- 77-day patrol
- 35-day refit and resupply period consisting of 22 days for refit production

Approximately every fourth refit and resupply period will be 50 days in duration including 35 days of refit production and dry-docking. The patrol period following a dry-docking refit will normally be shortened to keep the overall operating interval to about 112 days. All availabilities including ERPs will be conducted at the respective homeport and EOH will be conducted at either Norfolk Naval Shipyard (NNSY) or Puget Sound Naval Shipyard (PSNSY). Additionally, COLUMBIA will leverage OHIO existing infrastructure to the maximum extent possible.

Achieving this life cycle is the foundation of the product support model for the COLUMBIA Class Submarine Program and all support elements must be aligned to support the life cycle as described. The COLUMBIA Class Submarine life cycle is essentially the same as the current OHIO Class SSBN life cycle with the exception of the mid-life overhaul which will be shorter for COLUMBIA Class Submarines because refueling will not be required. The support model needed for the SSBN life cycle is well understood and being exercised today in support of the OHIO Class. The design of COLUMBIA Class Submarine and its product support strategy must be capable of meeting this life cycle in order to meet its availability requirements.

### Antecedent Information

The Antecedent System is the SSBN 726 OHIO Class Submarine. The ship's O&S estimate is based on a Blue/Gold

manning philosophy analogous to the OHIO Class manning structure, current maintenance and modernization requirements, and historical submarine data. There are currently 14 OHIO Class Submarines.

Annual O&S Costs BY2017 \$M		
Cost Element	SSBN 826 Average Annual Cost Per Ship	SSBN 726 (Antecedent) Average Annual Cost Per Ship
Unit-Level Manpower	29.631	30.843
Unit Operations	2.116	1.826
Maintenance	32.665	35.829
Sustaining Support	5.512	4.598
Continuing System Improvements	31.424	22.518
Indirect Support	15.678	16.010
Other	--	--
<b>Total</b>	<b>117.026</b>	<b>111.624</b>

O&S costs reflect revised requirements from updated 2018 analysis.

Item	Total O&S Cost \$M			
	SSBN 826		SSBN 726 (Antecedent)	
	Current Development APB Objective/Threshold	Current Estimate		
<b>Base Year</b>	60574.4	66631.8	61290.6	66416.0
<b>Then Year</b>	138910.5	N/A	141518.0	N/A

Disposal Cost is included in the Operating and Support Cost of the current APB objective and threshold for this program.

#### Equation to Translate Annual Cost to Total Cost

Total Ship O&S = unitized cost \* number of ships \* service life per ship

Total Ship O&S = \$120.0M/ship/year \* 12 ships \* 42.5 years = \$61,290.6 CY17\$M (includes Disposal and USNS Waters Operation and Replacement).

O&S Cost Variance		
Category	BY 2017 \$M	Change Explanations
Prior SAR Total O&S Estimates - Dec 2017 SAR	58970.7	
Programmatic/Planning Factors	712.9	Updates to Technical Foundation Paper.
Cost Estimating Methodology	0.0	
Cost Data Update	0.0	
Labor Rate	0.0	
Energy Rate	0.0	
Technical Input	0.0	
Other	1607.0	Reflects inclusion of Disposal costs.
<b>Total Changes</b>	<b>2319.9</b>	
Current Estimate	61290.6	



**Disposal Estimate Details**

Date of Estimate:	December 01, 2018
Source of Estimate:	Current Estimate
Disposal/Demilitarization Total Cost (BY 2017 \$M):	1607.0