Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-390

CH-53K King Stallion (CH-53K)

As of FY 2020 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

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Sensitivity Originator

No originator information is available at this time.

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
CH-53K King Stallion (CH-53K)

DoD Component
Navy

Responsible Office

Col Jack Perrin
PMA-261 Heavy Lift Helicopters
Program Executive Office - Air, Anti-Submarine Warfare, Assault & Special Mission Programs
48187 Standley Road, Bldg 4010
Patuxent River, MD 20670-1547

Phone: 301-757-5780
Fax: 301-757-5109
DSN Phone: 757-5780
DSN Fax: 757-5109
Date Assigned: July 12, 2018

jack.d.perrin@navy.mil

References

SAR Baseline (Production Estimate)

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated April 4, 2017

Approved APB

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated April 4, 2017

Mission and Description

The CH-53K Heavy Lift Replacement Helicopter (CH-53K) program mission is to generate and support a robust United States Marine Corps heavy-lift capability. The primary mission is vertical heavy lift**.** The Program includes improvements in lift and range capabilities, commonality, reliability, maintainability, interoperability, ship integration, survivability, and force protection. The CH-53K helicopter will be a replacement for the CH-53E.

Executive Summary

Program Highlights Since Last Report

The program awarded a Lot 2 Advanced Acquisition Contract (AAC) in February 2018 and a Lot 3 Spares contract in September 2018.

The test program successfully completed hover testing with the Joint Light Tactical Vehicle (JLTV), C-17 and C-5 load certifications, aerial refueling wake survey, high density altitude testing and hot ambient temperature and Degraded Visual Environment (DVE) testing.

Currently, four Engineering Development Model (EDM) and two System Demonstration Test Article (SDTA) aircraft are in developmental flight test at NAS Patuxent River, Maryland with a third SDTA conducting integrated logistics test at MCAS New River, North Carolina. The effort at MCAS New River is a supportability test and evaluation Logistics Demonstration (LOGDEMO) event that will exercise the supportability established for the CH-53K and identify issues early in the program.

Requirements are stable; however, technical issues during the developmental test program have resulted in a lower test event execution rate than planned, impacting test execution, program schedule, and cost. On January 4, 2019, the program submitted a Program Deviation Report (PDR) to the MDA for a breach to the APB schedule milestones. Additionally, in January, the Department of Navy submitted an Above Threshold Reprogramming (ATR) request of $158M to Congress to enable delivery of a deployable IOC configuration. The ATR funding maintains staffing levels and bridges funding to FY2020, in order to execute engineering design work for correction of deficiencies, resolution of technical issues and continuation of developmental flight test. On March 1, 2019, an Acquisition Decision Memorandum (ADM) was approved for a program restructure plan which prioritizes System Development and Demonstration (SDD) activities, provides a deployable configuration in a timely manner and within available budgetary resources, to include the ATR, in support of IOC. A new Joint Integrated SDD Program Schedule to IOC has been developed, validated and baselined for program execution, however, is dependent on ATR approval. The APB will be updated with new schedule milestones based upon the outcome of the requested FY2019 ATR.

Resolution of remaining technical issues and completion of airworthiness certification testing remain top priorities for planned entry into IOT&E. The program is currently tracking 126 open issues required to support a deployable configuration. The planned design completion for these technical issues is anticipated by 2nd quarter of CY2020, with the majority of the designs completed within CY2019. Examples of the top technical issues include Engine Gas Re-ingestion (EGR), Main Gearbox Pinion spall, Tail Rotor Flexbeam life, Damper high temperature and pressure spiking, Intermediate Ground Mode control, Brake Caliper temperatures and Master Cylinder design. The Flight Test Plan has been re-sequenced and prioritized to address EGR and related issues, validate correction of other technical deficiencies and expand flight envelope to meet Fleet deployment in FY2024.

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**
September 2003	Analysis of Alternatives completed, resulting in decision to initiate a Heavy Lift Replacement program
December 2004	JROC approved CH-53K ORD.
October 2005	The Heavy Lift Replacement (HLR) program completed a Milestone B Defense Acquisition Board (DAB).
December 2005	USD(AT&L) signed the Milestone B ADM for entry into System Development and Demonstration (SDD).
January 2006	SDD contract awarded to Sikorsky for the CH-53K
July 2010	The CH-53K program conducted the Critical Design Review.
June 2011	The Assistant Secretary of Defense for Research and Engineering completed a Post-CDR Assessment, determining the program situated to enter Systems Capability and Manufacturing Process Demonstration.
April 2013	Updated APB approved, based on an updated Program Life Cycle Cost Estimate (PLCCE) and January 2013 SCP.
May 2013	Contract awarded for 4 System Developmental Test Article (SDTA) aircraft. Beginning with this effort, the CH-53K program began procuring GE-38 (T-408) engines directly from General Electric Aviation.
October 2015	First flight completed on EMD aircraft.
April 2016	LRIP Lot 1 Advanced Acquisition Contract (AAC) awarded.
August 2016	Four EMD aircraft in flight test.
September 2016	Contract awarded for two additional SDTA aircraft to demonstrate that manufacturing processes are both mature and under control.
October 2016	Program successfully completed an initial Operational Assessment (OT-B1) in West Palm Beach, Florida.
January 2017	Letter of Request for Pricing and Availability received from Israel.
April 2017	USD (AT&L) signed the Milestone C ADM authorizing procurement of up to 26 aircraft. APB update approved.
May 2017	LRIP Lot 2 AAC awarded.
July 2017	Letter of Offer and Acceptance issued to Germany for potential Direct Commercial Sales.
August 2017	LRIP Lot 1 contract awarded for 2 aircraft.
November 2017	CH-53K Program was re-designated from an ACAT 1D to ACAT 1C Program.
January 2019	A program deviation was reported for a breach to APB Schedule milestones for TECHEVAL Complete, IOT&E (OPEVAL) Complete, IOC and FRP Decision Review as a result of inefficiencies in test event accomplishment, technical discoveries in test, and completion of design solutions and correction of deficiencies.
March 2019	ASN(RDA) signed an ADM approving a proposed program restructure as a result of technical issues during the developmental test program thathave resulted in a lower test event execution rate than planned, impacting test execution, program schedule, and cost. The plan prioritizes System Development and Demonstration activities, provides a deployable configuration in a timely manner and within available budgetary resources in support of IOC.

Threshold Breaches

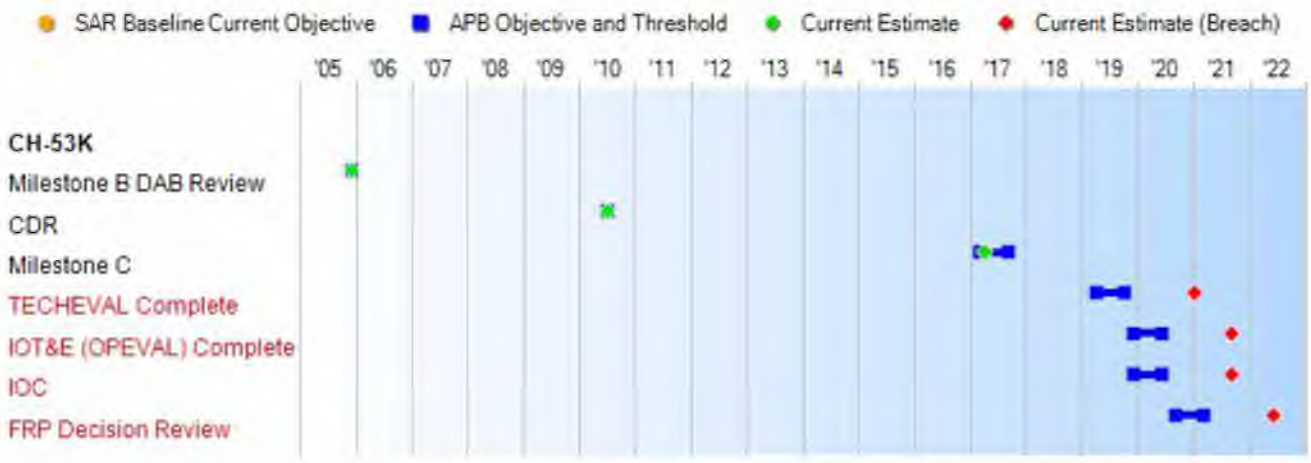
APB Breaches		
Schedule		☑
Performance		☐
Cost	RDT&E	☐
	Procurement	☐
	MILCON	☐
	Acq O&M	☐
O&S Cost		☐
Unit Cost	PAUC	☐
	APUC	☐

Nunn-McCurdy Breaches		
Current UCR Baseline		
	PAUC	None
	APUC	None
Original UCR Baseline		
	PAUC	None
	APUC	None

Explanation of Breach

Technical issues during the developmental test program have resulted in a lower test event execution rate than planned, impacting test execution, program schedule, and cost resulting in an APB schedule breach. On January 4, 2019, the CH-53K program submitted a Program Deviation Report (PDR) to the MDA.

Schedule



Schedule Events					
Events	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate	
Milestone B DAB Review	Dec 2005	Dec 2005	Dec 2005	Dec 2005	
CDR	Jul 2010	Jul 2010	Jul 2010	Jul 2010	
Milestone C	Mar 2017	Mar 2017	Sep 2017	Apr 2017	
TECHEVAL Complete	Apr 2019	Apr 2019	Oct 2019	**Jan 2021**[1]	(Ch-1)
IOT&E (OPEVAL) Complete	Dec 2019	Dec 2019	Jun 2020	**Sep 2021**[1]	(Ch-1)
IOC	Dec 2019	Dec 2019	Jun 2020	**Sep 2021**[1]	(Ch-1)
FRP Decision Review	Sep 2020	Sep 2020	Mar 2021	**Jun 2022**[1]	(Ch-1)

[1] *APB Breach*

Change Explanations

(Ch-1) The TECHEVAL Complete, IOT&E (OPEVAL) Complete, IOC and FRP Decision Review current estimate have changes due to inefficiencies in test event accomplishments, technical discovery in test, and completion of design solution and correction of deficiencies, which have resulted in a breach to the APB Schedule. TECHEVAL Complete changed from Oct 2019 to Jan 2021, IOT&E (OPEVAL) Completed changed from Jun 2020 to Sep 2021, IOC changed from Jun 2020 to Sep 2021, and FRP Decision Review changed from Sep 2020 to Jun 2022. These dates are tentative pending approval of the proposed Above Threshold Reprogramming request and the planned APB update.

Acronyms and Abbreviations

CDR - Critical Design Review
IOT&E - Initial Operational Test and Evaluation. Used interchangeably with Operational Evaluation (OPEVAL).
OPEVAL - Operational Evaluation. Used interchangeably with Initial Operational Test and Evaluation (IOT&E).
TECHEVAL - Technical Evaluation

Performance

Performance Characteristics				
SAR Baseline Production Estimate	**Current APB Production Objective/Threshold**		**Demonstrated Performance**	**Current Estimate**
Net Ready (NR)				
Satisfy 100% of NR reqts in JIA	Satisfy 100% of NR reqts in JIA	Satisfy 100% of NR reqts designated as enterprise-level or critical in JIA	TBD	Satisfy 100% of NR reqts in JIA
Range and Payload (nm)				
110 w/30,000 lbs external load, no refuel	110 w/30,000 lbs external load, no refuel	110 w/27,000 lbs external load, no refuel	TBD	110 w/27,000 lbs external load, no refuel
Mission Reliability (MR)				
90%	90%	89%	TBD	89%
Logistics Footprint				
10% reduction from current CH-53E	10% reduction from current CH-53E	<= current CH-53E	TBD	<= current CH-53E
Sortie Generation Rate (SGR)/Average Sortie Duration (ASD)				
(T=O) 2.6 sorties/ 2.25 hrs	(T=O) 2.6 sorties/ 2.25 hrs	2.6 sorties/ 2.25 hrs	TBD	2.6 sorties/ 2.25 hrs

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

Requirements Reference

CPD dated March 15, 2017

Change Explanations

None

Notes

Net Ready KPP: JVMF, Link-16, and Mode 5 capabilities were approved for deferral by JROCM 142-10 of September 10, 2010 until IOC + 6 months for Mode 5 and IOC + 2 years for JVMF and Link-16.

Acronyms and Abbreviations

<= - Less Than or Equal To
hrs - Hours
JROCM - Joint Requirements Oversight Council Memorandum
JVMF - Joint Variable Message Format
lbs - Pounds
nm - Nautical Miles
O - Objective
reqts - Requirements
T - Threshold

Track to Budget

RDT&E

Appn	BA	PE
Navy	05	0605212M

Project	Name
3059	CH-53K Development
Notes:	FY2019 - FY2023
9999	Congressional Add
Notes:	FY2019

Appn	BA	PE
Navy	05	0605212N

Project	Name	
3059	CH-53K Development	(Sunk)
Notes:	FY2002 - FY2018	

Procurement

Appn	BA	PE
Navy	01	0206122M

Line Item	Name
0158	CH-53K (Heavy Lift)

Appn	BA	PE
Navy	06	0206122M

Line Item	Name
0605	Spares and Repair Parts

MILCON

Appn	BA	PE
Navy	01	0202176M

Project	Name	
62573676	CH-53K Maintenance Training facility (New River, NC)	(Sunk)

Cost and Funding

Cost Summary

Total Acquisition Cost							
Appropriation	BY 2017 $M			BY 2017 $M	TY $M		
	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate	SAR Baseline Production Estimate	Current APB Production Objective	Current Estimate
RDT&E	7265.0	7265.0	7991.5	7488.1	6957.8	6957.8	7212.4
Procurement	20427.5	20427.5	22470.3	20444.6	24263.3	24263.3	24304.2
Flyaway	--	--	--	17626.0	--	--	20994.2
Recurring	--	--	--	17094.1	--	--	20355.5
Non Recurring	--	--	--	531.9	--	--	638.7
Support	--	--	--	2818.6	--	--	3310.0
Other Support	--	--	--	2199.4	--	--	2597.9
Initial Spares	--	--	--	619.2	--	--	712.1
MILCON	13.3	13.3	14.6	13.2	13.2	13.2	13.2
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	27705.8	27705.8	N/A	27945.9	31234.3	31234.3	31529.8

Current APB Cost Estimate Reference

SCP dated April 04, 2017

Cost Notes

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

Program's RDT&E Above Threshold Reprogramming (ATR) request of $158M, which has been submitted to Congress, is not included in this estimate.

Development contract cost overruns have resulted in insufficient funding levels to continue work on SDTAs 5 and 6; as a result, the contract was modified to avoid any further expenditures. Should no additional funding become available to complete SDTA 5 and 6, the program will take appropriate action to reduce the scope of the effort and utilize the parts and components as Government property. The total program of record quantity remains at 200 aircraft.

Total Quantity			
Quantity	SAR Baseline Production Estimate	Current APB Production	Current Estimate
RDT&E	6	6	6
Procurement	194	194	194
Total	200	200	200

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	6044.0	336.9	516.9	251.4	20.6	21.1	21.5	0.0	7212.4
Procurement	1553.0	1227.7	1121.6	1739.2	2288.9	2202.7	2349.4	11821.7	24304.2
MILCON	13.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB 2020 Total	7610.2	1564.6	1638.5	1990.6	2309.5	2223.8	2370.9	11821.7	31529.8
PB 2019 Total	7351.2	1660.8	1786.6	2183.5	2300.0	2324.9	3068.7	10489.5	31165.2
Delta	259.0	-96.2	-148.1	-192.9	9.5	-101.1	-697.8	1332.2	364.6

Funding Notes

Prior year includes two congressional add aircraft.

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	6	0	0	0	0	0	0	0	0	6
Production	0	8	8	6	12	19	18	19	104	194
PB 2020 Total	6	8	8	6	12	19	18	19	104	200
PB 2019 Total	6	6	8	9	14	19	19	25	94	200
Delta	0	2	0	-3	-2	0	-1	-6	10	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
2002	--	--	--	--	--	--	2.0
2003	--	--	--	--	--	--	2.7
2004	--	--	--	--	--	--	4.7
2005	--	--	--	--	--	--	98.9
2006	--	--	--	--	--	--	251.9
2007	--	--	--	--	--	--	338.1
2008	--	--	--	--	--	--	386.2
2009	--	--	--	--	--	--	541.9
2010	--	--	--	--	--	--	503.9
2011	--	--	--	--	--	--	562.2
2012	--	--	--	--	--	--	604.4
2013	--	--	--	--	--	--	535.5
2014	--	--	--	--	--	--	446.7
2015	--	--	--	--	--	--	533.2
2016	--	--	--	--	--	--	563.2
2017	--	--	--	--	--	--	339.1
2018	--	--	--	--	--	--	329.4
2019	--	--	--	--	--	--	336.9
2020	--	--	--	--	--	--	516.9
2021	--	--	--	--	--	--	251.4
2022	--	--	--	--	--	--	20.6
2023	--	--	--	--	--	--	21.1
2024	--	--	--	--	--	--	21.5
Subtotal	6	--	--	--	--	--	7212.4

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
2002	--	--	--	--	--	--	2.6
2003	--	--	--	--	--	--	3.5
2004	--	--	--	--	--	--	5.8
2005	--	--	--	--	--	--	119.9
2006	--	--	--	--	--	--	296.1
2007	--	--	--	--	--	--	388.0
2008	--	--	--	--	--	--	435.2
2009	--	--	--	--	--	--	602.9
2010	--	--	--	--	--	--	552.4
2011	--	--	--	--	--	--	601.9
2012	--	--	--	--	--	--	636.5
2013	--	--	--	--	--	--	558.1
2014	--	--	--	--	--	--	459.0
2015	--	--	--	--	--	--	541.1
2016	--	--	--	--	--	--	561.5
2017	--	--	--	--	--	--	332.0
2018	--	--	--	--	--	--	316.0
2019	--	--	--	--	--	--	316.8
2020	--	--	--	--	--	--	476.6
2021	--	--	--	--	--	--	227.3
2022	--	--	--	--	--	--	18.3
2023	--	--	--	--	--	--	18.3
2024	--	--	--	--	--	--	18.3
Subtotal	6	--	--	--	--	--	7488.1

Annual Funding 1506 | Procurement | Aircraft 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
2016	--	41.3	--	--	41.3	--	41.3
2017	2	319.2	--	3.1	322.3	162.6	484.9
2018	6	855.3	--	5.0	860.3	166.5	1026.8
2019	8	946.6	--	16.6	963.2	264.5	1227.7
2020	6	753.2	--	44.5	797.7	323.9	1121.6
2021	12	1418.1	--	60.7	1478.8	260.4	1739.2
2022	19	1961.8	--	62.6	2024.4	264.5	2288.9
2023	18	1968.4	--	46.7	2015.1	187.6	2202.7
2024	19	1924.2	--	82.2	2006.4	343.0	2349.4
2025	25	2754.5	--	49.0	2803.5	283.1	3086.6
2026	25	2603.5	--	79.0	2682.5	295.4	2977.9
2027	27	2636.3	--	80.1	2716.4	282.3	2998.7
2028	27	2173.1	--	109.2	2282.3	301.9	2584.2
2029	--	--	--	--	--	92.9	92.9
2030	--	--	--	--	--	81.4	81.4
Subtotal	194	20355.5	--	638.7	20994.2	3310.0	24304.2

Annual Funding 1506 | Procurement | Aircraft 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
2016	--	40.5	--	--	40.5	--	40.5
2017	2	307.2	--	3.0	310.2	156.4	466.6
2018	6	806.7	--	4.7	811.4	157.0	968.4
2019	8	875.3	--	15.3	890.6	244.6	1135.2
2020	6	682.8	--	40.3	723.1	293.6	1016.7
2021	12	1260.3	--	53.9	1314.2	231.5	1545.7
2022	19	1709.3	--	54.5	1763.8	230.5	1994.3
2023	18	1681.4	--	39.9	1721.3	160.3	1881.6
2024	19	1611.5	--	68.8	1680.3	287.2	1967.5
2025	25	2261.6	--	40.2	2301.8	232.4	2534.2
2026	25	2095.7	--	63.6	2159.3	237.7	2397.0
2027	27	2080.5	--	63.2	2143.7	222.8	2366.5
2028	27	1681.3	--	84.5	1765.8	233.6	1999.4
2029	--	--	--	--	--	70.5	70.5
2030	--	--	--	--	--	60.5	60.5
Subtotal	194	17094.1	--	531.9	17626.0	2818.6	20444.6

Cost Quantity Information 1506 | Procurement | Aircraft Procurement, Navy		
Fiscal Year	**Quantity**	**End Item Recurring Flyaway (Aligned With Quantity) BY 2017 $M**
2016	--	--
2017	2	278.6
2018	6	737.1
2019	8	865.0
2020	6	636.8
2021	12	1154.5
2022	19	1729.6
2023	18	1582.5
2024	19	1646.5
2025	25	2114.8
2026	25	2082.2
2027	27	2181.8
2028	27	2084.7
2029	--	--
2030	--	--
Subtotal	194	17094.1

Annual Funding 1205 | MILCON | Military Construction, Navy and Marine Corps	
Fiscal Year	TY $M Total Program
2014	13.2
Subtotal	13.2

Annual Funding 1205 | MILCON | Military Construction, Navy and Marine Corps	
Fiscal Year	BY 2017 $M Total Program
2014	13.2
Subtotal	13.2

Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
Approval Date	11/22/2005	4/4/2017
Approved Quantity	29	26
Reference	Milestone B Acquisition Strategy (AS)	Milestone C ADM
Start Year	2012	2017
End Year	2015	2020

The Current Total LRIP Quantity is more than 10% of the total production quantity due to the need to plan for an efficient production ramp-up.

Foreign Military Sales

None

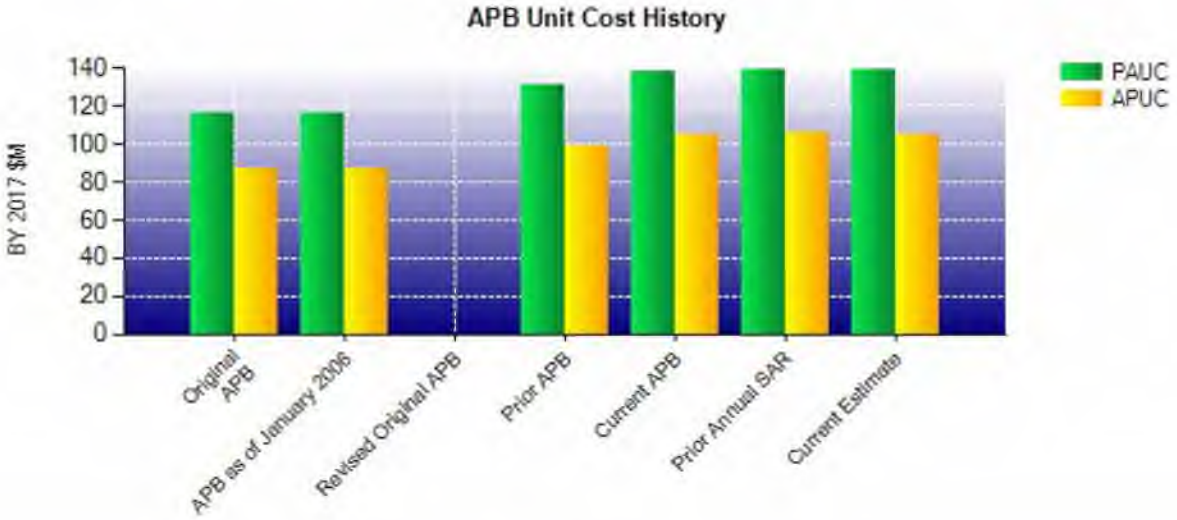
Nuclear Costs

None

Unit Cost

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 $M Current UCR Baseline (Apr 2017 APB)	BY 2017 $M Current Estimate (Dec 2018 SAR)	% Change
Program Acquisition Unit Cost			
Cost	27705.8	27945.9	
Quantity	200	200	
Unit Cost	138.529	139.730	+0.87
Average Procurement Unit Cost			
Cost	20427.5	20444.6	
Quantity	194	194	
Unit Cost	105.296	105.385	+0.08

Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 $M Original UCR Baseline (Dec 2005 APB)	BY 2017 $M Current Estimate (Dec 2018 SAR)	% Change
Program Acquisition Unit Cost			
Cost	18084.4	27945.9	
Quantity	156	200	
Unit Cost	115.926	139.730	+20.53
Average Procurement Unit Cost			
Cost	13301.6	20444.6	
Quantity	152	194	
Unit Cost	87.511	105.385	+20.42



APB Unit Cost History					
Item	Date	BY 2017 $M		TY $M	
		PAUC	APUC	PAUC	APUC
Original APB	Dec 2005	115.926	87.511	120.297	94.736
APB as of January 2006	Dec 2005	115.926	87.511	120.297	94.736
Revised Original APB	N/A	N/A	N/A	N/A	N/A
Prior APB	Apr 2013	130.940	99.272	142.503	113.157
Current APB	Apr 2017	138.529	105.296	156.172	125.069
Prior Annual SAR	Dec 2017	139.583	106.588	155.826	124.945
Current Estimate	Dec 2018	139.730	105.385	157.649	125.279

SAR Unit Cost History

Initial SAR Baseline to Current SAR Baseline (TY $M)									
Initial PAUC Development Estimate	Changes								PAUC Production Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
120.297	0.037	-10.579	18.691	-0.019	24.904	0.000	2.841	35.875	156.172

Current SAR Baseline to Current Estimate (TY $M)									
PAUC Production Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
156.172	-0.196	0.000	1.817	0.000	0.568	0.000	-0.712	1.477	157.649

Initial SAR Baseline to Current SAR Baseline (TY $M)									
Initial APUC Development Estimate	Changes								APUC Production Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
94.736	-0.082	-5.412	12.974	0.000	20.258	0.000	2.595	30.333	125.069

Current SAR Baseline to Current Estimate (TY $M)									
APUC Production Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
125.069	-0.221	0.000	0.328	0.000	0.838	0.000	-0.734	0.211	125.279

SAR Baseline History				
Item	SAR Planning Estimate	SAR Development Estimate	SAR Production Estimate	Current Estimate
Milestone A	N/A	N/A	N/A	N/A
Milestone B	N/A	Oct 2005	Dec 2005	Dec 2005
Milestone C	N/A	Dec 2012	Mar 2017	Apr 2017
IOC	N/A	Sep 2015	Dec 2019	Sep 2021
Total Cost (TY $M)	N/A	18766.3	31234.3	31529.8
Total Quantity	N/A	156	200	200
PAUC	N/A	120.297	156.172	157.649

Cost Variance

Summary TY $M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	6957.8	24263.3	13.2	31234.3
Previous Changes				
Economic	-7.8	-279.6	--	-287.4
Quantity	--	--	--	--
Schedule	--	-42.3	--	-42.3
Engineering	--	--	--	--
Estimating	-37.4	+295.9	--	+258.5
Other	--	--	--	--
Support	--	+2.1	--	+2.1
Subtotal	-45.2	-23.9	--	-69.1
Current Changes				
Economic	+11.5	+236.7	+0.1	+248.3
Quantity	--	--	--	--
Schedule	+299.8	+105.9	--	+405.7
Engineering	--	--	--	--
Estimating	-11.5	-133.3	-0.1	-144.9
Other	--	--	--	--
Support	--	-144.5	--	-144.5
Subtotal	+299.8	+64.8	--	+364.6
Total Changes	+254.6	+40.9	--	+295.5
CE - Cost Variance	7212.4	24304.2	13.2	31529.8
CE - Cost & Funding	7212.4	24304.2	13.2	31529.8

Summary BY 2017 $M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	7265.0	20427.5	13.3	27705.8
Previous Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	-0.5	--	-0.5
Engineering	--	--	--	--
Estimating	-39.7	+264.2	--	+224.5
Other	--	--	--	--
Support	--	-13.2	--	-13.2
Subtotal	-39.7	+250.5	--	+210.8
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	+275.8	+13.5	--	+289.3
Engineering	--	--	--	--
Estimating	-13.0	-107.6	-0.1	-120.7
Other	--	--	--	--
Support	--	-139.3	--	-139.3
Subtotal	+262.8	-233.4	-0.1	+29.3
Total Changes	+223.1	+17.1	-0.1	+240.1
CE - Cost Variance	7488.1	20444.6	13.2	27945.9
CE - Cost & Funding	7488.1	20444.6	13.2	27945.9

Previous Estimate: December 2017

RDT&E	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+11.5
Adjustment for current and prior escalation. (Estimating)	-6.9	-7.2
Revised estimate to reflect the application of new outyear escalation indices. (Estimating)	-6.1	-4.3
Program re-structured as a result of discoveries during flight test and qualification testing. (Schedule)	+275.8	+299.8
RDT&E Subtotal	+262.8	+299.8

Procurement	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+236.7
Adjustment for current and prior escalation. (Estimating)	-16.1	-17.3
Revised estimate to reflect the application of new outyear inflation indices. (Estimating)	-176.6	-211.6
Stretch-out of procurement buy profile resulting from pushing 10 aircraft out of the FYDP. (Schedule)	0.0	+92.1
Additional Schedule Variance resulting from pushing 10 aircraft out of the FYDP. (Schedule)	+13.5	+13.8
Updated estimate to reflect outyear material projections. (Estimating)	+85.1	+95.6
Adjustment for current and prior escalation. (Support)	-5.7	-6.0
Decrease in Other Support. (Support)	-114.0	-114.8
Decrease in Initial Spares due to aircraft quantity reductions in FYDP. (Support)	-19.6	-23.7
Procurement Subtotal	-233.4	+64.8

MILCON	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	+0.1
Adjustment for current and prior escalation. (Estimating)	-0.1	-0.1
MILCON Subtotal	-0.1	0.0

Contracts

Contract Identification

Appropriation: RDT&E
Contract Name: System Development and Demonstration
Contractor: Sikorsky Aircraft Corporation
Contractor Location: 6900 Main Street
Stratford, CT 06615-9129
Contract Number: N00019-06-C-0081
Contract Type: Cost Plus Incentive Fee (CPIF)
Award Date: January 03, 2006
Definitization Date: January 03, 2006

Contract Price							
Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
3052.2	N/A	5	3014.4	N/A	5	4633.5	5375.5

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to a reduction in target fee associated with contract type conversion from Cost Plus Award Fee to Cost Plus Incentive Fee and scope adjustments. Program Manager's Estimated Price is equal to the current Estimate at Completion plus scope changes, profit and fee.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (1/31/2019)	-429.0	-118.7
Previous Cumulative Variances	-315.5	-86.6
Net Change	-113.5	-32.1

Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to Flight Test Performance and technical issue resolution.

The unfavorable net change in the schedule variance is due to Flight Test Performance and technical issue resolution.

Notes

The Definitization date above reflects the Definitization of the interim System Development and Demonstration (iSDD) contract for $7.63M. On April 5, 2006 the SDD contract was signed for the negotiated cost of $2.73B.

Initial Contract Price Quantity was updated to correct previous submissions. The iSDD contract had a quantity of zero. This quantity was later negotiated to five when the full SDD contract was initialized.

Initial quantity has been updated to reflect the number of aircraft procured.

Contract Identification

Appropriation: RDT&E
Contract Name: System Demonstration Test Articles
Contractor: Sikorsky Aircraft Corporation
Contractor Location: 6900 Main Street
Stratford, CT 06614
Contract Number: N00019-06-C-0081/2
Contract Type: Cost Plus Incentive Fee (CPIF)
Award Date: May 30, 2013
Definitization Date: May 30, 2013

Contract Price							
Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
435.3	N/A	4	772.5	N/A	6	821.8	831.5

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to increase in scope to the contract, plus two additional aircraft.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (1/31/2019)	-9.3	-49.3
Previous Cumulative Variances	-5.2	-10.9
Net Change	-4.1	-38.4

Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to operations inefficiency and cost to recover schedule delays.

The unfavorable net change in the schedule variance is due to the Extension of the SDTA build cycle and delayed dynamics components.

Notes

PM's estimates provided for this submission reflect the April 2018 Estimate at Completion. PM's estimated price is equal to the current estimate plus scope and quantity changes, profit and fee.

In addition, critical parts for SDTA's 5&6 were added to the contract.

Contract Identification

Appropriation: RDT&E
Contract Name: SDTA Engines
Contractor: General Electric
Contractor Location: 1000 Western Avenue
Lynn, MA 01905
Contract Number: N00013-13-C-0132/3
Contract Type: Firm Fixed Price (FFP)
Award Date: July 18, 2013
Definitization Date: July 31, 2014

Contract Price							
Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
15.7	N/A	0	141.2	N/A	22	136.8	136.8

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to exercising options to procure engines and due to added scope for spares, supportability and cost reduction initiatives.

Cost and Schedule Variance Explanations

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

Notes

Initial contract price of $15.7M was awarded on July 18, 2013 for critical parts, systems engineering and program management related to engine procurement. On July 31, 2014, the Government added FFP CLINs to procure 16 engines and the associated technical data and tooling. On January 15, 2015, the Government exercised an option to procure an additional six engines. PM's estimated price is equal to the current estimate plus scope changes, profit, and fee.

An administrative change to Initial contract quantity has been changed from the previous SAR to reflect zero quantities associated with the initial award for critical parts, systems engineering, and program Management.

Additional scope and quantity have been added to the contract that increased the total contract value by 13.4M.

Contract Identification

Appropriation: Procurement
Contract Name: LRIP Lot 1 Aircraft
Contractor: Sikorsky Aircraft Corporation
Contractor Location: 6900 Main Street
Stratford, CT 06615-9129
Contract Number: N00019-16-C-0048/4
Contract Type: Fixed Price Incentive(Firm Target) (FPIF)
Award Date: April 18, 2016
Definitization Date: April 18, 2016

Contract Price							
Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
286.3	297.3	2	286.3	297.3	2	297.3	297.3

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (1/31/2019)	+4.1	-8.0
Previous Cumulative Variances	--	--
Net Change	+4.1	-8.0

Cost and Schedule Variance Explanations

The favorable cumulative cost variance is due to staffing levels under plan.

The unfavorable cumulative schedule variance is due to part shortages and purchase orders for suppliers late to award or not yet on contract.

Notes

Lot 1 Advanced Acquisition Contract (AAC) awarded for $31.25M on April 18, 2016, and was incorporated into the Lot 1 total contract cost.

Contract Identification

Appropriation: Procurement
Contract Name: LRIP Lot 1 and Lot 2 Engines
Contractor: General Electric Aviation
Contractor Location: 1000 Western Avenue
Lynn, MA 01905
Contract Number: N00019-18-C-1007
Contract Type: Firm Fixed Price (FFP)
Award Date: November 16, 2017
Definitization Date: November 16, 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
143.4	N/A	22	143.4	N/A	22	143.4	143.4

Cost and Schedule Variance Explanations

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

Contract Identification

Appropriation: Procurement
Contract Name: AAC Lot 2
Contractor: Sikorsky Aricraft Corporation
Contractor Location: 6900 Main Street
Stratford, CT 06615
Contract Number: N00019-16-C-0048
Contract Type: Firm Fixed Price (FFP)
Award Date: May 22, 2017
Definitization Date: May 22, 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
55.0	N/A	4	55.0	N/A	4	55.0	55.0

Cost and Schedule Variance Explanations

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

Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	1	1	6	16.67%
Production	0	0	194	0.00%
Total Program Quantity Delivered	1	1	200	0.50%

Expended and Appropriated (TY $M)			
Total Acquisition Cost	31529.8	Years Appropriated	18
Expended to Date	5927.1	Percent Years Appropriated	62.07%
Percent Expended	18.80%	Appropriated to Date	9174.8
Total Funding Years	29	Percent Appropriated	29.10%

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

Operating and Support Cost

Cost Estimate Details

Date of Estimate:	February 01, 2019
Source of Estimate:	POE
Quantity to Sustain:	200
Unit of Measure:	Aircraft
Service Life per Unit:	30.00 Years
Fiscal Years in Service:	FY 2019 - FY 2060

- Aircraft Attrition Rate: 0.5% of Total Aircraft Inventory (TAI) per year
- Aircraft Pipeline Factor: 15.5% of TAI
- Squadrons: 10 Marine Heavy Helicopter (HMH) squadrons (8 active / 2 reserve) / 1 Marine Training (HMHT) squadron
- Helicopters per HMH (active) squadron: 16
- Helicopters per HMH (reserve) squadron: 8
- Helicopters per HMHT squadron: 21
- Monthly Flight Hours per Helicopter (Primary Aircraft Authorized (PAA)): 17.9
- PB 2020 budgeted flight hours applied in the FYDP
- Aircraft reliability projections per NAVAIR-4.1.10 input
- Total Operating Helicopter Years: 5,033 (Phase-in of PAA required, 30 years operating life per aircraft, phase-out of PAA)

Sustainment Strategy

The CH-53K will be sustained utilizing Organizational, Intermediate, and Depot levels of maintenance. Repair and Overhaul capability establishment will be phased in over five years and will be based on component maturity, operational readiness and affordability factors. For components determined to require organic repair capability, a time-phased entry approach will be utilized to enable optimization of capacity as well as stabilization of repair processes and ensure repair capability will be established no later than IOC +4 years. Product Support analyses are being matured and will be compared to data obtained during flight test and initial operations to establish sustainment baselines at the component level. A Fleet Common Operation Environment (FCOE) has been established to fuse information from operations and sustainment activities across the Naval Aviation Enterprise and provide near real-time comparisons of actual environmental, reliability, cost and sustainment infrastructure performance against the established baselines. Current sustainment planning activities are facilitating engagement with both public and private industrial support services in the development of performance-based product support arrangements as well as utilizing the FCOE to enable more agile and effective product support packages during CH-53K sustainment operations.

Antecedent Information

- The antecedent system is CH-53E
- Antecedent CH-53E data representative of FY 2014 to FY 2016 average of Naval Visibility And Management of Operating and Support Cost (VAMOSC) reported cost data
- CH-53E is not capable of meeting Joint Requirements Oversight Council Key Performance Parameter requirements established for the CH-53K (CH-53K provides three times the lift capability compared to CH-53E)
- CH-53E Total O&S Cost (BY 2017$) = CH-53E Annual O&S Cost per Helicopter * CH-53K Total Operating Helicopter Years
- Historical data is unavailable for all years of the Antecedent System's life cycle and the calculation is supplemented with CH-53K data

Annual O&S Costs BY2017 $M		
Cost Element	**CH-53K Average Annual Cost Per Aircraft**	**CH-53E (Antecedent) Average Annual Cost Per Aircraft**
Unit-Level Manpower	1.279	1.579
Unit Operations	0.364	0.282
Maintenance	5.394	3.912
Sustaining Support	0.308	0.151
Continuing System Improvements	0.898	0.417
Indirect Support	0.774	0.953
Other	0.000	0.000
Total	9.017	7.294

Item	Total O&S Cost $M			
	CH-53K			CH-53E (Antecedent)
	Current Production APB Objective/Threshold		Current Estimate	
Base Year	46188.9	50807.8	45376.7	36709.5
Then Year	77882.8	N/A	77779.5	N/A

Equation to Translate Annual Cost to Total Cost

- CH-53K Average Annual Cost per Helicopter = Total O&S Cost (BY) / Total Operating Helicopter Years
- $45376.7 / 5,033 Total Operating Helicopter Years = $9.017M per Year per Helicopter

O&S Cost Variance		
Category	**BY 2017 $M**	**Change Explanations**
Prior SAR Total O&S Estimates - Dec 2017 SAR	44660.0	
Programmatic/Planning Factors	-299.1	Material Support Date delay, PB20 Delivery and Phasing
Cost Estimating Methodology	86.4	Historic data computation
Cost Data Update	-87.1	Inflation data, PB20 Budget Controls, PB20 Inflation
Labor Rate	853.9	Depot labor rate increase, 2019 Military Composite Pay Rates
Energy Rate	-3.5	PB20 fuel rate update
Technical Input	166.1	Increase due to degradation in Main Rotor Damper reliability predictions
Other	0.0	
Total Changes	716.7	
Current Estimate	45376.7	

Disposal Estimate Details

Date of Estimate: February 01, 2019

Source of Estimate:	POE
Disposal/Demilitarization Total Cost (BY 2017 $M):	52.3