RCS: DD-A&T(Q&A)823-487

Improved Turbine Engine Program (ITEP)

As of FY 2021 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

Table of Contents

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
Improved Turbine Engine Program (ITEP)

DoD Component
Army

Responsible Office

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Date Assigned: May 30, 2017

References

SAR Baseline (Development Estimate)

Army Acquisition Executive (AAE) Approved Acquisition Program Baseline (APB) dated August 26, 2019

Approved APB

Army Acquisition Executive (AAE) Approved Acquisition Program Baseline (APB) dated August 26, 2019

Mission and Description

The Improved Turbine Engine (ITE) program develops, tests, qualifies, and integrates the next generation turboshaft engine on Black Hawk and Apache aircraft. The ITE replaces the existing T700 engine design originated in the 1970's and meets the operational requirement of 6,000 feet altitude and 95 degrees (6K/95). The ITE will fit inside the existing engine bays of the Black Hawk and Apache Helicopters and provides a significant power enhancement of up to fifty percent (total of 3,000 class shaft horsepower) with increased fuel efficiency. Additional benefits include improved design life, enhanced reliability, lower maintenance cost and restored capability lost due to aircraft weight growth without an increase to the logistics footprint. The program consists of systems engineering and program management, detailed design engineering, design assurance, hardware manufacturing and testing, component and module level development and testing, system level testing and qualification, as well as integration into the airframe.

Executive Summary

Program Highlights Since Last Report

The AAE signed the ADM on January 29, 2019 approving Milestone B, allowing entry into the EMD phase.

The EMD contract was competitively awarded to General Electric Aviation on February 1, 2019.

An APB was approved on August 26, 2019, establishing APUC and PAUC.

Integration contracts were awarded to Black Hawk and Apache Original Equipment Manufacturers (OEMs) to conduct preliminary design and development.

The program requirements are stable and funding is adequate to meet cost, schedule, and performance objectives established in the current approved APB.

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

History of Significant Developments Since Program Initiation

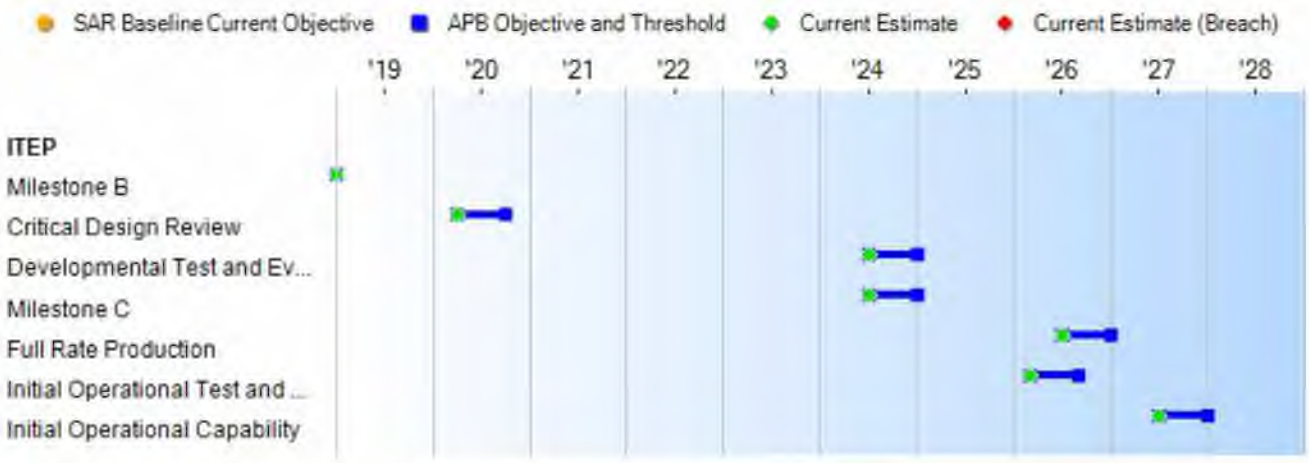
History of Significant Developments Since Program Initiation	
Date	**Significant Development Description**
January 2019	The AAE signed the ADM on January 29, 2019 approving Milestone B, allowing entry into the EMD phase

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

Schedule



Schedule Events				
Events	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate
Milestone B	Jan 2019	Jan 2019	Jan 2019	Jan 2019
Critical Design Review	Apr 2020	Apr 2020	Oct 2020	Apr 2020
Developmental Test and Evaluation	Jul 2024	Jul 2024	Jan 2025	Jul 2024
Milestone C	Jul 2024	Jul 2024	Jan 2025	Jul 2024
Full Rate Production	Jul 2026	Jul 2026	Jan 2027	Jul 2026
Initial Operational Test and Evaluation	Mar 2026	Mar 2026	Sep 2026	Mar 2026
Initial Operational Capability	Jul 2027	Jul 2027	Jan 2028	Jul 2027

Change Explanations

None

Notes

The ITEP schedule encompasses a 66-month EMD phase which began February 2019. The program completed a two-year, two-vendor Technology Maturation and Risk Reduction phase resulting in a down select to one vendor to enter EMD. The General Electric Aviation was awarded the EMD contract on February 1, 2019. A GAO Protest was filed and a Stop Work was issued on February 19, 2019. The protest was denied in its entirety and the Stop Work was lifted on May 30, 2019.

Developmental Test and Evaluation equates to the successful verification of T901-GE-900 engine system in accordance with Appendix B "Requirements for Preliminary Flight Rating" and Appendix C "Requirements for Qualification Testing" of the XT901-GE-900 Engine Model Specification E1342.

Acronyms and Abbreviations

GAO - General Accounting Office
OEM - Original Equipment Manufacturer

Performance

Performance Characteristics				
SAR Baseline Development Estimate	**Current APB Development Objective/Threshold**		**Demonstrated Performance**	**Current Estimate**
System Survivability				
The statistically average production engine will have an IR signature contribution from exhaust and component radiance that is less than the 701D engine at MRP in a comparably configured platform at 6K/95°F without suppressed engine exhaust. The statistically average production engine will also have an integrated IR suppression that is pilot controlled from either off (no suppression) or on (full suppression) capability and will have no more than 2% engine power loss when fully suppressed. The IR suppressor system should default to full suppression in the event of an actuator failure for redundancy.	The statistically average production engine will have an IR signature contribution from exhaust and component radiance that is less than the 701D engine at MRP in a comparably configured platform at 6K/95°F without suppressed engine exhaust. The statistically average production engine will also have an integrated IR suppression that is pilot controlled from either off (no suppression) or on (full suppression) capability and will have no more than 2% engine power loss when fully suppressed. The IR suppressor system should default to full suppression in the event of an actuator failure for redundancy.	The production engine will have an IR signature contribution from exhaust and component radiance that will not exceed the 701D engine at MRP in a comparably configured platform at 6K/95°F without suppressed engine exhaust.	TBD	The statistically average production engine will have an IR signature contribution from exhaust and component radiance that is less than the 701D engine at MRP in a comparably configured platform at 6K/95°F without suppressed engine exhaust. The statistically average production engine will also have an integrated IR suppression that is pilot controlled from either off (no suppression) or on (full suppression) capability and will have no more than 2% engine power loss when fully suppressed. The IR suppressor system should default to full suppression in the event of an actuator failure for redundancy.
Ballistic Survivability				
The automatic redundant digital engine control unit design will be such that engagement by a single round shall not result in loss of automatic engine control function. The unit must	The automatic redundant digital engine control unit design will be such that engagement by a single round shall not result in loss of automatic engine control function. The unit must	(T=O) The automatic redundant digital engine control unit design will be such that engagement by a single round shall not result in loss of automatic engine control function. The unit must	TBD	The automatic redundant digital engine control unit design will be such that engagement by a single round shall not result in loss of automatic engine control function. The unit must

autonomously function to continue to provide full automatic engine control without crew interaction. Threat round characteristics are as defined in the Apache Lot 4 CPD classified annex dated April 2, 2013.	autonomously function to continue to provide full automatic engine control without crew interaction. Threat round characteristics are as defined in the Apache Lot 4 CPD classified annex dated April 2, 2013.	autonomously function to continue to provide full automatic engine control without crew interaction. Threat round characteristics are as defined in the Apache Lot 4 CPD classified annex dated April 2, 2013.		autonomously function to continue to provide full automatic engine control without crew interaction. Threat round characteristics are as defined in the Apache Lot 4 CPD classified annex dated April 2, 2013.
Cybersecurity				
Installation, operations and sustainment of the ITE does not increase the number of known cybersecurity vulnerabilities on the hosting platforms. The ITE shall provide means to rapidly restore functionality in the event of compromise.	Installation, operations and sustainment of the ITE does not increase the number of known cybersecurity vulnerabilities on the hosting platforms. The ITE shall provide means to rapidly restore functionality in the event of compromise.	Installation, operations and sustainment of the ITE produces no Category 1 (critical) known vulnerabilities on the hosting platforms. Physical separation shall be maintained between the ITE and architecture not requiring communication. The ITE shall provide redundancy to prevent and mitigate functionality in the event of compromise.	TBD	Installation, operations and sustainment of the ITE does not increase the number of known cybersecurity vulnerabilities on the hosting platforms. The ITE shall provide means to rapidly restore functionality in the event of compromise.
Sustainment				
Ao = 98% Am = 80%	Ao = 98% Am = 80%	Ao = 95% Am = 70%	TBD	Ao = 98% Am = 80%
Energy				
The ITE must provide an increased fuel efficiency when compared to current 701D engine at cruise condition of no less than 25% (≤ 0.352 lbs/SHP-hr) improvement in SFC as measured in an appropriate test cell facility with the engine operating at 1450 SHP and environmental conditions set at 6K/95°F.	The ITE must provide an increased fuel efficiency when compared to current 701D engine at cruise condition of no less than 25% (≤ 0.352 lbs/SHP-hr) improvement in SFC as measured in an appropriate test cell facility with the engine operating at 1450 SHP and environmental conditions set at 6K/95°F.	The ITE must provide an increased fuel efficiency when compared to current 701D engine at cruise condition of no less than 13% (≤ 0.409 lbs/SHP-hr) improvement in SFC as measured in an appropriate test cell facility with the engine operating at 1450 SHP and environmental conditions set at 6K/95°F.	TBD	The ITE must provide an increased fuel efficiency when compared to current 701D engine at cruise condition of no less than 25% (≤ 0.352 lbs/SHP-hr) improvement in SFC as measured in an appropriate test cell facility with the engine operating at 1450 SHP and environmental conditions set at 6K/95°F.
UH-60 Worldwide Performance				
An H-60 with the installed ITE will have	An H-60 with the installed ITE will have	An H-60 with the installed ITE will have	TBD	An H-60 with the installed ITE will have

sufficient power available to perform a 750 fpm VROC from HOGE at mission start with a takeoff gross weight of 22,000 lbs up to 6K/95°F at MCP. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95°F.	sufficient power available to perform a 750 fpm VROC from HOGE at mission start with a takeoff gross weight of 22,000 lbs up to 6K/95°F at MCP. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95°F.	sufficient power available to perform a 500 fpm VROC from HOGE at mission start with a takeoff gross weight of 20,632 lbs up to 6K/95°F using no more than 95% MRP. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95°F.		sufficient power available to perform a 750 fpm VROC from HOGE at mission start with a takeoff gross weight of 22,000 lbs up to 6K/95°F at MCP. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95°F.
AH-64E Worldwide Performance				
An AH-64E with the installed ITE will have sufficient power available to HOGE at mission start with a takeoff gross weight of 20,260 lbs up to 6K/95°F at MCP. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95°F.	An AH-64E with the installed ITE will have sufficient power available to HOGE at mission start with a takeoff gross weight of 20,260 lbs up to 6K/95°F at MCP. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95°F.	An AH-64E with the installed ITE will have sufficient power available to HOGE at mission start with a takeoff gross weight of 18,461 lbs up to 6K/95°F using no more than 95% MRP. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95°F.	TBD	An AH-64E with the installed ITE will have sufficient power available to HOGE at mission start with a takeoff gross weight of 20,260 lbs up to 6K/95°F at MCP. *Note: HOGE is at zero wind conditions and zero airspeed at 6K/95°F.
Training				
The Training Program shall train 100% of the identified Critical Training Tasks in a Live, Virtual, or Constructive environment to the identified MOS and skill level at the location identified in the System Training Plan. The system training capability shall replicate/emulate operation and maintenance tasks of the ITE to 80% of the physical fidelity and 100% of the functional fidelity of the ITE for critical training tasks. Maintainer proficiency shall be maintained on 100% of critical and	The Training Program shall train 100% of the identified Critical Training Tasks in a Live, Virtual, or Constructive environment to the identified MOS and skill level at the location identified in the System Training Plan. The system training capability shall replicate/emulate operation and maintenance tasks of the ITE to 80% of the physical fidelity and 100% of the functional fidelity of the ITE for critical training tasks. Maintainer proficiency shall be maintained on 100% of critical and	(T=O) The Training Program shall train 100% of the identified Critical Training Tasks in a Live, Virtual, or Constructive environment to the identified MOS and skill level at the location identified in the System Training Plan. The system training capability shall replicate/emulate operation and maintenance tasks of the ITE to 80% of the physical fidelity and 100% of the functional fidelity of the ITE for critical training tasks. Maintainer proficiency shall be maintained on 100% of critical and	TBD	The Training Program shall train 100% of the identified Critical Training Tasks in a Live, Virtual, or Constructive environment to the identified MOS and skill level at the location identified in the System Training Plan. The system training capability shall replicate/emulate operation and maintenance tasks of the ITE to 80% of the physical fidelity and 100% of the functional fidelity of the ITE for critical training tasks. Maintainer proficiency shall be maintained on 100% of critical and

90% of supporting tasks within 180 days of the training event. The ITE shall facilitate operator and maintainer task proficiency and skill retention by incorporating trainability considerations in aspects of system design. The ITE shall make use of embedded job/memory aids to assist Soldiers in performing critical tasks and reducing refresher training requirements. ITE components and operator/maintainer interfaces shall provide built-in task performance feedback to enhance skill retention.	90% of supporting tasks within 180 days of the training event. The ITE shall facilitate operator and maintainer task proficiency and skill retention by incorporating trainability considerations in aspects of system design. The ITE shall make use of embedded job/memory aids to assist Soldiers in performing critical tasks and reducing refresher training requirements. ITE components and operator/maintainer interfaces shall provide built-in task performance feedback to enhance skill retention.	90% of supporting tasks within 180 days of the training event. The ITE shall facilitate operator and maintainer task proficiency and skill retention by incorporating trainability considerations in aspects of system design. The ITE shall make use of embedded job/memory aids to assist Soldiers in performing critical tasks and reducing refresher training requirements. ITE components and operator/maintainer interfaces shall provide built-in task performance feedback to enhance skill retention.		90% of supporting tasks within 180 days of the training event. The ITE shall facilitate operator and maintainer task proficiency and skill retention by incorporating trainability considerations in aspects of system design. The ITE shall make use of embedded job/memory aids to assist Soldiers in performing critical tasks and reducing refresher training requirements. ITE components and operator/maintainer interfaces shall provide built-in task performance feedback to enhance skill retention.

Requirements Reference

CDD approved July 24, 2017

Change Explanations

None

Acronyms and Abbreviations

% - Percent
°F - Degrees Fahrenheit
Am - Sustainment Materiel Availability
Ao - Operational Availability
CPD - Capability Production Development
F - Fahrenheit
fpm - Feet Per Minute
HOGE - Hover Out of Ground Effect
IR - Infrared
ITE - Improved Turbine Engine
K - Thousands
lb - Pound
MCP - Maximum Continuous Power
MOS - Military Occupational Specialty
MRP - Maximum Rated Power
SFC - Specific Fuel Consumption
SHP - Shaft Horsepower
shp-hr - Shaft Horsepower-Hour
VROC - Vertical Rate of Climb

Track to Budget

RDT&E

Appn	BA	PE
Army	2040	07	0607139A

Project	Name
ES6	Improved Turbine Engine Progam

Procurement

Appn	BA	PE
Army	2031	01	0210101A

Line Item	Name
A05213	Improved Turbine Engine

Acq O&M

Appn	BA	PE
Army	2020	04	0435107A

Subactivity Group	Name	
435	Acquisition and Management Support, ITEP	(Shared)

Cost and Funding

Cost Summary

Total Acquisition Cost							
Appropriation	BY 2019 $M			BY 2019 $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	1983.0	1983.0	2181.3	1981.8	2113.5	2113.5	2112.0
Procurement	10030.5	10030.5	11033.6	10032.3	15647.6	15647.6	15647.6
Flyaway	--	--	--	8394.1	--	--	13123.2
Recurring	--	--	--	8298.7	--	--	13011.1
Non Recurring	--	--	--	95.4	--	--	112.1
Support	--	--	--	1638.2	--	--	2524.4
Other Support	--	--	--	1263.5	--	--	1936.3
Initial Spares	--	--	--	374.7	--	--	588.1
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	74.9	74.9	82.4	75.0	104.8	104.8	104.8
Total	12088.4	12088.4	N/A	12089.1	17865.9	17865.9	17864.4

Current APB Cost Estimate Reference

ITEP Milestone B Army Cost Position dated January 18, 2019

Cost Notes

CAPE Cost Risks: No cost risks are identified at this time. Funding in the Army Cost Position accounts for any potential schedule variance.

Total Quantity			
Quantity	SAR Baseline Development Estimate	Current APB Development	Current Estimate
RDT&E	69	69	69
Procurement	6189	6189	6189
Total	6258	6258	6258

Cost and Funding

Funding Summary

Appropriation Summary FY 2021 President's Budget / December 2019 SAR (TY$ M)									
Appropriation	Prior	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	To Complete	Total
RDT&E	651.0	206.4	249.5	245.8	206.1	183.0	131.0	239.2	2112.0
Procurement	0.0	0.0	0.0	0.0	0.0	22.9	331.7	15293.0	15647.6
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	1.3	1.7	1.9	2.5	3.0	2.4	3.1	88.9	104.8
PB 2021 Total	652.3	208.1	251.4	248.3	209.1	208.3	465.8	15621.1	17864.4
	--	--	--	--	--	--	--	--	--

Quantity Summary FY 2021 President's Budget / December 2019 SAR (TY$ M)										
Quantity	Undistributed	Prior	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	To Complete	Total
Development	69	0	0	0	0	0	0	0	0	69
Production	0	0	0	0	0	0	0	107	6082	6189
PB 2021 Total	69	0	0	0	0	0	0	107	6082	6258
	--	--	--	--	--	--	--	--	--	--

Cost and Funding

Annual Funding By Appropriation

Annual Funding 2040 | RDT&E | Research, Development, Test, and Evaluation, Army							
		TY $M					
Fiscal Year	Quantity	End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2012	--	--	--	--	--	--	7.7
2013	--	--	--	--	--	--	16.6
2014	--	--	--	--	--	--	79.9
2015	--	--	--	--	--	--	49.3
2016	--	--	--	--	--	--	49.1
2017	--	--	--	--	--	--	111.6
2018	--	--	--	--	--	--	167.5
2019	--	--	--	--	--	--	169.3
2020	--	--	--	--	--	--	206.4
2021	--	--	--	--	--	--	249.5
2022	--	--	--	--	--	--	245.8
2023	--	--	--	--	--	--	206.1
2024	--	--	--	--	--	--	183.0
2025	--	--	--	--	--	--	131.0
2026	--	--	--	--	--	--	106.6
2027	--	--	--	--	--	--	58.6
2028	--	--	--	--	--	--	39.0
2029	--	--	--	--	--	--	33.2
2030	--	--	--	--	--	--	1.8
Subtotal	69	--	--	--	--	--	2112.0

Annual Funding 2040 | RDT&E | Research, Development, Test, and Evaluation, Army							
Fiscal Year	Quantity	BY 2019 $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2012	--	--	--	--	--	--	8.5
2013	--	--	--	--	--	--	17.9
2014	--	--	--	--	--	--	84.7
2015	--	--	--	--	--	--	51.4
2016	--	--	--	--	--	--	50.7
2017	--	--	--	--	--	--	112.9
2018	--	--	--	--	--	--	166.6
2019	--	--	--	--	--	--	165.9
2020	--	--	--	--	--	--	197.9
2021	--	--	--	--	--	--	235.1
2022	--	--	--	--	--	--	227.0
2023	--	--	--	--	--	--	186.6
2024	--	--	--	--	--	--	162.5
2025	--	--	--	--	--	--	114.0
2026	--	--	--	--	--	--	91.0
2027	--	--	--	--	--	--	49.0
2028	--	--	--	--	--	--	32.0
2029	--	--	--	--	--	--	26.7
2030	--	--	--	--	--	--	1.4
Subtotal	69	--	--	--	--	--	1981.8

Annual Funding 2031 | Procurement | Aircraft Procurement, Army							
Fiscal Year	Quantity	TY $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2024	--	--	--	22.0	22.0	0.9	22.9
2025	107	257.4	--	32.7	290.1	41.6	331.7
2026	105	242.8	--	57.4	300.2	64.2	364.4
2027	212	428.0	--	--	428.0	102.8	530.8
2028	212	414.4	--	--	414.4	105.5	519.9
2029	212	411.3	--	--	411.3	118.1	529.4
2030	212	407.3	--	--	407.3	131.1	538.4
2031	212	405.9	--	--	405.9	80.3	486.2
2032	212	402.9	--	--	402.9	75.9	478.8
2033	212	404.3	--	--	404.3	74.8	479.1
2034	212	406.6	--	--	406.6	75.5	482.1
2035	212	409.6	--	--	409.6	74.7	484.3
2036	212	407.4	--	--	407.4	75.6	483.0
2037	212	411.3	--	--	411.3	75.9	487.2
2038	212	415.7	--	--	415.7	77.0	492.7
2039	212	420.4	--	--	420.4	78.2	498.6
2040	212	425.4	--	--	425.4	79.4	504.8
2041	212	430.7	--	--	430.7	80.7	511.4
2042	212	434.9	--	--	434.9	81.5	516.4
2043	212	425.9	--	--	425.9	81.2	507.1
2044	212	447.8	--	--	447.8	83.3	531.1
2045	212	456.6	--	--	456.6	77.1	533.7
2046	212	463.2	--	--	463.2	73.4	536.6
2047	212	470.0	--	--	470.0	69.6	539.6
2048	212	477.0	--	--	477.0	74.2	551.2
2049	218	495.5	--	--	495.5	74.0	569.5
2050	218	509.0	--	--	509.0	73.8	582.8
2051	218	517.5	--	--	517.5	75.1	592.6
2052	218	525.6	--	--	525.6	76.3	601.9
2053	218	533.9	--	--	533.9	77.6	611.5
2054	223	552.8	--	--	552.8	78.9	631.7
2055	--	--	--	--	--	92.5	92.5
2056	--	--	--	--	--	23.7	23.7
Subtotal	6189	13011.1	--	112.1	13123.2	2524.4	15647.6

Annual Funding 2031 | Procurement | Aircraft Procurement, Army							
Fiscal Year	Quantity	BY 2019 $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2024	--	--	--	19.2	19.2	0.8	20.0
2025	107	220.5	--	28.0	248.5	35.6	284.1
2026	105	203.9	--	48.2	252.1	53.9	306.0
2027	212	352.3	--	--	352.3	84.7	437.0
2028	212	334.5	--	--	334.5	85.1	419.6
2029	212	325.4	--	--	325.4	93.5	418.9
2030	212	316.0	--	--	316.0	101.7	417.7
2031	212	308.7	--	--	308.7	61.1	369.8
2032	212	300.4	--	--	300.4	56.6	357.0
2033	212	295.5	--	--	295.5	54.7	350.2
2034	212	291.4	--	--	291.4	54.1	345.5
2035	212	287.8	--	--	287.8	52.5	340.3
2036	212	280.6	--	--	280.6	52.1	332.7
2037	212	277.8	--	--	277.8	51.2	329.0
2038	212	275.2	--	--	275.2	51.0	326.2
2039	212	272.9	--	--	272.9	50.7	323.6
2040	212	270.7	--	--	270.7	50.5	321.2
2041	212	268.7	--	--	268.7	50.4	319.1
2042	212	266.0	--	--	266.0	49.9	315.9
2043	212	255.4	--	--	255.4	48.7	304.1
2044	212	263.3	--	--	263.3	48.9	312.2
2045	212	263.2	--	--	263.2	44.4	307.6
2046	212	261.7	--	--	261.7	41.5	303.2
2047	212	260.4	--	--	260.4	38.5	298.9
2048	212	259.1	--	--	259.1	40.3	299.4
2049	218	263.8	--	--	263.8	39.5	303.3
2050	218	265.7	--	--	265.7	38.6	304.3
2051	218	264.9	--	--	264.9	38.4	303.3
2052	218	263.7	--	--	263.7	38.3	302.0
2053	218	262.6	--	--	262.6	38.2	300.8
2054	223	266.6	--	--	266.6	38.1	304.7
2055	--	--	--	--	--	43.7	43.7
2056	--	--	--	--	--	11.0	11.0
Subtotal	6189	8298.7	--	95.4	8394.1	1638.2	10032.3

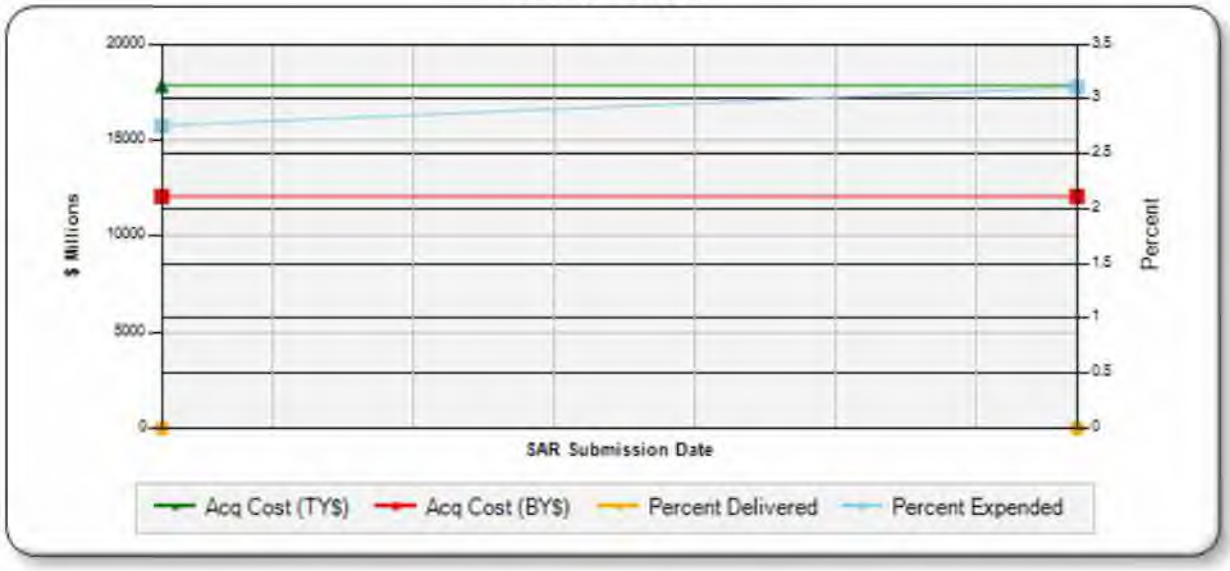
Annual Funding 2020 | Acq O&M | Operation and Maintenance, Army	
Fiscal Year	TY $M
	Total Program
2019	1.3
2020	1.7
2021	1.9
2022	2.5
2023	3.0
2024	2.4
2025	3.1
2026	3.1
2027	3.2
2028	3.3
2029	3.3
2030	3.4
2031	3.5
2032	3.5
2033	3.6
2034	3.7
2035	3.7
2036	3.8
2037	3.9
2038	4.0
2039	4.0
2040	4.1
2041	4.2
2042	4.3
2043	4.4
2044	4.5
2045	3.4
2046	2.3
2047	1.3
2048	1.3
2049	1.3
2050	1.3
2051	1.4
2052	1.4
2053	1.4
2054	1.5
2055	0.8
Subtotal	104.8

Annual Funding 2020 | Acq O&M | Operation and Maintenance, Army	
Fiscal Year	BY 2019 $M
	Total Program
2019	1.3
2020	1.6
2021	1.8
2022	2.3
2023	2.7
2024	2.1
2025	2.7
2026	2.7
2027	2.7
2028	2.7
2029	2.7
2030	2.7
2031	2.7
2032	2.7
2033	2.7
2034	2.7
2035	2.7
2036	2.7
2037	2.7
2038	2.7
2039	2.6
2040	2.7
2041	2.7
2042	2.7
2043	2.7
2044	2.7
2045	2.0
2046	1.3
2047	0.7
2048	0.7
2049	0.7
2050	0.7
2051	0.7
2052	0.7
2053	0.7
2054	0.7
2055	0.4
Subtotal	75.0

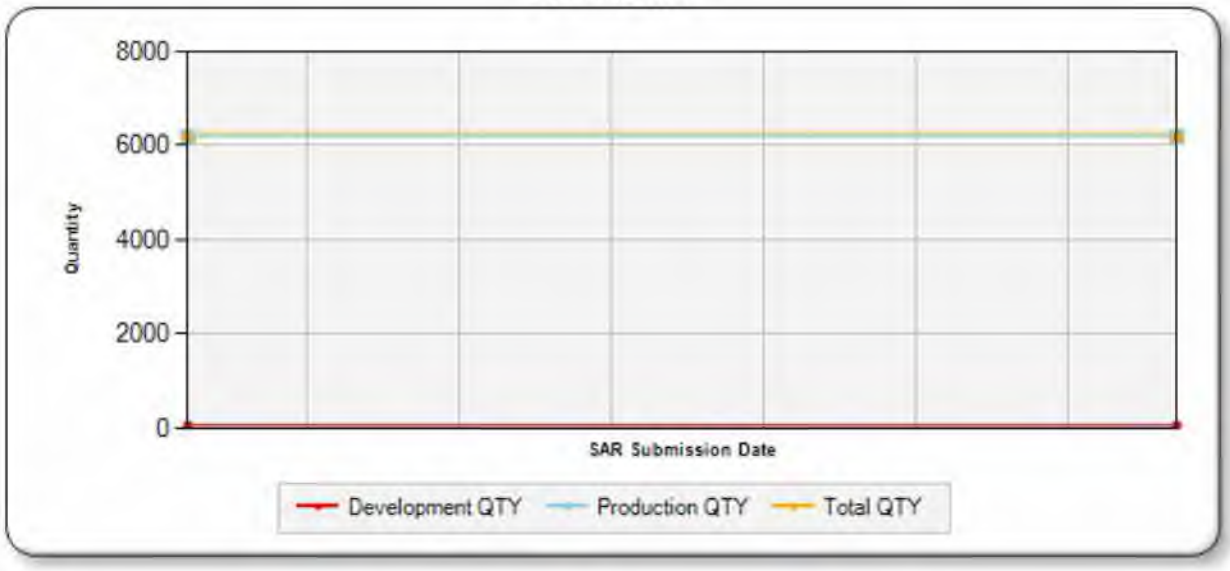
Charts

ITEP first began SAR reporting in September 2019

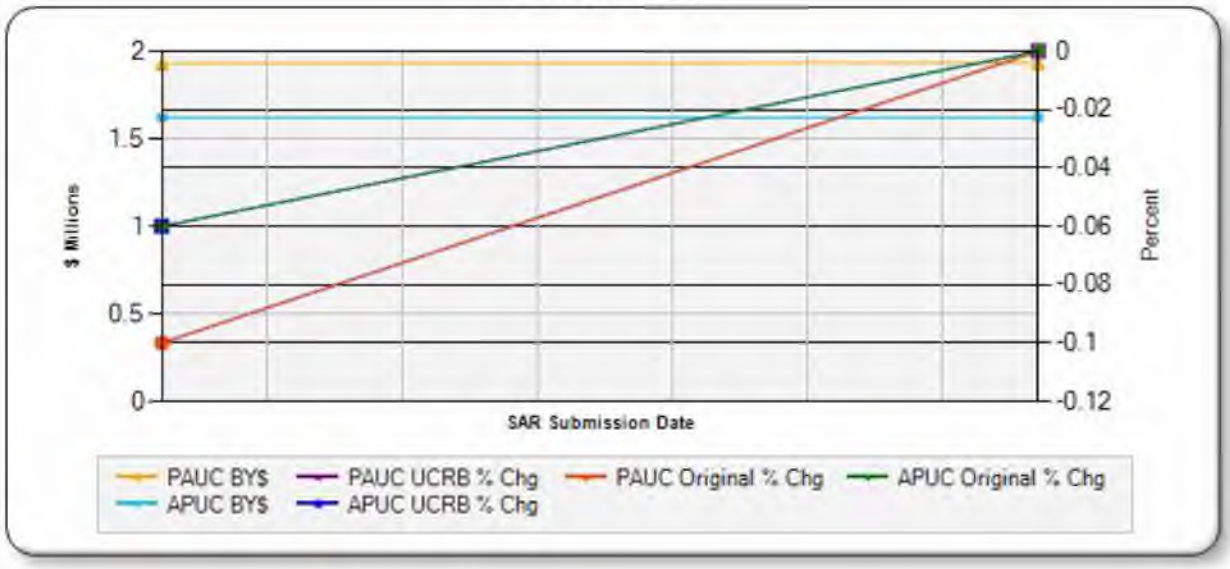
Program Acquisition Cost - ITEP
Base Year 2019 $M



Quantity - ITEP



Unit Cost - ITEP
Base Year 2019 $M



Risks

Significant Schedule and Technical Risks

Significant Schedule and Technical Risks	
Current Estimate (December 2019)	
1.	There are no known risks for this program at this time.

Risks

Risk and Sensitivity Analysis

Risks and Sensitivity Analysis	
Current Baseline Estimate (August 2019)	
1.	The Current Baseline Estimate is based on the 2019 Milestone B Army Cost Position. The PB FY 2021-2025 fully funds the EMD program.
Original Baseline Estimate (August 2019)	
1.	The Improved Turbine Engine Program Original Baseline was established by the Army Acquisition Executive on January 29, 2019. The Milestone B Army Cost Position was used to establish the APB. The most significant cost drivers in the estimate were the projected engine unit price and aircraft platform integration costs.
Revised Original Estimate (N/A)	
None	
Current Procurement Cost (December 2019)	
1.	The Current Procurement Cost uses the Original Baseline Estimate.

Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
Approval Date	1/29/2019	1/29/2019
Approved Quantity	255	255
Reference	MS B ADM	MS B ADM
Start Year	2024	2024
End Year	2026	2026

Foreign Military Sales

None

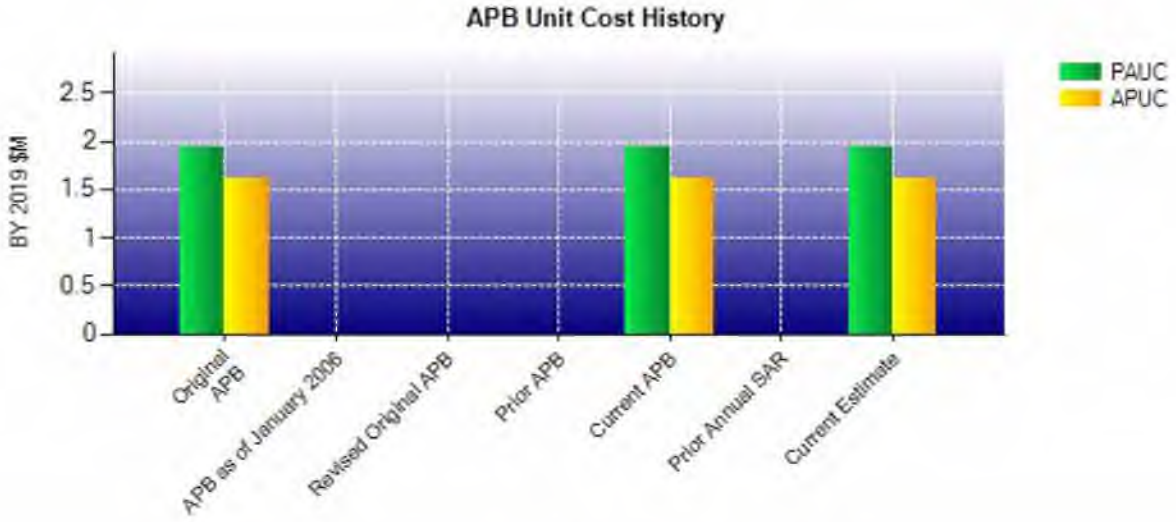
Nuclear Costs

None

Unit Cost

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2019 $M Current UCR Baseline (Aug 2019 APB)	BY 2019 $M Current Estimate (Dec 2019 SAR)	% Change
Program Acquisition Unit Cost			
Cost	12088.4	12089.1	
Quantity	6258	6258	
Unit Cost	1.932	1.932	0.00
Average Procurement Unit Cost			
Cost	10030.5	10032.3	
Quantity	6189	6189	
Unit Cost	1.621	1.621	0.00

Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2019 $M Original UCR Baseline (Aug 2019 APB)	BY 2019 $M Current Estimate (Dec 2019 SAR)	% Change
Program Acquisition Unit Cost			
Cost	12088.4	12089.1	
Quantity	6258	6258	
Unit Cost	1.932	1.932	0.00
Average Procurement Unit Cost			
Cost	10030.5	10032.3	
Quantity	6189	6189	
Unit Cost	1.621	1.621	0.00



APB Unit Cost History					
Item	Date	BY 2019 $M		TY $M	
		PAUC	APUC	PAUC	APUC
Original APB	Aug 2019	1.932	1.621	2.855	2.528
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	N/A	N/A	N/A	N/A	N/A
Current APB	Aug 2019	1.932	1.621	2.855	2.528
Prior Annual SAR	N/A	N/A	N/A	N/A	N/A
Current Estimate	Dec 2019	1.932	1.621	2.855	2.528

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	
2.855	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.855

Current SAR Baseline to Current Estimate (TY $M)									
Initial APUC Development Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
2.528	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.528

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	Jan 2019	N/A	Jan 2019
Milestone C	N/A	Jul 2024	N/A	Jul 2024
IOC	N/A	Jul 2027	N/A	Jul 2027
Total Cost (TY $M)	N/A	17865.9	N/A	17864.4
Total Quantity	N/A	6258	N/A	6258
PAUC	N/A	2.855	N/A	2.855

Cost Variance

Summary TY $M					
Item	RDT&E	Procurement	MILCON	Acq O&M	Total
SAR Baseline (Development Estimate)	2113.5	15647.6	--	104.8	17865.9
Previous Changes					
Economic	+2.2	+11.5	--	+0.1	+13.8
Quantity	--	--	--	--	--
Schedule	--	--	--	--	--
Engineering	--	--	--	--	--
Estimating	-2.2	-11.5	--	-0.1	-13.8
Other	--	--	--	--	--
Support	--	--	--	--	--
Subtotal	--	--	--	--	--
Current Changes					
Economic	-2.2	-14.4	--	-0.1	-16.7
Quantity	--	--	--	--	--
Schedule	--	--	--	--	--
Engineering	--	--	--	--	--
Estimating	+0.7	+13.8	--	+0.1	+14.6
Other	--	--	--	--	--
Support	--	+0.6	--	--	+0.6
Subtotal	-1.5	--	--	--	-1.5
Total Changes	-1.5	--	--	--	-1.5
Current Estimate	2112.0	15647.6	--	104.8	17864.4

Summary BY 2019 $M					
Item	RDT&E	Procurement	MILCON	Acq O&M	Total
SAR Baseline (Development Estimate)	1983.0	10030.5	--	74.9	12088.4
Previous Changes					
Economic	--	--	--	--	--
Quantity	--	--	--	--	--
Schedule	--	--	--	--	--
Engineering	--	--	--	--	--
Estimating	-1.9	-6.2	--	--	-8.1
Other	--	--	--	--	--
Support	--	-1.2	--	--	-1.2
Subtotal	-1.9	-7.4	--	--	-9.3
Current Changes					
Economic	--	--	--	--	--
Quantity	--	--	--	--	--
Schedule	--	--	--	--	--
Engineering	--	--	--	--	--
Estimating	+0.7	+7.7	--	+0.1	+8.5
Other	--	--	--	--	--
Support	--	+1.5	--	--	+1.5
Subtotal	+0.7	+9.2	--	+0.1	+10.0
Total Changes	-1.2	+1.8	--	+0.1	+0.7
Current Estimate	1981.8	10032.3	--	75.0	12089.1

Previous Estimate: September 2019

RDT&E	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-2.2
Adjustment for current and prior escalation. (Estimating)	-0.3	-0.3
Realignment of funds to Army Budget Office for high priority Army programs (Estimating)	-1.4	-1.5
Adjustment to cost risk (Estimating)	+2.4	+2.5
RDT&E Subtotal	+0.7	-1.5

Procurement	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-14.4
Adjustment to cost risk (Estimating)	+7.7	+13.8
Increase in Other Support. (Support)	+1.0	+0.6
Increase in Initial Spares. (Support)	+0.5	0.0
Procurement Subtotal	+9.2	0.0

Acq O&M	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-0.1
Adjustment to cost risk (Estimating)	+0.1	+0.1
Acq O&M Subtotal	+0.1	0.0

Contracts

Contract Identification

Appropriation: RDT&E
Contract Name: Engine EMD Contract
Contractor: General Electric Aviation
Contractor Location: 1000 Western Ave
Lynn, MA 01905
Contract Number: W58RGZ-19-C-0003
Contract Type: Fixed Price Incentive(Firm Target) (FPIF)
Award Date: February 01, 2019
Definitization Date:

Contract Price							
Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
517.4	540.0	N/A	517.4	540.0	N/A	517.4	517.4

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (7/31/2019)	0.0	0.0
Previous Cumulative Variances	0.0	0.0
Net Change	+0.0	+0.0

Cost and Schedule Variance Explanations

None

General Contract Variance Explanation

Cost and schedule variances are not reported for this contract. Contract recently awarded and earned value management reporting has not yet commenced.

Contract Identification

Appropriation: RDT&E
Contract Name: Apache Integration Phase I
Contractor: The Boeing Company
Contractor Location: 5000 E McDowell Rd
Mesa, AZ 85215
Contract Number: W58RGZ-19-C-0054
Contract Type: Cost Plus Fixed Fee (CPFF)
Award Date: August 28, 2019
Definitization Date:

Contract Price							
Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
33.6	N/A	N/A	33.6	N/A	N/A	33.6	33.6

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (9/30/2019)	0.0	0.0
Previous Cumulative Variances	0.0	0.0
Net Change	+0.0	+0.0

Cost and Schedule Variance Explanations

None

General Contract Variance Explanation

Cost and schedule variances are not reported for this contract. Contract recently awarded and earned value management reporting has not yet commenced.

Contract Identification

Appropriation: RDT&E
Contract Name: Black Hawk Integration Phase I
Contractor: Sikorsky Aircraft Corporation
Contractor Location: 6900 Main Street
Stratford, CT 06614-1385
Contract Number: W911W6-14-D-0002
Contract Type: Cost Plus Fixed Fee (CPFF)
Award Date: September 09, 2019
Definitization Date:

Contract Price							
Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
24.1	N/A	0	24.1	N/A	0	24.1	24.1

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (9/9/2019)	0.0	0.0
Previous Cumulative Variances	0.0	0.0
Net Change	+0.0	+0.0

Cost and Schedule Variance Explanations

None

General Contract Variance Explanation

Cost and schedule variances are not reported for this contract. Contract recently awarded and earned value management reporting has not yet commenced.

Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	69	0.00%
Production	0	0	6189	0.00%
Total Program Quantity Delivered	0	0	6258	0.00%

Expended and Appropriated (TY $M)			
Total Acquisition Cost	17864.4	Years Appropriated	9
Expended to Date	555.5	Percent Years Appropriated	20.00%
Percent Expended	3.11%	Appropriated to Date	860.4
Total Funding Years	45	Percent Appropriated	4.82%

The above data is current as of February 10, 2020.

Operating and Support Cost

Cost Estimate Details

Date of Estimate:

Source of Estimate:

Quantity to Sustain:

Unit of Measure:

Service Life per Unit:

Fiscal Years in Service:

There are no O&M costs tracked in the APB. ITEP will deliver a sub-component to other weapon systems. O&S costs are not tracked at the sub-component level.

ITEP has a Key System Attribute (KSA) which defines threshold and objective values for O&M costs per engine operating hour which are defined in the CDD. ITEP will be tracking performance against this KSA.

Sustainment Strategy

None

Antecedent Information

The antecedent system for ITEP is the T700-GE-701D engine used in both the Apache and Black Hawk aircraft.

Annual O&S Costs BY2019 $M		
Cost Element	**ITEP**	**No Antecedent**
Unit-Level Manpower	--	--
Unit Operations	--	--
Maintenance	--	--
Sustaining Support	--	--
Continuing System Improvements	--	--
Indirect Support	--	--
Other	--	--
Total	--	--

Item	Total O&S Cost $M			
	ITEP			No Antecedent
	Current Development APB Objective/Threshold		Current Estimate	
Base Year	11276.0	12403.6	N/A	N/A
Then Year	23361.9	N/A	N/A	0.00

O&S Cost Variance

Category	BY 2019 $M	Change Explanations
Prior SAR Total O&S Estimates - Sep 2019 SAR	0.00	
Programmatic/Planning Factors	0.00	
Cost Estimating Methodology	0.00	
Cost Data Update	0.00	
Labor Rate	0.00	
Energy Rate	0.00	
Technical Input	0.00	
Other	0.00	
Total Changes	0.00	
Current Estimate	0.00	

Disposal Estimate Details

Date of Estimate:

Source of Estimate:

Disposal/Demilitarization Total Cost (BY 2019 $M):