Selected Acquisition Report (SAR)

Weather System Follow-on (WSF)

FY 2024 President's Budget

Defense Acquisition Visibility Environment (DAVE)

Table of Contents

Common Acronyms and Abbreviations

$B - Billions of Dollars
$K - Thousands of Dollars
$M - Millions of Dollars
ACAT - Acquisition Category
Acq O&M - Acquisition-Related Operations and Maintenance
ADM - Acquisition Decision Memorandum
APB - Acquisition Program Baseline
APPN - Appropriation
APUC - Average Procurement Unit Cost
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
FMS - Foreign Military Sales
FOC - Full Operational Capability
FRP - Full Rate Production
FY - Fiscal Year
FYDP - Future Years Defense Program
ICE - Independent Cost Estimate
Inc - Increment
IOC - Initial Operational Capability
JROC - Joint Requirements Oversight Council
KPP - Key Performance Parameter
LRIP - Low Rate Initial Production
MDA - Milestone Decision Authority
MDAP - Major Defense Acquisition Program
MILCON - Military Construction
N/A - Not Applicable
O&M - Operations and Maintenance
O&S - Operating and Support
ORD - Operational Requirements Document
OSD - Office of the Secretary of Defense
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
U.S. - United States
UCR - Unit Cost Reporting
USD(A&S) - Under Secretary of Defense (Acquisition and Sustainment)
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)

Program Information

Program Name

Weather System Follow-on (WSF)

DoD Component

Air Force

Responsible Office

Program Manager

Name: Col Dennis R. Birchenough
Date Assigned: March 21, 2022
Address: 483 N. Aviation Blvd
El Segundo, CA 90245
Phone: 310-653-9291

Mission and Description

Weather System Follow-on (WSF) is a Low-Earth Orbit microwave imaging system developed and delivered by the United States Space Force's Space Systems Command. WSF is the next generation of space-based passive microwave sensing technology. It will provide U.S. and Allied warfighters with essential weather data, including the measurement of ocean surface wind speed and direction, ice thickness, snow depth, soil moisture, and local spacecraft Energetic Charged Particle environment. The ocean surface wind speed measurement enables tropical cyclone intensity determination by the Joint Typhoon Warning Center. The data gathered by WSF will be provided to meteorologists in support of the generation of a wide variety of weather products necessary to conduct mission planning and operations globally.

WSF is an Acquisition Category IB program comprised of two Space Vehicles and their associated command, control, and data dissemination network. Global environmental monitoring data is gathered, stored, and down-linked through the Satellite Control Network and disseminated to Air Force and Navy weather centers. Additionally, data is broadcast real time by the satellite for utilization by heritage Direct Readout Terminals that use the data for local weather forecasting.

Executive Summary

WSF

Program Highlights Since Last Report

Congress approved a $15.6M FY 2022 Above Threshold Reprogramming (ATR). The Program Office received sufficient funds to award Space Vehicle (SV) 2 (SV-2) and after a successful Interim Program Review (IPR) on November 2, 2022, the (SV-2) contract was awarded on November 10, 2022. SV-2 is on track to operationally replace SV-1 in CY2027.

The WSF team made significant progress during this reporting period and WSF SV-1 is on track for a September 2023 Availability for Launch. Notable accomplishments include the completion of all SV-1 spacecraft and payload subsystem production and testing. The production and testing of the primary and secondary payloads, Microwave Imager (MWI) and Energetic Charged Particle sensors, were completed in October 2022. The SV-1 Spacecraft Integration Readiness Review (IRR) and Test Readiness Review (TRR) were held concurrently on October 18, 2022. The SV-1 integration and test phase began on October 19, 2022. The Ground Segment fully completed three of the four planned testing events. The dry-run for the fourth and final Ground Test Event was completed November 4, 2022, and the final test was completed on February 3, 2023.

The WSF satellite design highly leverages a heritage bus design, and similarly, the WSF ground services provider, NRL Blossom Point Tracking Facility (BPTF), is heavily leveraging existing ground capabilities. It is technically impractical and cost prohibitive to redesign WSF using a Modular Open System Approach (MOSA).

WSF and Weather System Follow-on – Microwave (WSF-M) are the same and used interchangeably throughout programmatic and contractual documentation.

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
Nov - 2022	Awarded Firm Fixed Price Contract Option for WSF-M Space Vehicle-2.
Nov - 2022	Interim Program Review completed; Space Force Program Executive Officer for Space Sensing approved exercising the contract option for Space Vehicle-2.
Oct - 2022	Microwave Imager (MWI) and Energetic Charged Particle (ECP) sensor delivered for Space Vehicle-1 Integration and Test.
Oct - 2022	Spacecraft Integration Readiness Review (IRR) and Test Readiness Review (TRR) completed.
Nov - 2021	MWI Reflector Deployment Assembly delivered to I&T.
Aug - 2021	Cyber Vulnerability Test 1 completed.
Aug - 2021	Primary Bus Structure completed.
Jun - 2021	Ground System Microwave Sensor Data Processing Software completed.
May - 2021	Microwave Imager (MWI) entered Integration and Test (I&T).
Apr - 2021	ECP Engineering Design Unit USSF completed testing.
Dec - 2020	Mission Assurance Technical Interchange Meeting completed.
Oct - 2020	Director, Operational Test and Evaluation approved the WSF-M TEMP.
Aug - 2020	Delta Interoperability Analysis Exercise completed.
Jun - 2020	SAF/AQ approved the WSF APB.

Date	Significant Development Description
May - 2020	SAE certified WSF prior to Milestone B, per 10 U.S.C. § 2366b, and approved Milestone B.
Apr - 2020	System CDR completed.
Feb - 2020	CDD validation by the JROC.
Jan - 2020	Ground CDR completed.
Dec - 2019	Ground Final Design Review completed.
Dec - 2019	Spacecraft CDR completed.
Oct - 2019	Cyber Table Top Mission-Based Cyber Risk Assessment completed.
Sep - 2019	Air Force Review Board meeting with SAE for MS B, completion pending the Joint Requirements Oversight Council (JROC) validation of the CDD.
Sep - 2019	Ground Initial Design Review and CEASE III ECP sensor Delta CDR completed.
Aug - 2019	Delta Ground PDR completed.
Jul - 2019	Microwave Imager CDR completed.
Nov - 2018	System PDR completed.
Oct - 2018	Spacecraft Preliminary Design Review (PDR) completed.
Aug - 2018	Compact Environment Anomaly Sensor (CEASE III) ECP Engineering Design Unit completed.
Jul - 2018	Ground System SRR completed.
May - 2018	Spacecraft and Payload System Readiness Review (SRR) completed.
Nov - 2017	The Program Office awarded a FFP contract to Ball Aerospace and Technologies Corporation.
Jun - 2017	Chief of Staff of the AF approved WSF-M Draft CDD and validated Key Performance Parameters.
Jan - 2017	The Principal Deputy Assistant Secretary of the Air Force (Acquisition and Logistics) signed ADM authorizing MS B entrance criteria. Determined the streamlined Weather System Follow-on -Microwave (WSF-M) Draft Capability Development Document (CDD) in AF initial staffing exhibited sufficient requirements maturity to release the WSF-M for Proposal.
Dec - 2015	The Program Office released a Request for Information requesting industry's intent and ability to develop, launch, and operate space-based commercial services that could meet the 12 SBEM AoA weather gaps.
Mar - 2015	SECAF policy memo directed each pre-Milestone B (MS B) United States Air Force satellite program to integrate an Energetic Charged Particles (ECP) sensor for anomaly attribution.
Sep - 2014	JROC reviewed the Space Based Environmental Monitoring (SBEM) Analysis of Alternative (AoA) results and supported recommendation of a materiel solution to address Gaps 3, 8, and 11.
Oct - 2012	Obtained authorization to enter into Materiel Solution Analysis phase and designated as a pre -Major Defense Acquisition Program with the Air Force (AF) as the lead component.

Schedule

WSF

Events	Milestone Baseline Objective	Current Baseline Objective/Threshold		Current Estimate/Actual	Deviation
CDR	Mar 2020	Mar 2020	Sep 2020	Apr 2020	
SV-1 Available for Launch	Sep 2023	Sep 2023	Mar 2024	Sep 2023	
SV-1 IOC	Mar 2024	Mar 2024	Sep 2024	May 2024	
SV-1 FOC	Mar 2025	Mar 2025	Sep 2025	Apr 2025	
SV-2 Available for Launch	Jul 2027	Jul 2027	Jan 2028	Jul 2027	

Schedule Note

The SV-1 IOC and FOC milestones current estimate dates were adjusted from March 2024 and March 2025 to May 2024 and April 2025, respectively, due to a new Initial Launch Capability (ILC) No Earlier Than Date in January 2024. The initial ILC window on the launch vehicle contract at time of award was between December 2023 and February 2024. The USSF Launch Program Office refines the ILC window to a thirty-day period at least one year prior to the projected launch date. The ILC window is further refined to specific dates at approximately six months before the projected launch date.

Performance

WSF

Performance Characteristics					
Development APB Objective	**Current Baseline Objective/Threshold**		**Demonstrated Performance**	**Current Estimate/Actual**	**Deviation**
(KPP) - OSVW and TCI HSR - OSVW					
OSVW <= 25 km	OSVW <= 25 km	OSVW <= 30 km	TBD	OSVW <= 30 km	
(KPP) - OSVW and TCI Coverage					
Global over ice-free oceans, during the stated refresh period	Global over ice-free oceans, during the stated refresh period	(T=O) Global over ice-free oceans, during the stated refresh period	TBD	Global over ice-free oceans, during the stated refresh period	
(KPP) - OSVW and TCI Refresh Rate					
<= 6 hours	<= 6 hours	<= 22 hours at a point of interest + 100 km in all directions from the point	TBD	≤ 22 hours at a point of interest + 100 km in all directions from the point	
(KPP) - OSVW Measurement Uncertainty, Speed & Direction - Range 1					
Actual Wind Speed 5-7 m/s, Speed Uncertainty <= 1.5 m/s, Direction Uncertainty <= 30 degrees	Actual Wind Speed 5-7 m/s, Speed Uncertainty <= 1.5 m/s, Direction Uncertainty <= 30 degrees	(T=O) Actual Wind Speed 5-7 m/s, Speed Uncertainty <= 1.5 m/s, Direction Uncertainty <= 30 degrees	TBD	Actual Wind Speed 5-7 m/s, Speed Uncertainty <= 1.5 m/s, Direction Uncertainty <= 30 degrees	
(KPP) - OSVW Measurement Uncertainty, Speed & Direction - Range 2					
Actual Wind Speed >7-10 m/s, Speed Uncertainty <= 1.5 m/s, Direction Uncertainty <= 20 degrees	Actual Wind Speed >7-10 m/s, Speed Uncertainty <= 1.5 m/s, Direction Uncertainty <= 20 degrees	(T=O) Actual Wind Speed >7-10 m/s, Speed Uncertainty <= 1.5 m/s, Direction Uncertainty <= 20 degrees	TBD	Actual Wind Speed >7-10 m/s, Speed Uncertainty <= 1.5 m/s, Direction Uncertainty <= 20 degrees	
(KPP) - OSVW Measurement Uncertainty, Speed & Direction - Range 3					
Actual Wind Speed >10-25 m/s, Speed Uncertainty <= 2 m/s, Direction Uncertainty <= 15 degrees	Actual Wind Speed >10-25 m/s, Speed Uncertainty <= 2 m/s, Direction Uncertainty <= 15 degrees	(T=O) Actual Wind Speed >10-25 m/s, Speed Uncertainty <= 2 m/s, Direction Uncertainty <= 15 degrees	TBD	Actual Wind Speed >10-25 m/s, Speed Uncertainty <= 2 m/s, Direction Uncertainty <= 15 degrees	

(KPP) OSVW Measurement Uncertainty, Speed & Direction - Range 4					
Actual Wind Speed >25 m/s, Speed Uncertainty N/A; expected to be accurate, Direction Uncertainty N/A; expected to be accurate	Actual Wind Speed >25 m/s, Speed Uncertainty N/A; expected to be accurate, Direction Uncertainty N/A; expected to be accurate	(T=O) Actual Wind Speed >25 m/s, Speed Uncertainty N/A; expected to be accurate, Direction Uncertainty N/A; expected to be accurate	TBD	Actual Wind Speed >25 m/s, Speed Uncertainty N/A; expected to be accurate, Direction Uncertainty N/A; expected to be accurate	
(KPP) - OSVW and TCI Latency - Real-Time Data - Latency					
RTD threshold latency is <= 15 minutes, at least 95% of the time, for afloat operations when WSF-M satellite is in line of sight of tactical users.	RTD threshold latency is <= 15 minutes, at least 95% of the time, for afloat operations when WSF-M satellite is in line of sight of tactical users.	(T=O) RTD threshold latency is <= 15 minutes, at least 95% of the time, for afloat operations when WSF-M satellite is in line of sight of tactical users.	TBD	RTD threshold latency is <= 15 minutes, at least 95% of the time, for afloat operations when WSF-M satellite is in line of sight of tactical users.	
(KPP) - OSVW and TCI Latency - Stored Mission Data - Latency					
Latency threshold for SMD is <= 2 hours, at least 95% of the time as measured over a 30 day period and is defined as the maximum time from data acquisition until delivery of the collected SMD to the Weather Centers' enterprise security boundaries.	Latency threshold for SMD is <= 2 hours, at least 95% of the time as measured over a 30 day period and is defined as the maximum time from data acquisition until delivery of the collected SMD to the Weather Centers' enterprise security boundaries.	(T=O) Latency threshold for SMD is <= 2 hours, at least 95% of the time as measured over a 30 day period and is defined as the maximum time from data acquisition until delivery of the collected SMD to the Weather Centers' enterprise security boundaries.	TBD	Latency threshold for SMD is <= 2 hours, at least 95% of the time as measured over a 30 day period and is defined as the maximum time from data acquisition until delivery of the collected SMD to the Weather Centers' enterprise security boundaries.	
(KPP) - Survivability					
Autonomous Operations - 60 days; Protect against and mitigate cyber domain attacks	Autonomous Operations - 60 days; Protect against and mitigate cyber domain attacks	(T=O) Autonomous Operations - 60 days; Protect against and mitigate cyber domain attacks	TBD	Autonomous Operations - 60 days; Protect against and mitigate cyber domain attacks	
(KPP) - Sustainment					

System Ao - 0.92; Space Vehicle Ao - 0.99	System Ao - 0.92; Space Vehicle Ao - 0.99	(T=O) System Ao - 0.92; Space Vehicle Ao - 0.99	TBD	System Ao - 0.92; Space Vehicle Ao - 0.99	
(KPP) - OSVW and TCI HSR - TCI					
TCI is defined as the measure of the maximum 1-minute averaged sustained wind speed, the associated maximum instantaneous gusts, the associated minimum sea-level pressure, and the radii of the 34-knot, 50-knot and 64-knot winds around a tropical cyclone. WSF-M will provide mission data to support TCI assessment to <= 15 km in the Ka and W band propagation windows.	TCI is defined as the measure of the maximum 1-minute averaged sustained wind speed, the associated maximum instantaneous gusts, the associated minimum sea-level pressure, and the radii of the 34-knot, 50-knot and 64-knot winds around a tropical cyclone. WSF-M will provide mission data to support TCI assessment to <= 15 km in the Ka and W band propagation windows.	(T=O) TCI is defined as the measure of the maximum 1-minute averaged sustained wind speed, the associated maximum instantaneous gusts, the associated minimum sea-level pressure, and the radii of the 34-knot, 50-knot and 64-knot winds around a tropical cyclone. WSF-M will provide mission data to support TCI assessment to <= 15 km in the Ka and W band propagation windows.	TBD	TCI is defined as the measure of the maximum 1-minute averaged sustained wind speed, the associated maximum instantaneous gusts, the associated minimum sea-level pressure, and the radii of the 34-knot, 50-knot and 64-knot winds around a tropical cyclone. WSF-M will provide mission data to support TCI assessment to ≤ 15 km in the Ka and W band propagation windows.	

Requirement Reference

CDD dated February 19, 2020.

Performance Note

The performance characteristics of the WSF-M program are defined by the CDD for WSF-M, reviewed and validated by the JROC Joint Capabilities Board on February 19, 2020.

1. Ocean Surface Vector Wind (OSVW) measurement uncertainty (speed & direction) are validated through on orbit- testing and truth data comparison. Truth data is derived from quality-controlled buoy data and model predictions.
2. OSVW and Tropical Cyclone Intensity (TCI) Latency are verified via on-orbit testing during the Initial Operational Capability phase.
3. OSVW and TCI Refresh Rates are verified via analysis using orbital parameters and off-nadir angles and validated post orbital insertion.
4. OSVW and TCI Coverage are verified via analysis using orbital parameters and validated post orbital insertion.
5. OSVW and TCI HSR are verified by combining ground-measured antenna beam patterns with analysis incorporating spin speed, instrument geometry, and integration time.
6. Survivability is validated via a combination of flight vehicle demonstration and simulation on the FVTB.
7. Sustainment: SV reliability and system availability are verified through analysis.

Acquisition Budget Estimate

WSF

Total Acquisition Cost

		Milestone APB	Current Baseline		Budget Estimate PB 2024		
Category	**Base Year**	**Objective (BY$M)**	**Objective (BY$M)**	**Threshold (BY$M)**	**BY$M**	**TY$M**	**Deviation**
RDT&E	2019	982.7	982.7	1,081.0	938.876	999.9	
Procurement							
MILCON							
Acq. O&M							
Total	2019	982.7	982.7	1,081.0	938.9	999.9	
PAUC	2019	491.350	491.350		469.438	499.950	
APUC							

Budget Note

Net increase of $11.3M in FY 2022 due to Above Threshold Reprogramming ($13M) and decrease due to Congressional General Reduction ($1.7M).

Decrease of $0.2M in FY 2023 due to Federally Funded Research Development Center Redux.

Increase of $10.6M in FY 2024 from PE 1206422SF, Weather System Follow-On (WSF), Project 644289, BA 04, to PE 1206422SF, WSF, Project 65A039, BA 05.

Increase of $7.0M in FY 2025 from PE 1206422SF, Weather System Follow-On (WSF), Project 644289, BA 04, to PE 1206422SF, WSF, Project 65A039, BA 05.

FY 2024-2028:

- -$1.3M to realign funding to APPN 3410, PE 1207804SF (SAG 13C), for fiscal policy compliance as Space Systems Command (SSC) establishes Headquarters functions and a Chief Information Office (CIO) for integrated cybersecurity
- +$1.4M for Inflation Rates for Non-Pay and Non-Fuel Purchases
- +$46M Additional funding for WSF-M SV-2

FY 2028: +$25.2M Baseline Extension

Total End Item Quantity

Quantity Category	Current APB Quantity	Current Estimate Quantity
Development	2	2
Procurement	0	0
O&M-Acquired	--	--

Unit Cost

Current Baseline Compared with Current Estimate			
Category (BY2019$M)	**Current APB**	**Current Estimate**	**% Change**
Program Acquisition Unit Cost			
Cost	982.700	938.876	-4.46%
Quantity	2	2	
Unit Cost	491.350	469.438	-4.46%
Average Procurement Unit Cost			
Cost			
Quantity			
Unit Cost			

Original Baseline Compared with Current Estimate			
Category (BY2019$M)	**Original APB**	**Current Estimate**	**% Change**
Program Acquisition Unit Cost			
Cost	982.7	938.9	-4.46%
Quantity	2	2	
Unit Cost	491.350	469.438	-4.46%
Average Procurement Unit Cost			
Cost			
Quantity			
Unit Cost			

Risks

WSF

Risk and Sensitivity Analysis

Risk and Sensitivity Analysis
Current Procurement Cost (December - 2022)
1. This program does not have Procurement Costs making this risk section not applicable.
Original Baseline Estimate (June - 2020)
1. Total Acquisition Cost (BY 2019) - $982.7M (Quantity 2); PAUC - $491.350M (Quantity 2); Risks - A mathematically derived confidence level was not computed for this Life Cycle Cost Estimate (LCCE). The LCCE does however represent the expected value, or mean, of the cost estimate distribution, typically between the 50 and 65% confidence levels. This LCCE takes into consideration relevant risks, including ordinary levels of external and unforeseen events. It aims to provide sufficient resources to execute the program under normal conditions encountering average levels of technical, schedule, and programmatic risk and external influence.
Current Baseline Estimate (June - 2020)
1. Risks identified in the Current Baseline Estimate (June 2020) is the same as the Original Baseline Estimate.

Significant Schedule Risks

Significant Schedule Risks
Current Estimate (December - 2022)
1. This program does not have Procurement Costs making this risk section not applicable.
Milestone B (May - 2020)
1. Total Acquisition Cost (BY 2019) - $982.7M (Quantity 2); PAUC - $491.350M (Quantity 2); Risks - A mathematically derived confidence level was not computed for this Life Cycle Cost Estimate (LCCE). The LCCE does however represent the expected value, or mean, of the cost estimate distribution, typically between the 50 and 65% confidence levels. This LCCE takes into consideration relevant risks, including ordinary levels of external and unforeseen events. It aims to provide sufficient resources to execute the program under normal conditions encountering average levels of technical, schedule, and programmatic risk and external influence. 2. Designation of a Continuity of Operations (COOP) location by United States Space Force (USSF). A COOP designation is needed if the capability is expected by USSF for initial operations of Space Vehicle-1. The designation includes the site location, manning, and associated resources and must be designated in time to prepare and field the capability.

Technologies and Systems Engineering

Significant Technical Risks
Current Estimate (December - 2022)
1. Risks identified for the Current Estimate align with the Milestone B Risks.
Milestone B (May - 2020)
1. Designation of a COOP location by USSF. A COOP designation is needed if the capability is expected by USSF for initial operations of SV-1. The designation includes the site location, manning, and associated resources and must be designated in time to prepare and field the capability.

Low Rate Initial Production

WSF

There is no LRIP for this program.

Contracts & Efforts

Contract Data ($TYM)	
Contract Number	FA8810-18-C-0002
Effort Number	
Modification Number	P00058
Award Date	11/17/2017
Definitization Date	11/17/2017
Order Number	
CAGE Code/CAGE Legal Name	13993/Ball Aerospace & Technologies Corp
Contract Title	Weather System Follow-on-Microwave
Contract Address	1600 Commerce Street Boulder, CO 80301
Contract Type	Firm-Fixed-Price

Contracts/Effort Price, Quantity, and Performance ($M)		
Initial Target Price	Current Target Price	
$93.7	$502.5	
Initial Ceiling Price	Current Ceiling Price	
N/A	N/A	
Contractor EAC	PM EAC	
$502.5	$502.502	
Initial Quantity	Current Quantity	Delivered Quantity
1	2	0

Contract Note:
Cost and Schedule Variance reporting is not required on this FFP contract. The difference between the Initial Contract Price Target and the Current Contract Price Target is due to the result of multiple contract modifications to include: 1) exercising the WSF-M SV-1 Development and Fabrication option; 2) adding the Microwave Sounder, Microwave Imager end-to-end, and SV Early Integration special studies; 3) COVID-19 Request for Equitable Adjustment, 4) KI-700 Government Furnished Property Request for Equitable Adjustment; 5) realigning the SV-1 schedule within the Government funding profile and transferring ground operations from Schriever Air Force Base to the Naval Research Laboratory Blossom Point Tracking Facility; 6) exercising the WSF-Microwave SV-1 Integration, Test, and Operations option; 7) adding Payload Processing Facility (PPF) requirement effective November 2, 2022, and 8) exercising the WSF-M SV-2 Development and Fabrication option.

Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	2	0.00%
Production	0	0	0	N/A
Total Program Quantity Delivered	0	0	2	0.00%

Expended and Appropriated (TY $M)

Years Appropriated to date: 9

Total Years Appropriated Funding (Current Baseline): 14

Percent Years Appropriated: 64.29%

Then-Year Funding Appropriated as Percentage of Total Acquisition Estimate: 77.12%

Then-Year Funding Expended as Percentage of Total Acquisition Estimate: 63.00%

Total Acquisition Cost: $999.9

Operating and Support Costs

Operating and Support Cost Estimate Breakout

Category (BY2019$ Million)	WSF-M Cost Estimate
Unit-Level Manpower	$16.8
Unit Operations	$5.2
Maintenance	$1.3
Sustaining Support	$43.9
Continued System Improvements	$26.5
Other	$2.1
Total	$95.8

O&S BReakout Note: $2.0M added to “Other” category for Withholds, combined with $0.13M in Total Disposal costs (BY$M).

Operating and Support and Disposal Cost Estimate Compared with Baseline					
	Current Baseline				
Base Year: 2019	Objective (BY$M)	Threshold (BY$M)	Current Estimate (BY$M)	Current Estimate (TY$M)	Deviation
Total O&S	$118.2	$130.0	$95.8	$120.6	
Total Disposal	$0.0	$0.0	$0.13	$0.16	

Note: Decrease in the Total O&S estimate a result of the following: per OSD Guidance, CES 6.0 Indirect Support is no longer required, assumption of autonomous operations, and incorporated the NRL Ground estimate data into methodology.
Total Disposal Cost: Disposal cost not estimated in the SCP which was the basis for the APB.

O&S costs include unit level manpower, unit operations, maintenance, sustaining support, continuing system improvements and indirect support. O&S cost elements include support cost for the Energetic Charged Particle sensor hosted payload. WSF will be integrated into and flown from the Naval Research Labratory Blossom Point Tracking Facility, which is an Enterprise Ground Services (EGS) compatible, unclassified operations center. A backup EGS compatible operations center will be installed at a TBD location. The O&S cost estimate assumes WSF is ready to operate in month end November 2023 and initial O&S activities will start in November 2023. The system has a 5-year service life which will continue to provide coverage until November 2028. If the option for Space Vehicle (SV)2 is exercised, coverage will extend to 2032. If the option for SV2 is not exercised, the O&S estimate will be revised to account for only one SV. The estimate also assumes SVs will have Interim Contractor Support (ICS) for 18 months after each launch, which will include factory/reachback support, software updates and 50% onsite satellite operations center support, with an option for an additional 12 months. ICS will reduce costs in FY 2024-2025 and FY 2027-2029. Unit-Level Manpower assumes a mixture of Air Force and contractors to perform operations, unit-level maintenance, as well as any administrative, security, logistics, safety, engineering, or other mission support functions at the unit level. Maintenance costs for depot level reparables are estimated based on a factor of the hardware investment costs. Sustaining Support costs provide for sustaining engineering and program management at both the Program Office and contractor facilities. Costs of hardware technical refresh and software maintenance post-ICS will be provided through Contractor Logistics Support (CLS). Indirect support activities that cannot be directly attributable to the system (installation support, etc.) are estimated using approved OSD and Air Force Cost Analysis Agency factors.

Operating and Support Costs - Disposal and Unitized Costs

Annual Unitized O&S Cost Definition and Calculation Relative to Total O&S Cost:

The annual O&S Cost was calculated based on the total BY 2019 cost of $95.8 and divided by the expected service life of 5 years and quantity of 2, resulting in an annual O&S Cost of $9.58M based on the January 2022 SBE.

Sustainment Factors	System Name: Weather System Follow-On	Antecedent System Name: N/A
Quantity to Sustain	2	
Unit of Measure	Spacecraft	
Unit Expected Service Life	5	

Base Year: 2019

Annual Unitized O&S Cost by Category Base Year $ Unit:($M)	System Name: Weather System Follow-On	Antecedent System Name: N/A
Unit-Level Manpower	$1.68	
Unit Operations	$0.52	
Maintenance	$0.13	
Sustaining Support	$4.39	
Continued System Improvements	$2.65	
Other	$0.21	
Total O&S	**$9.58**	

Disposal/Demilitarization Cost Estimate

(Base Year $Millions)	System Name: Weather System Follow-On	Antecedent System Name: N/A
Total Disposal	$0.1	

Operating and Support/Disposal Cost Source	
Type:	2021 SBE
Approval Authority and Date:	PEO 01/21/2022
Note:	
None	
Additional O&S Estimate Assumptions:	
None	

Sustainment Strategy:
None
Antecedent Estimate Assumptions:
WSF has no antecedent and provides a new and different capability. The weather capability from the Defense Meteorological Satellite Program was disaggregated, with WSF providing a subset and with sensor support through only one provider, which is fundamentally different from DMSP. Additionally, the command and control approach for WSF utilizes modernized technologies and procedures that are not analogous to those 15+ years ago when the last DMSP satellites were being built.
Calculating Annual O&S Cost per Unit
The annual O&S Cost was calculated based on the total BY 2019 cost of $95.8 and divided by the expected service life of 5 years and quantity of 2, resulting in an annual O&S Cost of $9.58M based on the January 2022 SBE.