REPORT TO CONGRESS

MAJOR PROGRAM ANNUAL REPORT ON NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION SATELLITES TO ACCOMPANY THE FY 2021 BUDGET REQUEST

Developed pursuant to: 33 U.S.C. § 878a(c)(1) and Public Law 116-93

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THE 33 U.S.C. § 878A, SPECIFICALLY 33 U.S.C. § 878A(C)(1), INCLUDED THE FOLLOWING LANGUAGE

(C)(1) Annually, at the same time as the President's annual budget submission to the Congress, the Under Secretary shall transmit to the appropriate congressional committees a report that includes the information required by this section for the satellite development program for which NOAA proposes to expend funds in the subsequent fiscal year. The report under this paragraph shall be known as the Major Program Annual Report.

This report is current as of December 2020 and organized into the following categories:

I. Programs that have submitted a Baseline Report.
II. New programs that have not yet submitted a Baseline Report.

THIS REPORT SATISFIES THE REQUIREMENTS SET FORTH IN 33 U.S.C. § 878A(C)(1).

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I. EXECUTIVE SUMMARY

This document is the Major Program Annual Report on National Oceanic and Atmospheric Administration (NOAA) satellites to accompany the Fiscal Year (FY) 2021 President's Budget request pursuant to the *Explanatory Statement (116-43) accompanying the Consolidated Appropriations Act, 2020 (Public Law 116-93) and 33 U.S.C. § 878a.*

This report includes updates and overall information on the life cycle costs, schedule, and other technical data for NOAA's major satellite programs that have submitted baseline reports to Congress. The Geostationary Operational Environmental Satellite Series-R Program delivered its baseline report to Congress on February 8, 2013. The Joint Polar Satellite System (JPSS) program delivered its Determination of Readiness and Baseline Report to the Congress on November 14, 2014. The Polar Follow-On (PFO) program delivered its Determination of Readiness and Baseline Report to the Congress on June 28, 2021. This report also contains current known status and information on life cycle costs, schedule, and other technical data for NOAA's satellite programs that have not yet submitted baseline reports to Congress. The Space Weather Follow-On program ensures continuity of select space weather observations beyond the current generation of missions.

II. REPORT PURSUANT TO 33 U.S.C. § 878A(C)(3) FOR PROGRAMS THAT HAVE SUBMITTED A BASELINE REPORT

A. Geostationary Operational Environmental Satellite Program, Series-R

The Geostationary Operational Environmental Satellite-R (GOES-R) Series Program delivered its baseline report to Congress on February 8, 2013.

Effective May 27, 2018, the responsible reporting official under Section 105(c)(2)(E) of Public Law (P.L.) 112-55 is: Pam Sullivan, System Program Director for the GOES-R Series Program.

1. Life Cycle Cost

FY 2021 President's Budget

The FY 2021 President's Budget request continues support for operations and acquisitions in both the Procurement, Acquisition, and Construction (PAC) and Operations, Research, and Facilities accounts, after the Operational Phase Transfers enacted in the Consolidated Appropriations Act, 2017 (P.L. 115-31).

Updated GOES-R Series Life Cycle Cost

On May 12, 2020, the acting Under Secretary of Commerce for Oceans and Atmosphere, in his capacity as the Milestone Decision Acquisition Authority for the GOES-R Series Program, approved a revised program life cycle cost (LCC) of

$11,700 million, covering the period from FY 2001 through FY 2036. NOAA provided the GOES-R Series LCC update to Congress on June 19, 2020.

This update was an increase of $872 million, an 8-percent increase relative to the previous LCC of $10,828 million. The GOES-R Series has performed well to date and continues to be in compliance with cost, schedule, and risk. There are two primary drivers that required this LCC revision, both related to ongoing and future ground systems and operations. The first is the requirement under the Consolidated Appropriations Act, 2014 (P.L. 113-76) to comply with the whole of Government actions to secure information technology systems of national importance. The cost of replacing the IBM x86 (Lenovo) servers has resulted in a total increase of $365 million to the LCC. The second driver is to ensure adequate funds are available for a comprehensive Operations and Sustainment program through FY 2036. This sustainment cost has resulted in a total increase of $507 million to the program LCC. Since the 2016 launch of GOES-R, the first satellite in the series, NOAA has a better basis to estimate the costs for maximizing the exploitation of the capabilities of this new series to address all user needs.

2. Schedule

There have been no changes to the launch schedule from the Major Satellite Report accompanying the FY 2020 President's Budget request.

Satellite	Launch Commitment Date Reported in Baseline Report February 8, 2013	Launch Commitment Date as of February 1, 2020
GOES-R	Second Quarter of FY 2016	Launched November 19, 2016
GOES-S	Third Quarter of FY 2017	Launched March 1, 2018
GOES-T	Third Quarter of FY 2019	Fourth Quarter of FY 2022
GOES-U	First Quarter of FY 2025	First Quarter of FY 2025

We are continuing to monitor the impacts of the current COVID-19 pandemic to NOAA and to the general aerospace community. With the knowledge available at this time, we believe we can meet the Launch Commitment Dates (LCD) for GOES-T and GOES-U.

3. Technical Data

GOES-R Satellite: The GOES-R satellite was successfully launched on November 19, 2016, at 6:42 p.m. EST. Upon reaching geostationary orbit on November 29, 2016, the satellite was renamed GOES-16. On December 18,

2017, GOES-16 replaced GOES-13 as NOAA's operational GOES East satellite, taking up its location at 75 degrees west longitude.

GOES-S Satellite: The GOES-S satellite was successfully launched on March 1, 2018, at 5:02 p.m. EST. The satellite was renamed GOES-17 when it reached geostationary orbit on March 12, 2018. On February 12, 2019, GOES-17 replaced GOES-15 as NOAA's operational GOES West satellite, taking up its location at 137 degrees west longitude. GOES-15 continued tandem operations with GOES-17 (GOES West) throughout calendar year 2019. As of March 2020, GOES-15 was placed in on-orbit storage; it will provide additional tandem operations in August/September 2020 to supplement for data affected by the GOES-17 Advanced Baseline Imager (ABI) thermal anomaly.

This thermal anomaly on the ABI instrument was detected during on-orbit checkout of GOES-17 in 2018. The loop heat pipe (LHP) subsystem, which transfers heat from the ABI to a radiator, was found to be not working properly. This results in inadequate cooling for some of the infrared (IR) and Near-IR channels during parts of the day during portions of the year, which causes partial loss of ABI imagery during those periods. A team of experts from NOAA, NASA, and the ABI contractor team pursued multiple courses of corrective action. Changes in flight and ground software and operating techniques have resulted in the achievement of ~98 percent of the baseline ABI sensor capabilities. Additional ground software changes are underway through 2021 to further mitigate impacts to derived data products. For GOES-T and -U, design changes to the LHP system have been identified and are being implemented to prevent the anomaly experienced on GOES-17.

GOES-T Satellite: The GOES-T satellite is being prepared for environmental testing at Lockheed Martin in Denver, Colorado. As a result of the GOES-17 ABI anomaly, a redesigned LHP system was built and integrated to the GOES-T ABI. The Geostationary Lightning Mapper (GLM) sensor unit also underwent retest following a component repair. Both the ABI and GLM sensor units were delivered to Lockheed Martin in June 2020 after their respective repairs and testing, and are now being prepared for installation on the spacecraft. The GOES-T LCD remains unchanged (Fourth Quarter of FY 2022).

GOES-U Satellite: The satellite continues integration and test at Lockheed Martin in Denver. In August 2019, the spacecraft system module was mated to the propulsion core module to form the assembled spacecraft. As a result of the GOES-17 ABI thermal anomaly, a new LHP system is being built for the GOES-U ABI sensor. The GOES-U LCD remains unchanged (First Quarter of FY 2025).

GOES-R Series Ground System Upgrade: In March 2019, NOAA awarded a sole-source modification to the existing contract to provide the Core Ground System for the GOES-R Series to Harris Corporation (the current contractor that developed and fielded the original GOES-R Series Ground System). This

modification includes the replacement of the IBM (now Lenovo) servers for the GOES-R Series Ground System and cybersecurity improvements, as well as an extension of the contract's period of performance from May 2019 to May 2022 to allow for implementation and deployment of the server replacements without impacting critical satellite operations. The System Requirements Review/System Design Review for the ground system modification was completed in November 2019. Ground server refresh activities have been delayed due to COVID-19 pandemic restrictions. Server replacement activities are currently ongoing and testing began in spring 2021.

B. Polar Weather Satellites – Joint Polar Satellite System

The Consolidated Appropriations Act, 2020 (P.L. 116-93), accepted the request in the FY 2020 President's Budget request to merge the two major polar subactivities – the Joint Polar Satellite System (JPSS) and Polar Follow-On (PFO) – into a new subactivity called Polar Weather Satellites (PWS). With PFO being the continuation of the JPSS Program of Record, merging these two subactivities ensures programmatic flexibility and minimizes risk in the developmental stages of the JPSS satellites. NOAA continues to track the different components of PWS per the approved LCC for JPSS and funding provided for PFO.

The JPSS Program delivered its Determination of Readiness and Baseline Report to the Congress on November 14, 2014.

Effective January 2017, the responsible reporting official under Section 105(c)(2)(E) of P.L. 112-55 is Gregory Mandt, JPSS Director.

1. Life Cycle Cost

As baselined in September 2014, the JPSS Program LCC is $11,322.1 million, and this total supports operations for the NOAA/NASA Suomi National Polar-orbiting Partnership (Suomi NPP), development and launch of the JPSS-1 and JPSS-2 spacecraft, development and operations of the common ground system, and operations for JPSS satellites through FY 2025. During the development of the Independent Cost Estimate (ICE) for PFO, which was concluded by the Department of Commerce (DOC) Office of Acquisition and Management in 2019, a projected underrun within the JPSS program was identified based on recent program execution performance. The JPSS PAC request in the FY 2023 President's Budget will include this assessment of funding needs, as well as the implementation of any plans to mitigate the impact of COVID-19.

While the ICE exercise identified efficiencies within the JPSS program on the order of $134 million, the DOC and NOAA agreed that the LCC would not be reduced at this time. The efficiencies and LCC will be managed by the program within the PWS subactivity to address out-year issues within JPSS and PFO.

2. Schedule

There have been no changes to the launch schedule from the Major Satellite Report accompanying the FY 2020 President's Budget request.

Satellite	Launch Commitment Date Reported in Baseline Report November 14, 2014	Launch Commitment Date as of February 1, 2020
Suomi NPP	N/A	Launched October 28, 2011
JPSS-1	Second Quarter of FY 2017	Launched November 18, 2017
JPSS-2	First Quarter of FY 2022	First Quarter of FY 2023

3. Technical Data

Suomi NPP Satellite: The Suomi NPP satellite was successfully launched on October 28, 2011, at 2:48 a.m. PDT. Suomi NPP is NOAA's secondary operational polar-orbiting satellite and operates in tandem with NOAA-20. Suomi NPP is currently operating beyond its design life, allowing NOAA to continue to use Suomi NPP to meet its operational data needs.

JPSS-1 Satellite: The JPSS-1 satellite was successfully launched on November 18, 2017, at 1:47 a.m. PST. Upon reaching its polar orbit, the satellite was named NOAA-20. The NOAA-20 spacecraft and operations were transferred from the launch team to NOAA on March 7, 2018. NOAA-20 became operational on May 30, 2018, after completing on-orbit calibration and validation. On February 12, 2019, NOAA-20 was designated as NOAA's primary afternoon polar satellite. NOAA-20 and Suomi NPP circle the Earth in tandem with the two satellites being separated in time and space by 50 minutes.

JPSS-2 Satellite: JPSS-2 is being assembled by Northrop Grumman at their facility in Gilbert, Arizona. The Mission Critical Design Review (CDR), which includes the Flight CDR, for JPSS-2 was held in September 2018. The NOAA/NASA Agency Program Management Council met on September 19, 2018, to review and approve a change to the JPSS-2 LCD. The change moved the LCD from Q1 FY 2022 to Q1 FY 2023 and maintains a 5-year cadence between JPSS launches.

JPSS Ground System Upgrade: Block 2.1 transitioned to operations in April 2019 and supports all on-orbit missions on a single string-per-nominal operational configuration.

C. Polar Weather Satellites – Polar Follow On

As stated in Section B above, the Consolidated Appropriations Act, 2020 (P.L. 116-93), accepted the FY 2020 President's Budget request to merge JPSS and PFO into the new PWS subactivity. As part of the merged PWS program, PFO extends the current JPSS program to 2038 to continue weather observations in the afternoon orbit beyond JPSS-2. PFO builds robustness into the weather satellite constellation with the acquisition of the PFO/JPSS-3 and PFO/JPSS-4 missions.

The PFO program delivered its Determination of Readiness and Baseline Report to the Congress on June 28, 2021.

Effective June 28, 2021, the responsible reporting official under Section 105(c)(2)(E) of P.L. 112-55 is Gregory Mandt, JPSS Director.

1. Life Cycle Cost

On December 16, 2016, NOAA baselined the LCC of the PFO program at $7,573 million through FY 2038, as reflected within the DOC Milestone 2/3 Decision Memorandum (Appendix C). As directed by this memorandum, NOAA has since updated the PFO LCC to incorporate efficiencies into the implementation of the program, and the greater clarity in the actual contracted costs for all major satellite hardware elements. This LCC includes the JPSS-3 and -4 spacecraft, instruments, launch vehicle, operations for all on-orbit assets, maintenance, sustainment, and science from FY 2016 to FY 2038. The cost re-baseline also benefited from the ICE generated by the DOC Office of Acquisition Management, which was developed using a different methodology than the program's estimate. The new LCC of the PFO program documented in the updated DOC Milestones 2/3 Decision Memorandum on June 1, 2020 (Appendix D) is $6,838 million.

2. Schedule

There have been no changes to the launch schedule from the Determination of Readiness and Baseline Report.

Satellite	Launch Commitment Date as of June 28, 2021
PFO / JPSS-3	Q1 FY 2028
PFO / JPSS-4	Q1 FY 2033

3. Technical Data

JPSS-3 & JPSS-4 Satellites: The PFO program is developing PFO/JPSS-3 and PFO/JPSS-4 instruments and spacecraft buses as copies of the JPSS-2 satellite. This takes advantage of JPSS-2 development experiences to reduce overall cost and risk to PFO. NOAA has employed a "build ahead and store" strategy for PFO. The strategy calls for procuring and building instruments as a block-buy to reduce schedule, cost, and risks. The instruments will be integrated with the

satellite and fully tested to be available for launch earlier than the scheduled date if required due to a launch or on-orbit failure. This approach was recommended by an independent review team, as well as the National Academies of Sciences.[1] The building of the JPSS-3 instruments began in FY 2018 and is ongoing with the system integration review to be conducted in FY 2023.

III. REPORT FOR NEW PROGRAMS THAT HAVE NOT YET SUBMITTED A BASELINE REPORT PURSUANT TO 33 U.S.C. § 878A(C)

D. Space Weather Follow-On

NOAA's Space Weather Follow-On (SWFO) program was established to provide continuity of space weather observations beyond the current generation of missions, including the Deep Space Climate Observatory (DSCOVR) and the NASA/European Space Agency Solar and Heliophysics Observatory (SOHO). Observations required to produce space weather watches and warnings include imagery of coronal mass ejections (CME) and measurements of solar wind plasma. These operational space-based observation and measurement capabilities for coronal imaging and upstream solar wind measurements are used by the NWS' Space Weather Prediction Center to create watches and warnings for the two major types of space weather events that affect the Earth: solar radiation storms and geomagnetic storms. Requirements for these measurements derive from the NOAA Space Weather Mission Service Area Observational User Requirements Document baselined by the NOAA Observing System Council in November 2017.

1. Life Cycle Cost

SWFO successfully completed DOC Milestone 2/3 on October 31, 2019, and the DOC MDM was signed by the Deputy Secretary for Commerce on November 19, 2019. The SWFO Report of Readiness was sent to Congress on June 16, 2020.

The SWFO Congressional Baseline Report will be developed when the program passes Key Decision Point-C and will include the overall SWFO LCC pursuant to the requirements of 33 U.S.C. § 878a(c).

2. Schedule

The Consolidated Appropriations, 2020 (P.L. 116-93), signed DOC 2/3 MDM, and the FY 2021 President's Budget request will allow the SWFO Program to continue the development of the SWFO Lagrange point 1 (SWFO-L1) spacecraft to maintain schedule to meet the 2024 launch rideshare with the NASA Interstellar Mapping & Acceleration Probe (IMAP) launch, as well as backup CME in geostationary orbit.

[1] National Research Council 1997. Continuity of NOAA Satellites. Washington, DC: The National Academies Press. https://doi.org/10.17226/5588.

The FY 2021 President's Budget request will also allow the SWFO Program to award SWFO ground segment contracts. Upon award of the ground segment contract, in addition to the already awarded SWFO-L1 spacecraft to Ball Aerospace, the schedule will be updated, and the schedule reserve will be defined in the SWFO Congressional Baseline Report.

The SWFO master schedule will be included in the baseline report as required pursuant to the requirements of 33 U.S.C. § 878a(c).

3. Technical Data

L1 Mission: The SWFO Program has been designed to have high technical maturity. There is no new technology development foreseen for the SWFO Program. The L1 vantage point provides upstream sampling of solar winds and continuous optimal view of the sun required for forecast operations. The SWFO Program is being developed to take advantage of a rideshare opportunity with the launch of NASA's IMAP mission and instrument accommodation capacity on the GOES-U, both scheduled for launch in 2024. NOAA and NASA's Science Mission Directorate formalized a partnership and developed a joint project management structure to oversee the SWFO-L1 mission acquisition.

In FY 2020, NOAA will start procurement of the spacecraft and all of the instruments in order to leverage the NASA IMAP mission to L1, scheduled to take place in 2024. The Consolidated Appropriations Act, 2020 (P.L. 116-93), enacted on December 20, 2019, allocated $64.0 million for SWFO and provided direction to NOAA to maintain its expected SWFO-L1 mission pace. NOAA shall also begin preparations to integrate a compact coronagraph (CCOR) on GOES-U to ensure continuation of Federal space weather sentinel and forecasting capabilities.

The FY 2020 appropriation provided sufficient funding to continue ongoing development, award contracts for the SWFO-L1 instruments and spacecraft contract by FY 2020 Q4, and continue accommodation of a CCOR on GOES-U. The acquisition strategy leveraged the efficient NASA Rapid Spacecraft Development Office for spacecraft procurement and separate low-risk instrument procurements to mitigate schedule risk. SWFO is developing a ground segment that will include command and control, data acquisition, product generation and product distribution, and long-term archive and access at NOAA's National Centers for Environmental Information.

This SWFO-L1 mission will include both a CCOR providing CME imagery and a Solar Wind Instrument Suite (SWIS) providing solar wind measurements to replace the current DSCOVR and SOHO missions. Two CCOR instruments are being developed by the U.S. Naval Research Laboratory (NRL), and this is the only component in the program that underwent a technology development effort. CCOR successfully met the Technology Readiness Level (TRL) requirement to

be TRL 6 by the CCOR PDR in September 2018. Achievement of TRL 6 means that models or prototypes of all the components have been successfully tested in the environment in which the component will operate. The CCOR instruments are in Phase C of development having successfully concluded a CDR in August 2019 for the first CCOR and in preparation for the delta-CDR in August 2020 for the second instrument. NRL's scheduled CCOR delivery dates to NOAA are 2021 and 2022.

All other components are expected to be greater than TRL 6 at contract award. The SWIS will comprise a solar wind bulk plasma detector, a set of magnetometers, and a low energy ion spectrometer. Market research via requests for information indicated that multiple organizations can develop and deliver the solar wind instruments for integration to the SWFO-L1 spacecraft within the mission schedule. In early spring 2020 on behalf of NOAA, NASA awarded contracts to the Regents of the University of California, Berkeley, for the SWFO Supra Thermal Ion Sensor and to the Southwest Research Institute in San Antonio, Texas, for the SWFO-L1 magnetometer. The European Space Agency (ESA) has offered to contribute an X-ray flux monitor for integration by NASA to the SWFO-L1 spacecraft. An agreement between NOAA and ESA is being developed. The X-ray flux monitor would be an enhancement to the SWFO-L1 mission, but its inclusion is not a criterion for launch. If the X-ray flux monitor schedule does not match the SWFO-L1 need date, the instrument will not be included.

Geostationary Mission: The Consolidated Appropriations Act, 2020 (P.L. 116-93) directed NOAA to continue the accommodation of the first CCOR on the GOES-U spacecraft. Funding is also included in the Consolidated Appropriations Act, 2020 to accommodate the second CCOR instrument of the SWFO-L1 spacecraft.

Appendix A: List of Acronyms

ABI	Advanced Baseline Imager
CCOR	Compact Coronagraph
CDR	Critical Design Review
CME	Coronal Mass Ejections
DOC	Department of Commerce
DSCOVR	Deep Space Climate Observatory
ESA	European Space Agency
FY	Fiscal Year
GLM	Geostationary Lightning Mapper
GOES	Geostationary Operational Environmental Satellite
IMAP	Interstellar Mapping and Acceleration Probe
IR	Infrared
JPSS	Joint Polar Satellite System
L1	Earth-Sun LaGrange Point 1
LCC	Life Cycle Cost
LCD	Launch Commitment Date
LHP	Loop Heat Pipe
MDM	Milestone Decision Memorandum
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
NRL	U.S. Naval Research Laboratory
OPT	Operational Phase Transfer
ORF	Operational Research and Facilities
PAC	Procurement, Acquisition, and Construction
PDR	Preliminary Design Review
PFO	Polar Follow-On
POR	Program of Record
PWS	Polar Weather Satellites
Office	
SOHO	Solar and Heliospheric Observatory
Suomi NPP	Suomi National Polar Partnership
SWFO	Space Weather Follow-On
SWIS	Solar Wind Instrument Suite
TRL	Technology Readiness Level
U.S.C.	United States Code

Appendix B: Legislative Mandate

Title 33. Navigation and Navigable Waters
Chapter 17, National Oceanic and Atmospheric Administration
Subchapter 1. General Provisions
§ 878a. Contract for development of a major program; costs; Major Program Annual Report for satellite development program

(a) For purposes of this section–

(1) the term 'Under Secretary' means Under Secretary of Commerce for Oceans and Atmosphere;
(2) the term 'appropriate congressional committees' means--
(A) the Committee on Appropriations and the Committee on Commerce, Science, and Transportation of the Senate; and
(B) the Committee on Appropriations and the Committee on Science, Space and Technology of the House of Representatives;
(3) the term 'satellite' means the satellites proposed to be acquired for the National Oceanic and Atmospheric Administration (NOAA);
(4) the term 'development' means the phase of a program following the formulation phase and beginning with the approval to proceed to implementation, as defined in NOAA Administrative Order 216-108, Department of Commerce Administrative Order 208-3, and NASA's Procedural Requirements 7120.5c, dated March 22, 2005;
(5) the term 'development cost' means the total of all costs, including construction of facilities and civil servant costs, from the period beginning with the approval to proceed to implementation through the achievement of operational readiness, without regard to funding source or management control, for the life of the program;
(6) the term 'life-cycle cost' means the total of the direct, indirect, recurring, and nonrecurring costs, including the construction of facilities and civil servant costs, and other related expenses incurred or estimated to be incurred in the design, development, verification, production, operation, maintenance, support, and retirement of a program over its planned lifespan, without regard to funding source or management control;
(7) the term 'major program' means an activity approved to proceed to implementation that has an estimated life-cycle cost of more than $250 million; and
(8) the term 'baseline' means the program as set following contract award and preliminary design review of the space and ground systems.

(b)(1) NOAA shall not enter into a contract for development of a major program, unless the Under Secretary determines that–

(A) the technical, cost, and schedule risks of the program are clearly identified and the program has developed a plan to manage those risks;

(B) the technologies required for the program have been demonstrated in a relevant laboratory or test environment;
(C) the program complies with all relevant policies, regulations, and directives of NOAA and the Department of Commerce;
(D) the program has demonstrated a high likelihood of accomplishing its intended goals; and
(E) the acquisition of satellites for use in the program represents a good value to accomplishing NOAA's mission.

(2) The Under Secretary shall transmit a report describing the basis for the determination required under paragraph (1) to the appropriate congressional committees at least 30 days before entering into a contract for development under a major program.

(3) The Under Secretary may not delegate the determination requirement under this subsection, except in cases in which the Under Secretary has a conflict of interest.

(c)(1) Annually, at the same time as the President's annual budget submission to the Congress, the Under Secretary shall transmit to the appropriate congressional committees a report that includes the information required by this section for the satellite development program for which NOAA proposes to expend funds in the subsequent fiscal year. The report under this paragraph shall be known as the Major Program Annual Report.

(2) The first Major Program Annual Report for NOAA's satellite development program shall include a Baseline Report that shall, at a minimum, include–

(A) the purposes of the program and key technical characteristics necessary to fulfill those purposes;
(B) an estimate of the life-cycle cost for the program, with a detailed breakout of the development cost, program reserves, and an estimate of the annual costs until development is completed;
(C) the schedule for development, including key program milestones;
(D) the plan for mitigating technical, cost, and schedule risks identified in accordance with subsection (b)(1)(A); and
(E) the name of the person responsible for making notifications under subsection (d), who shall be an individual whose primary responsibility is overseeing the program.

(3) For the major program for which a Baseline Report has been submitted, subsequent Major Program Annual Reports shall describe any changes to the information that had been provided in the Baseline Report, and the reasons for those changes.

(d)(1) The individual identified under subsection (c)(2)(E) shall immediately notify the Under Secretary any time that individual has reasonable cause to believe that, for the major program for which he or she is responsible, the

development cost of the program has exceeded the estimate provided in the Baseline Report of the program by 20 percent or more.

(2) Not later than 30 days after the notification required under paragraph (1), the individual identified under subsection (c)(2)(E) shall transmit to the Under Secretary a written notification explaining the reasons for the change in the cost of the program for which notification was provided under paragraph (1).

(3) Not later than 15 days after the Under Secretary receives a written notification under paragraph (2), the Under Secretary shall transmit the notification to the appropriate congressional committees.

(e) Not later than 30 days after receiving a written notification under subsection (d)(2), the Under Secretary shall determine whether the development cost of the program has exceeded the estimate provided in the Baseline Report of the program by 20 percent or more. If the determination is affirmative, the Under Secretary shall–

(1) transmit to the appropriate congressional committees, not later than 15 days after making the determination, a report that includes–

(A) a description of the increase in cost and a detailed explanation for the increase;

(B) a description of actions taken or proposed to be taken in response to the cost increase; and

(C) a description of any impacts the cost increase, or the actions described under subparagraph (B), will have on any other program within NOAA; and

(2) if the Under Secretary intends to continue with the program, promptly initiate an analysis of the program, which shall include, at a minimum–

(A) the projected cost and schedule for completing the program if current requirements of the program are not modified;

(B) the projected cost and the schedule for completing the program after instituting the actions described under paragraph (1)(B); and

(C) a description of, and the projected cost and schedule for, a broad range of alternatives to the program.

(f) NOAA shall complete an analysis initiated under paragraph (e)(2) not later than 6 months after the Under Secretary makes a determination under subsection (e). The Under Secretary shall transmit the analysis to the appropriate congressional committees not later than 30 days after its completion.

Appendix C: 2016 DOC Milestone 2/3 Decision Memorandum

Joint NOAA and NASA Agency Program Management Council (APMC) Decision Memorandum

Joint Polar Satellite System Polar Follow-on Baseline

Summary: A joint National Oceanic and Atmospheric Administration (NOAA) / National Aeronautics and Space Administration (NASA) Agency Program Management Council (APMC) met on December 8, 2016 and evaluated the Joint Polar Satellite System (JPSS) program's proposed life-cycle cost and schedule baseline for Polar Follow-on (PFO). This APMC review will enable NOAA to make a commitment as part of its Congressional Baseline Report. The formal NASA Procedural Requirements (NPR) 7120.5E Baseline Key Decision Point C (KDP-C) commitment for the JPSS-3 and JPSS-4 missions is currently scheduled for 2018. The PFO baseline includes the operations, maintenance, and sustainment of JPSS on-orbit and ground assets from Fiscal Year (FY) 2026 to FY 2038 and the acquisition, development and launch readiness of the JPSS-3 and JPSS-4 missions as early as possible to ensure continuous observations. In addition, the PFO baseline includes the capability to launch a JPSS-3 Contingency Mission (carrying only the Advanced Technology Microwave Sounder (ATMS) and Cross-track Infrared Sounder (CrIS) instruments) in advance of the full mission Launch Readiness Date (LRD) should the need arise.

Decision: Based on this APMC review, the program/project readiness documents and the recommendation of the Center Management Council (CMC)/Directorate Program Management Council (DPMC), the co-chairs and decision authority recommend approval to the Department of Commerce (DOC) Milestone Review Board and Deputy Secretary of Commerce for the JPSS Program to continue its efforts for PFO working towards full implementation and mission baseline commitments. This includes the planned cost and scheduled launch readiness dates in Tables 1 and 2 below.

PFO Cost by Fiscal Year ($M)[1]							
FY2016 – FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023 - FY2038	Total LCC
$753	$419	$416	$458	$412	$435	$4,680	$7, 573

[1] Earth Observing Nanosatellite-Microwave (EON-MW) not included in the above cost

Table 1: PFO Budget ($M)

JPSS-3 and JPSS-4 Launch Schedule		
Satellite	Launch Readiness Date	Launch On Schedule Date
JPSS-3 Contingency[1]	Q3 FY2023	
JPSS-3 Full	Q2 FY2024	Q4 FY2026
JPSS-4	Q4 FY2026	Q4 FY2031

[1] Consists of ATMS and CrIS instruments only

Table 2: PFO Launch Schedule

Concurrence:

8 DEC 2016
NOAA: Director Date
Joint Polar Satellite System (JPSS)

8 Dec 2016
NASA: Acting Program Manager Date
Joint Polar Satellite System (JPSS) Program

8 DECEMBER 2016
NASA: Director Date
Goddard Space Flight Center

8 Dec 2016
NASA: Director Date
Joint Agency Satellite Division

8 Dec 2016
NOAA: Date
Assistant Administrator for
Satellite and Information Services

12/8/16
NASA: Associate Administrator Date
Science Mission Directorate

12/8/16
NASA: Associate Administrator Date

Approval:

12/8/2016
Manson Brown Date
Assistant Secretary of Commerce for
Environmental Observation and
Prediction, and NOAA Deputy
Administrator

Appendix D: 2020 Updated DOC Milestone 2/3 Decision Memorandum

UNITED STATES DEPARTMENT OF COMMERCE
The Deputy Secretary of Commerce
Washington, D.C. 20230

June 1, 2020

MEMORANDUM FOR THE UNDER SECRETARY OF COMMERCE FOR OCEANS AND ATMOSPHERE AND NOAA ADMINISTRATOR

FROM: Karen Dunn Kelley
Deputy Secretary of Commerce

SUBJECT: Polar Follow-On Program Baseline Update

This Milestone Decision Memorandum (MDM) sets out my expectations for officials at the National Oceanic and Atmospheric Administration (NOAA) regarding the update to the Polar Follow-On (PFO) program baseline that was established with MS2/3 approval in December 2016. The MDM from December 16, 2016, set the guidance for the implementation of an efficient block-buy acquisition strategy for the PFO program to improve the constellation resiliency and yield a projected $585M in program contract savings, while efficiently integrating JPSS program office support. That MDM established the PFO performance baseline at $7,573M. The PFO program successfully executed the efficient block-buy contracting acquisition and established the Polar Weather Satellite (PWS) program management portfolio structure (formally approved by Congress for reporting in 2020).

At NOAA's request, the Department's Office of Acquisition Management (DOC/OAM) completed an in-depth program and cost evaluation of all elements of the PWS portfolio. The results of the evaluation demonstrated that not only were the PFO advertised acquisition efficiencies realized, but substantially exceeded. The DOC/OAM Independent Cost Estimate (ICE), compared and fully reconciled with the PWS program, yields an additional $735M reduction to the Department's MS2 program's Life Cycle Cost (LCC) estimate (baseline) for PFO. At the summary level, the reduction is traceable to:

- Excellent program management performance
- Efficiencies associated with PFO block-buy acquisition strategy. Contract performance to date is within 2% of the original DOC/OAM MS2 ICE, thus not requiring the use of budgeted program reserves to date.
- Synergy from common engineering and program support leveraged across PWS portfolio (PoR + PFO) program elements

In my capacity as the Milestone Decision Authority for the Department of Commerce and chair of the Milestone Review Board (MRB), I direct NOAA to report to Congress the updated PFO baseline in accordance with the below funding requirements.

PFO Baseline Funding Requirements	FY 2020 & Prior *	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	CTC	Total
PFO LCC (PAC & ORF)	1,750.8	286.3	225.0	225.0	300.0	343.5	3,707.3	6,837.9

(TY$M)

*Reflects appropriated funds thru FY20. Future year funding assumes $425M per year for PWS from FY22-FY25, allocated efficiently between PFO and POR while remaining at or under each program's LCC baseline in total.

The NOAA Satellite Observing System Architecture study recommends a partially disaggregated Low Earth Orbit (LEO) architecture, whereby critical atmospheric sounding instruments are flown together on satellites separate from other instruments in LEO. I further direct that you consider and incorporate these proven acquisition and management efficiencies for the sustained resilience and affordability investments of NOAA's Earth observation analysis and forecasting capabilities from global polar-orbiting observations.

CC:
PFO MRB Members