REPORT TO CONGRESS

POLAR WEATHER SATELLITES POLAR FOLLOW ON PROGRAM DETERMINATION OF READINESS AND BASELINE REPORT

Developed pursuant to: 33 U.S.C. § 878A

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

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.

33 U.S.C. § 878A, SPECIFICALLY 33 U.S.C. § 878A(B)(2), INCLUDES THE FOLLOWING LANGUAGE

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.

33 U.S.C. § 878A, SPECIFICALLY 33 U.S.C. § 878A(C)(2), INCLUDED THE FOLLOWING LANGUAGE

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.

Per 33 U.S.C. § 878A(A)(7), a Major Program is defined as having an estimated life cycle cost of more than $250 million. A Baseline Report is submitted following contract award and preliminary design review of the space and ground systems (33 U.S.C. § 878A(A)(8)).

THIS REPORT SATISFIES THE REQUIREMENTS SET FORTH IN
33 U.S.C. § 878A(B) AND (C)(2).

United States Department of Commerce
National Oceanic and Atmospheric Administration

Polar Weather Satellites Polar Follow On Program
Determination of Readiness Report and Baseline Report

Senate Committee on Appropriations
Senate Committee on Commerce, Science, and Transportation
House Committee on Appropriations
House Committee on Science, Space, and Technology

In accordance with 33 U.S.C. § 878A(A),(B), and (C), the Under Secretary of Commerce for Oceans and Atmosphere submits this Determination of Readiness Report and Baseline Report for the Polar Weather Satellite Polar Follow On Program, Joint Polar Satellite System satellites -3 and -4 missions.

Annual updates and reports on any deviations from this Baseline Report will be reported to the above-referenced appropriate Committees pursuant to the requirements of Section 105(c)(2) of Public Law 112-55, as adopted by reference in Section 105 of Public Law 113-6 and further adopted by reference in Public Law 113-76.

Submitted by:

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3/31/2021
Date

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I. Executive Summary

This document is the Determination of Readiness Report and Baseline Report for the Polar Weather Satellite (PWS) Polar Follow On (PFO) program, Joint Polar Satellite System (JPSS) satellites -3 and -4 missions, required by the Consolidated Appropriations Act, 2020, or P.L. 116-93, which provided that the requirements set forth by Section 105 of P.L. 112-55 (33 U.S. Code § 878a), as amended by Section 105 of the Title I of Division B of P.L. 113-6, were adopted by reference and made applicable with respect to fiscal year 2020.

Under the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Program, the instrument contracts for the Suomi NPP and JPSS-1 satellites were initially awarded in the late 1990s. NOAA assumed management control of the instruments in 2010 to complete development of the JPSS-1 satellite. In 2014, the contracts were subjected to a Justification for Other than Full and Open Competition (JOFOC) to allow for JPSS-2 development with subsequent options for the JPSS-3 and JPSS-4 satellites. Having met all the requirements set forth in the Consolidated and Further Continuing Appropriations Act, 2012, Div. B, Title I, Section 105(b)(1) of Public Law (P.L) 112-55, and having received Congressional approval to begin the PFO program in the Consolidated Appropriations Act of 2016 (P.L. 114-113), in January 2017 NOAA exercised the options on existing JPSS -2 spacecraft and instruments contracts for the PFO satellites, JPSS-3 and -4.

As stated in the FY 2016 President's Budget request, NOAA initiated the PFO program in 2016 to reduce the risk of a JPSS gap following the launch of JPSS-2 and to take advantage of the ongoing JPSS instrument development. This allowed NOAA to reduce cost and risk, as well as conduct a simultaneous instrument block buy for the JPSS-3 and JPSS-4 instruments, as it was deemed the most efficient acquisition strategy and production cadence.

Since the PFO satellites are copies of JPSS-2, the technical readiness of the PFO satellites was established within the JPSS Determination of Readiness report, submitted to Congress in November 2014. This Determination of Readiness report reaffirms those JPSS Program of Record (POR) findings.

The PFO program completed Department of Commerce (DOC) Milestone 2/3 on December 16, 2016, when the Deputy Secretary of Commerce signed the Milestone 2/3 Decision Memorandum (Appendix B) to baseline the PFO program and proceed with implementation. Initial approval was based on the recommendations of the independent Standing Review Board, and the Joint NOAA and National Aeronautics and Space Administration (NASA) Agency Program Management Council (APMC) on December 8, 2016 (see Appendix C). The cost, schedule, and technical data in this report are updated from the 2016 Milestone 2/3 Decision Memorandum following the operational completion of the JPSS POR first satellite (JPSS-1). The PFO program is managed by the JPSS Program Office and is leveraging its existing engineering and acquisition expertise.

This Congressional report satisfies the requirements for a Determination of Readiness Report, as outlined and required in 33 U.S.C. § 878A that the Under Secretary determine that PFO complies with the following:

1. the technical, cost, and schedule risks of the program are clearly identified and the program has developed a plan to manage those risks;
2. the technologies required for the program have been demonstrated in a relevant laboratory or test environment;
3. the program complies with all relevant policies, regulations, and directives of NOAA and the Department of Commerce;
4. the program has demonstrated a high likelihood of accomplishing its intended goals; and
5. the acquisition of satellites for use in the program represents a good value to accomplishing NOAA's mission.

This Congressional report also satisfies the requirement 33 U.S.C. § 878A, to submit a Baseline Report that shall, at a minimum, include:

1. the purposes of the program and key technical characteristics necessary to fulfill those purposes;
2. 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;
3. the schedule for development, including key program milestones;
4. the plan for mitigating technical, cost, and schedule risks identified in accordance with subsection(b)(1)(A); and
5. the name of the person responsible for making notifications under subsection (d), who shall be an individual whose primary responsibility is overseeing the program.

II. Purposes of the Program and Key Technical Characteristics Necessary to Fulfill Those Purposes

Since the 1960s, NOAA has operated a system of satellites in polar orbit to provide an enduring capability for global weather and environmental data. The PFO program adds two satellite missions (JPSS-3 and -4) following the JPSS POR missions (JPSS-1 and -2) to continue this essential Earth observing satellite system that provides continuous data for weather forecasting and environmental monitoring. PFO enables a robust polar orbiting satellite observing system by providing for the early build and storage of satellites in case of an on-orbit failure. PFO also extends operations, maintenance, sustainment and science for all JPSS missions from Fiscal Year (FY) 2026 through FY 2038 following the end of the JPSS program in FY 2025.

The PFO program supports NOAA's operations and the Agency's contribution to DOC's strategic plan (Strategic Objective 3.3) by continuing the deployment of the next generation of polar satellites and environmental observation systems to provide more accurate weather information and reduce the economic impact of severe weather events. PFO continues support for NOAA's mission to understand and predict changes in climate, weather, oceans, and coasts and share that knowledge and information with others. The JPSS-3 and -4 satellites will continue to provide critical global atmospheric, oceanic, and climatic products supporting weather forecasts and warnings, environmental forecasts and warnings, climatological prediction, and ecosystems management. These forecasts, warnings, and predictions are critical to the protection of life and property during major weather and environmental events for weather sensitive sectors of our economy and national security.

The *Consolidated Appropriations Act, 2016* (H.R. 2029, P.L. 114-113) provided the approval to begin the PFO program. This enabled JPSS to modify existing instrument contracts to initiate development of JPSS-3 and -4 instruments. The JPSS-3 and -4 spacecraft are being procured by exercising existing pre-priced options on the JPSS-2 spacecraft contract. The contract actions were used to refine and mature the budget included in this baseline report. The JPSS-3 and -4 instruments and spacecraft, which are essentially copies of JPSS-2, are being built using the same contractors and contracts to a stable set of mission requirements following a well-documented and well-exercised process, executed on current and past NOAA and NASA missions.

A. Program Management

The JPSS and PFO programs are managed as an integrated enterprise, the PWS program, while maintaining each program's established life cycle cost (LCC). The PWS program is a collaborative effort between NOAA and NASA to develop, acquire, and operate the JPSS satellites, as documented in the Assisted Acquisition Interagency Agreement (IAA) originally signed March 15, 2012. On July 30, 2019, NOAA and NASA signed a new IAA to continue the program through September 2024. NOAA has the responsibility and authority for the development and operations of the JPSS and PFO programs. This includes defining requirements, integrating user systems, partner contributions, and NASA-developed capabilities in the NOAA architecture. Additionally, NOAA is leading program systems engineering, developing the science necessary to deliver data products, storing, delivering and archiving the satellite data, operating the space and ground segments, and representing the system to all entities, internal and external to the government including international partners. The ground segment includes data exploitation, product distribution and access, data archival storage and dissemination, facility upgrades, space/ground communications, ground network, tracking, telemetry and control, data processing, calibration/validation, and field terminal support. NOAA is responsible for operations, science, and supporting infrastructure.

NASA is implementing its efforts on a reimbursable basis for NOAA. NASA is the acquisition agent for the flight project (e.g., satellites, instruments, and launch services) and leads program safety and mission assurance. All PWS activities between NOAA and NASA are governed by the IAA. PWS is managed as a loosely coupled program as defined in NASA Procedural Requirements (NPR) 7120.5E, and is tailored to meet NOAA requirements.

B. Mission

The JPSS-3 and -4 satellites will continue to provide critical global atmospheric, surface, and oceanic data for products supporting weather forecasts and warnings, environmental forecasts and warnings, climate monitoring, and ecosystems management. These products are critical to protection of life and property during major weather and environmental events for weather sensitive sectors of our economy and national security.

PFO continues JPSS support of NOAA's operations and the Agency's contribution to DOC's strategic plan by deploying the next generation of polar satellites and environmental

observation and modeling systems to provide more accurate weather information and reduce the economic impact of severe weather events, as well as to continue and extend long term environmental and climate data records. PFO will continue JPSS support of NOAA's mission to predict changes in climate, weather, oceans, and coasts and share that knowledge and information with others. PFO will strengthen the resiliency of ecosystems, communities and economies; foster healthy and sustainable marine resources, habitats and ecosystems; and enable U.S. businesses to adapt and prosper by developing environmental and climate informed solutions and NOAA's priority of investing in critical observational infrastructure.

JPSS and PFO also implement the policies and mandates documented in the National Space Policy of the United States of America.[1] Some of NOAA's observational requirements outlined in this Policy are met by leveraging key international partnerships. JPSS and PFO, consistent with National Space Policy, partner with the European Organization for the Exploitation of Meteorological Satellites (or EUMETSAT) and the Japan Aerospace Exploration Agency (or JAXA) to provide additional coverage, redundancy and to meet unique product requirements.

NOAA will be responsible for command and control of the PFO satellites after their launch and checkout. All satellite command and control occurs at the NOAA Satellite Operations Facility in Suitland, Maryland, with support from ground stations located in McMurdo, Antarctica; Fairbanks, Alaska; and Svalbard, Norway, and from ground stations supporting NASA's Tracking and Data Relay Satellite System.

The PFO satellites are copies of the JPSS-2 satellite to reduce mission and program schedule, risk, and cost. Each mission will include the following NOAA-defined and funded instruments:

- Advanced Technology Microwave Sounder (ATMS);
- Cross Track Infrared Sounder (CrIS);
- Visible Infrared Imaging Radiometer Suite (VIIRS); and
- Ozone Mapping and Profiler Suite-Nadir (OMPS-Nadir).

Through an interagency agreement with NASA, NOAA is hosting the NASA-defined and developed Libera instrument and is including an ozone limb measurement capability to the OMPS instrument (OMPS-Limb). Libera supports the NASA research objective of understanding the Earth radiation balance and provides observational information used in NOAA mission services and products. The OMPS-Limb profiler measures ozone in the lower stratosphere and troposphere with high vertical resolution, and is integral to the overall OMPS instrument.

More than 8 years of flight experience with the NOAA/NASA Suomi National Polar-orbiting Partnership (Suomi NPP) satellite, the first to fly these instruments, and the launch of NOAA-20 (formerly known as JPSS-1) on November 17, 2017, have demonstrated the essential capabilities they provide to meet NOAA's mission. The PFO satellites and instruments, supported by the JPSS ground system, provide the secure, rapid, and high

[1] https://www.space.commerce.gov/policy/national-space-policy/

volume capability for operational product generation resulting in continuity of the NOAA polar satellite contribution to accuracy of operational weather and environmental forecasts that directly affect public safety, protection of property, and recovery efforts.

C. Technical Characteristics

The key technical performance characteristic of the PFO program is the ability to provide with high reliability continuous and comprehensive Earth observations from the polar orbit. The data collected by the JPSS-3 and -4 satellites must be processed and delivered to the National Weather Service (NWS) and other operational users in a timely fashion to support weather forecasting capabilities. For the PFO data to benefit numerical weather prediction, it must meet stringent latency requirements supporting operational forecast requirements established by NWS. The JPSS-3 and -4 missions will continue delivering data with the same low latency provided by the JPSS satellites, continuing the improvements in global and regional forecast models.

The JPSS-3 and -4 instruments will continue the global coverage from a sun-synchronous early-afternoon orbit. In addition to daylight sensing, the VIIRS instrument will allow significant data collection in darkness, including cloud, ice, and land imaging of the Arctic during the winter months, as well as night time lights and global cloud imagery. These observations are important for short-term weather forecasting and ice detection in the high latitudes where NOAA's geostationary satellites cannot observe. Table 1 provides an overview of the NOAA PFO instruments and what they will measure.

Table 1: NOAA PFO Instruments and Functions

Instrument	Measurement
ATMS – Advanced Technology Microwave Sounder	ATMS and CrIS together provide profiles of atmospheric temperature, moisture, and pressure
CrIS – Cross-track Infrared Sounder	
VIIRS – Visible Infrared Imaging Radiometer Suite	Provides daily high-resolution imagery and radiometry across the visible to long wave infrared spectrum
OMPS-Nadir – Ozone Mapping and Profiler Suite	Spectrometers with UV bands for ozone total column measurements

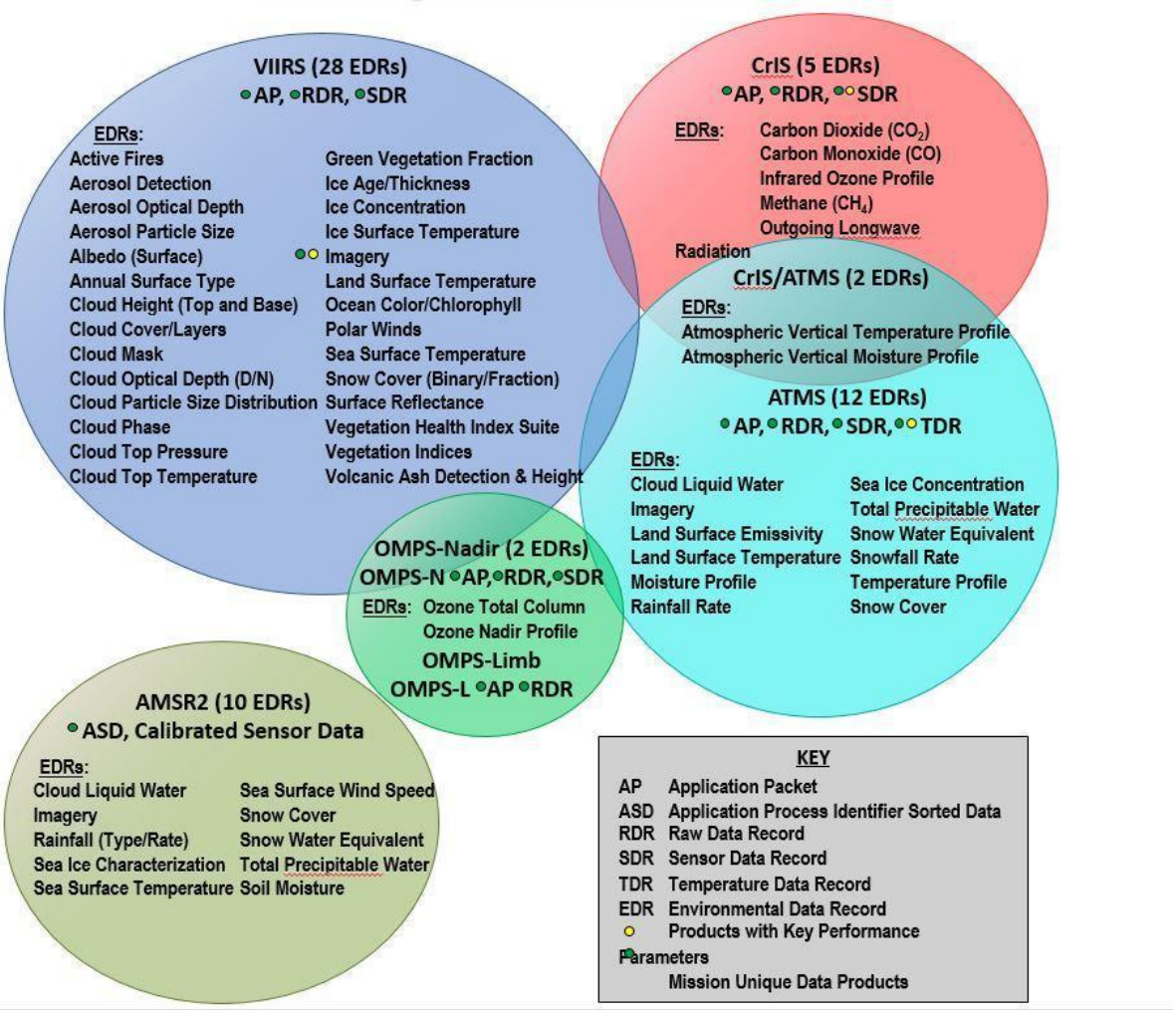
Each satellite mission will have a nominal three-year build cycle, five-year launch cadence, and 10.5 years of fuel life. These characteristics, when added to the Suomi NPP, NOAA-20 and JPSS-2 satellite missions, will provide for a robust system of primary and backup operational satellites.

To ensure the constellation health and data continuity for the JPSS and PFO satellites, NOAA shares data annually with the Department of Defense, National Science Foundation, NASA, and DOC to update the polar orbit weather satellite constellation data availability. This information-sharing is intended to verify compliance with the 2018 NESDIS 1330 Polar Orbiting Launch Policy, which states that NOAA's National Satellite, Data, and Information Service (NESDIS) will maintain a primary and secondary source of sounders

on-orbit to ensure the agency can recover from an instrument failure. The collaboration also supports risk reduction efforts for future polar requirements as part of continuing work on future low Earth orbiting (or LEO) architecture efforts. The ensuing reports analyze the availability through 2038 of the polar orbiting weather satellite elements that provide data to the NWS for weather forecasting. The JPSS satellites currently on-orbit, as well as the future JPSS and PFO satellites that will provide this meteorological data to NWS, are included in these analyses.

The PFO program will provide data for products derived solely from PFO instruments, as well as combine PFO data with that from JPSS, other NOAA offices, and partners. Table 2 below shows some of the many products based on data from PFO satellites. PFO will use the ground system that is supporting JPSS-1 and -2 to process data products and information for the NWS and other users. In addition, some PFO data products will be used by advanced-users of the data to create their own higher-level products.

Table 2: PFO Data Products



Among other uses, PFO data products will be used to:

- Improve tropical storm intensity predictions, thereby allowing communities to better prepare for potential storm surge or power loss;
- Improve river flooding decision-making, enabling appropriate preparedness recommendations;
- Provide higher spatial resolution vegetation information needed to improve numerical weather prediction and to provide more comprehensive drought monitoring tools, critical for agricultural productivity and food security;
- Monitor and track sea ice in the northern latitudes through cloud cover, allowing for safer transportation especially during winter months in Alaska when daylight can be minimal;
- Observe the intensity and extent, in greater detail, of major forest fires, which provide firefighters better planning and response information;
- Observe the path of tropical storms and hurricanes at night, allowing forecasters to know hours earlier whether they would or would not hit specific areas;

- Identify massive dust clouds and severe weather conditions, which forecasters use to prepare warnings for the public;
- Track volcanic ash plumes, to protect aviation;
- Detect harmful algal blooms impacting local coastal communities and marine life; and
- Provide night time imagery for ship tracking and power usage and availability.

III. 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

The PFO LCC is based on the experience of the JPSS program that was baselined August 1, 2013, and the "Joint Polar Satellite System Program Determination of Readiness and Baseline Report to Congress" that was submitted in September 2014. As part of the JPSS program, Suomi NPP has operated successfully for more than eight years, NOAA-20 was launched in 2017, and JPSS-2 integration is on-going (all four instruments are complete and the spacecraft is close to being ready to receive the instruments). In addition, there are more than eight years of operational experience with the original JPSS Ground System. The activities supporting a major redevelopment of the JPSS Ground System into a multi-mission system supporting all the JPSS and PFO missions is nearing completion. The mature state of the JPSS program, experience with building the NOAA-20 and JPSS-2 spacecraft and instruments, and flying the NOAA-20 and Suomi NPP satellites provide extensive actual costing data on which to anchor the cost estimate for PFO.

A. Life Cycle Cost

On December 16, 2016, NOAA baselined the budget for the LCC of the PFO program at $7,573 million through FY 2038, as reflected within the DOC Milestone 2/3 Decision Memorandum (Appendix B). The JPSS Program Office has since updated the PFO Baseline to incorporate efficiencies into the implementation of the PFO program, as directed by the December 16, 2016 DOC Milestone 2/3 Decision Memorandum 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. The cost re-baseline also benefitted from an Independent Cost Estimate (ICE) generated by DOC, 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.

Table 3: Polar Follow-On Cost Baseline Budget Estimate

PFO Cost by Fiscal Year ($M)*										
Prior Years				FY20	Future Budget Requirements				Cost to Complete	Total
FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 – FY 2038	Life Cycle Cost (LCC)
$369	$326	$419	$326	$311	$286	$225	$225	$300	$4,051	$6,838

*Reflects appropriated funds thru FY20. Future year funding assumes $425M per year for PWS (ORF and PAC) from FY22–FY23, allocated efficiently between PFO and JPSS while remaining at or under each program's LCC baseline in total.

B. Development Cost and Contingency/Reserves

The PFO program allocates reserves or contingencies in a deliberative process closely tied with the JPSS risk management program (Table 4). The purpose of contingency is to allow for items, conditions, or events for which the occurrence or effect is uncertain. The JPSS program continuously monitors mission and program risks and, as issues are identified, allocates contingency funds to assess, mitigate, or respond to the risks.

The "% Reserves" row depicts the funds available at that point in time to address unexpected problems. The contingency funding profile is consistent with NASA Goddard Space Flight Center (GSFC) Procedural Requirement (GPR) 7120.7B[2] and reflects the state of maturity of the program and the development stage of the program. Mission risks and contingency usage are continuously assessed and adjusted and are reported monthly at the NOAA/NASA Management Status Review and the Joint NOAA/NASA Agency Program Management Council.

[2] https://nodis3.gsfc.nasa.gov/npg_img/N_PR_7120_0007_/N_PR_7120_0007_.pdf

Table 4: PFO Program Development Cost and Contingency/Reserves

PFO Development Cost and Reserves ($M)								
	FY 2019 and Prior	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025 – FY 2038	Total
Total PFO	$1,440	$311	$286	$225	$225	$300	$4,051	$6,838
Development*	$1,412	$306	$279	$214	$213	$282	$1,940	$4,646
O&S**	$28	$5	$7	$11	$12	$18	$2,111	$2,192
% Reserves	N/A	11%	11%	12%	11%	11%	8%	8%

*** Development** includes the following through JPSS-4 Launch Commitment Date (FY 2033): Flight Elements (launch vehicle, satellite, instruments); Program and Flight Segment Project Management (PM), Systems Engineering (SE) and Mission Assurance (MA); Science Development Efforts (Program Science, Pre-Launch Calibration, Post Launch Validation, Algorithm Engineering and Integration and Test); Mission Operations Support Team; and the Reserves allocated to certain of these elements.

**** Operations & Sustainment (O&S)** includes the following through JPSS-4 Launch Commitment Date (FY 2033) and all subsequent program activities (FY 2033-2038): Ground Segment (PM, SE, MA, Ground O&S, System Integration and Testing; Operations, Maintenance, & Sustainment of the JPSS constellation, the Common Ground Segment and NOAA Enterprise Elements; all NOAA Science & Technology element not listed in Development, and the Reserves allocated to certain of these elements)

IV. Schedule for Development, Including Key Program Milestones

The PFO budget and development baseline supports both of the launch commitment dates for JPSS-3 and -4 (Table 5). NOAA will establish actual launch dates based upon the health and safety of the constellation, space on the launch manifest, and available funding.

Table 5: Polar Follow-On Schedule Baseline Commitment

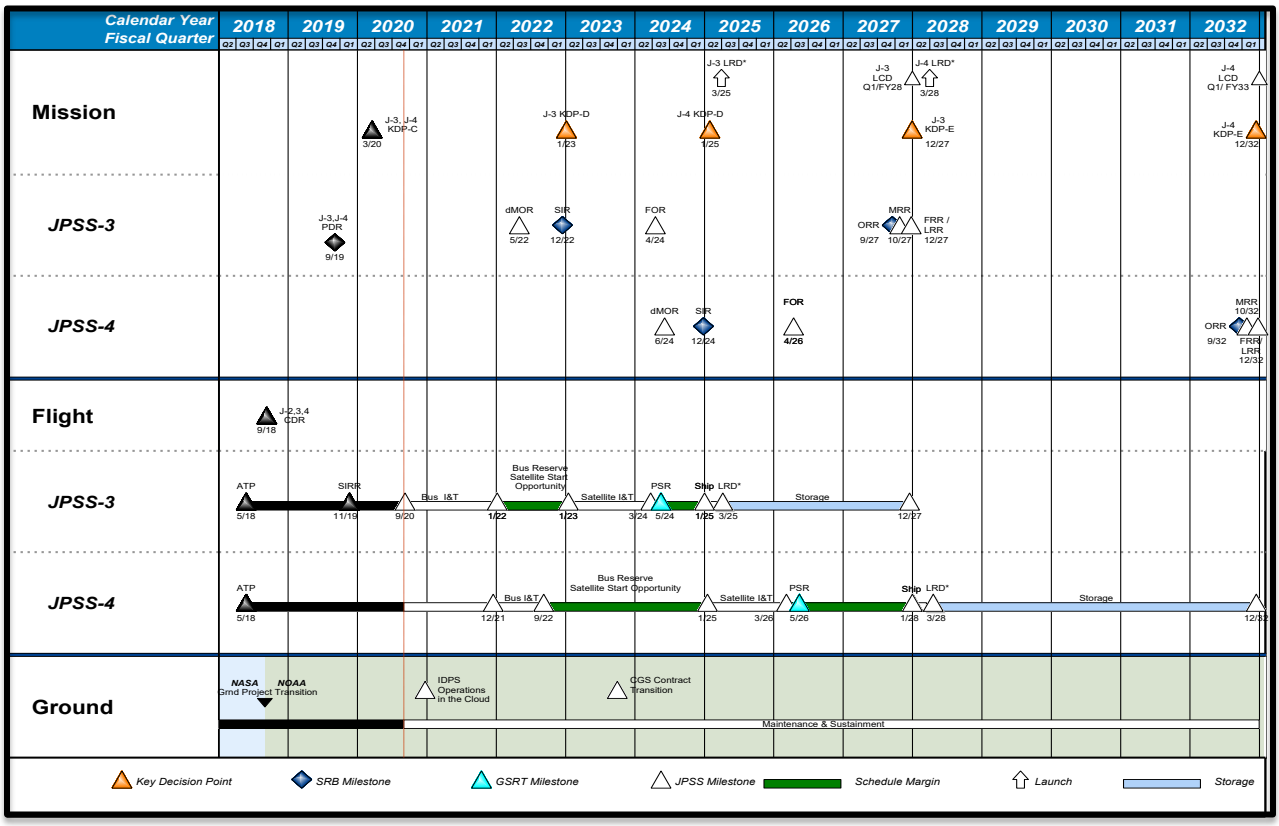
PFO Launch Schedule	
Satellite	**Launch Commitment Date**

PFO / JPSS-3	**Q1 FY 2028**
PFO / JPSS-4	**Q1 FY 2033**

The NOAA/NASA management reviews preceding the DOC baseline decision evaluated the cost and schedule commitments for the program and determined they were aligned with the content of the JPSS Level 1 Requirements Document. The milestones representing the key commitments for JPSS-3 and -4 are managed consistent with the JPSS Implementation Plan and Schedule Management Plan.

Figure 1 depicts major milestones for each PFO satellite, as of August 31, 2020.

Figure 1: Schedule of Mission Development and Key Mission Milestones



Milestone Descriptions to Accompany Figure 1:

- Mission Key Decision Points (KDPs) – A KDP is an event where the Decision Authority determines the readiness of a project to progress to the next phase of the life cycle. As such, KDPs serve as gates through which projects must demonstrate it has reached a sufficient level of completeness and maturity to be allowed to move on to the next stage of development. Within each phase, KDP approval is preceded by one or more reviews, including the governing Program Management Council Review. These reviews enable a

disciplined approach to assessing programs, projects, and missions. To achieve formal actions at a KDP, the Decision Authority makes and documents the decision and its basis, and archives the documents.

- The remaining Key Decision Points for JPSS-3 and -4 are:

  - KDP-D: This milestone will evaluate the readiness of the JPSS-3 and -4 missions to begin system-level integration and testing and evaluate the readiness of the satellites and supporting systems for a safe and successful launch and mission. There will be separate KDP-Ds for JPSS-3 and -4.
  - KDP-E: This milestone will evaluate the readiness of the JPSS-3 and -4 missions for supporting operations. There will be separate KDP-Es for JPSS-3 and -4.

V. Plan for Mitigating Identified Technical, Cost, and Schedule Risks

The development and implementation of the PFO program is in accordance with NASA best practices and standards, including NPR 7120.5, Space Flight Program and Project Management Requirements and NPR 7123.1 for Systems Engineering Processes and Requirements. JPSS-3 and -4 mission life cycle reviews are supported at the Flight Project level by a Goddard Systems Review Team; at the program level by a Standing Review Board; and at the enterprise level the JPSS program is reviewed along with the other NOAA/NESDIS environmental satellite programs by an Independent Review Team.

A. Technical Risk

The JPSS Multi-Mission Requirements Review was completed in February 2016 for a new technical baseline that included JPSS-3 and -4 missions as copies of JPSS-2 mission (the same spacecraft bus and instruments). The JPSS program management monitors technical risks for both contractor and government efforts closely utilizing the same measures as used in the POR, with in-plant government oversight and weekly and monthly technical reviews and reporting. The JPSS program maintains tight control of execution to design and manufacturing process requirements, application of lessons learned from prior builds, spares, control of anomaly resolution and material discrepancies, and application of reserves to mitigate risks.

In addition to known requirements, programmatic and technical risks that are identified will be actively managed using established processes. The JPSS Program Office has an integrated approach to risk management processes using appropriate reserve factors for contingency planning, and comprehensive program controls consistent with applicable agency requirements, standards, processes, and procedures. In addition, the proven track record of flying the Suomi NPP satellite for more than 8 years and NOAA-20 since 2017 demonstrates the technical maturity of the system design.

PFO utilizes the JPSS Continuous Risk Management (CRM) plan (470-00004) as a decision-making tool to enable programmatic and technical success through the life of the program. Decisions are made on the basis of an orderly CRM effort that includes identification, analysis, planning, tracking, control, documentation, and communication of

risks. The goal of applying CRM to JPSS-3 and -4 is to manage programmatic and technical risks throughout the program life cycle before they become issues. The aim is to reduce the overall risk to the PFO program in a systematic and disciplined way within budget, schedule, and resource constraints.

PFO risk is managed according to the JPSS Risk Management Plan (470-00004), which details the functional structure and responsibilities for identifying, monitoring, mitigating and reporting program risks. The PFO risk management follows the approach of the JPSS risk management, maintains a consolidated program-wide risk register and uses this register in the regular internal and external reviews of the program. The CRM and Risk Management Plan track the technical risks associated with NASA's implementation of POR. Once the satellites are on-orbit, the risks are managed according to the NOAA Office of Satellite and Product Operations risk management procedures.

Through the PFO risk management process, the PFO program maintains a consolidated program-wide risk register and uses it in the regular internal and external reviews of the program. Program management reviews risks monthly and the top risks and strategies for mitigating and/or resolving them are briefed monthly at the NOAA/NASA Management Status Review and the APMC.

The procurement strategy for JPSS-3 and -4 also reduces the risk to the program. Technical and programmatic risks are reduced because the PFO instruments utilize the proven design of the Suomi NPP, JPSS-1 and -2 instrument suites and are procured under existing contracts.

Within the Flight Project, the JPSS-3 and -4 instrument and spacecraft development is currently assessed as low risk. All instrument designs have been proven through on-orbit performance on Suomi NPP and NOAA-20 and the program continues to monitor on-orbit performance looking for issues that may affect JPSS-3 and -4 instruments. Known instrument issues, for example ATMS on Suomi NPP and NOAA-20, will be resolved before JPSS-3 and -4 missions are launched.

A long-term technical risk to PFO is evolving Information Technology (IT) security threats, vulnerabilities, and compliance requirements. The capabilities of adversaries and frequency of IT attacks on NOAA owned and operated systems are increasing. In parallel, the number of interconnections and dependencies on third party vendors/services make the JPSS and PFO programs vulnerable to externally driven changes. Combined with lower threshold for risk acceptance by Authorizing Officials and stakeholders, there is a risk that the planned operations, maintenance and sustainment budget for the ground segment may not cover the additional security activities or compliance requirements to adequately maintain system availability, confidentiality and integrity over the life of the program. NOAA is tracking this risk and will ensure that National Institute of Standards and Technology guidelines are followed and industry best practices are used to protect IT systems from unauthorized intrusions.

B. Schedule Risk

The JPSS Program Office monitors development schedules closely and NOAA has developed approaches to keep the JPSS-3 and -4 missions on track. As directed by the 2016 Milestone 2/3 Decision Memorandum, NOAA has implemented an efficient block-buy acquisition strategy for the JPSS-3 and -4 instrument contracts and instituted annual formal reviews of the JPSS constellation health as part of its PMC. The JPSS-3 and -4 Missions Schedule includes margin consistent with NASA GSFC guidelines. The Joint Confidence Level statistical analysis, which considers the potential range of cost and schedule outcomes, was conducted for the PFO flight segment and indicated more than a 70-percent probability that PFO will launch as committed. As directed by the 2016 PFO DOC Milestone 2/3 Decision Memorandum, the PMC annually reviews the PWS Constellation Health.

NOAA has implemented a 3-year build cadence and a 5-year launch cadence to develop the JPSS-3 and JPSS-4 satellite missions as efficiently as possible and to provide for a robust constellation with a goal of operating a primary and secondary satellite on-orbit, having an additional satellite ready to replace a failed satellite or mitigate a launch failure.

C. Cost Risk

The development budget has been allocated by the program across all contracts. Each contract is closely monitored by a Program Performance Evaluation Board. In addition, each contract's earned value management indices, including current and long-term trends, and their completed versus schedule milestones are also tracked and reported monthly. At the present time all contracts are below or at their allocated budget and the overall program has sufficient reserves on the cost to go. The contingency funding profile is consistent with NASA GPR 7120.7B and reflects the state of maturity of the program and the development stage of the program. The JPSS Program Office reviews its risks at the monthly status reviews and monthly risk boards. Annually, the JPSS Program Office reviews non-priority activities for the possibility of de-scoping to adjust for funding shortfalls.

The principal plan for controlling cost risk is to apply reserves to mitigate problems early before they grow and impact the schedule and LCC. Cost risks that exist for JPSS-3 and -4 include uncertainty in the cost of storing and maintaining the satellites for extended time periods and the uncertainty in the cost of future launch services. The build-and-store approach for the PFO satellites is different than a typical program, and there is uncertainty in the cost of this approach, considering the length of storage being indeterminate and conditional on the health of the constellation of operational satellites. The program baseline includes reserves allocated for the storage cost risk. There is also cost risk related to the uncertainty in the cost of future launch services. The current NASA Launch Services contract ordering-period expires in June 2020 and there is a risk associated with unknown future launch vehicle market conditions and new contract terms and conditions. There is also a risk that infrastructure costs for launch services currently paid for by the U.S. Air Force and the Intelligence Community could be reduced or phased-out, resulting in higher cost to the launch services.

There are also cost risks related to the Ground Segment. For example, evolving technology may drive costly Ground Segment architectural changes; unexpected increases in ground

segment license and maintenance costs may occur; IT security change requirements; and there may be increased costs for the sustainment and technical system refreshes of the Ground System.

Given that unforeseen changes in technology will occur, there is a possibility that significant changes in the ground system architecture will be required for system performance. Likewise, given that significant portions of the Ground System are commercial off the shelf (COTS)-based, there is a possibility that operations and maintenance, and license costs for COTS will exceed estimates in the program's cost estimate. Because periodic technology refresh is required to ensure continued reliability, availability, and supportability for ground system hardware and software, there is a possibility that sustainment costs will exceed funds programmed in the baseline budget. These cost risks are tracked and NOAA will implement strict management controls on upgrading and refreshing technologies to control the cost escalation.

VI. Name of the Person Responsible for Making Notifications and Whose Primary Responsibility is Overseeing the Program

The responsible reporting official as required by P.L. 112-55, Division B, Title I, subsection 105(c)(2)(E) is: Gregory A. Mandt, Director, JPSS Program Office.

Appendix A: List of Acronyms

APMC	Agency Program Management Council
ATMS	Advanced Technology Microwave Sounder
COTS	Commercial Off The Shelf
CrIS	Cross-Track Infrared Sounder
CRM	Continuous Risk Management
DOC	Department of Commerce
EUMETSAT	European Organisation for the Exploitation of Metrological Satellite
FY	Fiscal Year
GPR	Goddard Procedural Requirements
GSFC	Goddard Space Flight System
IAA	Inter-Agency Agreement
ICE	Independent Cost Estimate
IT	Information Technology
JAXA	Japan Aerospace Exploration Agency
JPSS	Joint Polar Satellite System
JPSS-1	Joint Polar Satellite System Mission/Satellite 1
JPSS-2	Joint Polar Satellite System Mission/Satellite 2
JPSS-3	PFO Joint Polar Satellite System Mission/Satellite 3
JPSS-4	PFO Joint Polar Satellite System Mission/Satellite 4
KDP	Key Decision Point
LCC	Life Cycle Cost
MA	Mission Assurance
MSR	Management Service Review
NASA	National Aeronautics and Space Administration
NESDIS	National Environmental Satellite, Data, and Information Service
NOAA	National Oceanic and Atmospheric Administration
NPR	NASA Procedural Requirements
NWS	National Weather Service
OMPS-Limb	Ozone Mapping and Profiler Suite-Limb
OMPS-Nadir	Ozone Mapping and Profiler Suite-Nadir
O&S	Operations and Sustainment
PFO	Polar Follow-On
PMC	Program Management Council
POE	Program Office Estimate
POR	Program of Record
PPA	Program, Project, and Activity
PWS	Polar Weather Satellites
RDR	Raw Data Record
SDR	Sensor Data Record
SE	Systems Engineering
Suomi NPP	Suomi National Polar-orbiting Partnership
TDR	Temperature Data Record
U.S.C.	United States Code
VIIRS	Visible Infrared Imaging Radiometer Suite

Appendix B: 2016 DOC Milestone 2/3 Decision Memorandum

DEC 1 6 2016

THE DEPUTY SECRETARY OF COMMERCE
Washington, D.C. 20230

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

FROM: Bruce H. Andrews
Deputy Secretary of Commerce

SUBJECT: Polar Follow-On (PFO) Milestone 2/3 Decision

This Milestone Decision Memorandum (MDM) sets out my expectations for officials at the National Oceanic and Atmospheric Administration (NOAA) as they proceed with the Polar Follow-On (PFO) Program. PFO is the production successor of the Joint Polar Satellite System (JPSS) program. The PFO baseline includes the next two JPSS space vehicles, JPSS 3 and JPSS 4, procured in an efficient block-buy acquisition approach in support of a timely transition to a robust constellation. The JPSS Program of Record (PoR) is responsible for funding the development, operation, and support of the JPSS ground segment activities through 2025; the PFO baseline as currently defined funds these activities from 2026 until 2038.

The JPSS Program is committed to restoring a resilient polar architecture with the feature of a two-failure system to a critical mission gap. The PFO acquisition strategy procures JPSS 3 and JPSS 4 as virtual copies of JPSS 2, with the primary goal of reducing Program technical, cost and schedule risk. At the same time, given the size and complexity of the Program, there are still issues related to cost and other factors that need to be addressed.

In my capacity as the Milestone Decision Authority (MDA) for the Department of Commerce and chair of the Milestone Review Board (MRB), I approve the PFO Program's Milestone 2/3, and authorize NOAA and JPSS to proceed in the development, execution, and implementation phases of the Program. The JPSS performance baseline is established by this Memo and is found in Attachment A (APMC Decision Memo). Further, I direct NOAA and the Program as follows:

- Previous direction to reduce JPSS management and systems engineering costs has not been realized to-date. The NESDIS Assistant Administrator has issued direction to incorporate efficiencies within the PFO baseline. The management team must continue to implement efficiencies and reductions to these expenses over the course of the Program.

- In the development of the PFO Program Baseline, Public Law 112-55 requires the inclusion of the life-cycle cost for the Program, with estimates of the annual costs until development is

completed. The inclusion of Ground operation and support costs through 2038 (28% of total costs) obscures the measurement of the core elements of the PFO Program – development of two satellites missions. Therefore, I direct NOAA to pursue the feasibility of establishing a PFO subordinate baseline consisting of flight mission development activities.

- The implementation of the efficient block-buy acquisition strategy for the PFO sensor contracts will improve the constellation resiliency and yield $585 million in program savings over the development. NOAA must continue to ensure sufficient annual budget requests are submitted to ensure these savings are realized.

- Currently the PFO proposed baseline begins funding the JPSS 4 launch vehicle ten years prior to the nominal launch schedule, in order to accommodate the potential early launch availability. I direct NOAA and NESDIS to institute an annual formal review of JPSS constellation health as part of their Program Management Council (PMC) to inform their annual budget submission. This should include the development of key technical criteria, which when triggered would initiate the JPSS 4 launch campaign and associated launch vehicle funding.

- The Earth Observing Nanosatellite (EON) development is part of NESDIS gap mitigation strategy, but not the PFO baseline in Attachment A. For this reason, the PFO budget request may include EON, but the PFO baseline shall not.

- Looking to the future, given the time necessary to build and launch, NESDIS will need to reach decisions early on related to architecture. For this reason, I direct NOAA and NESDIS to provide a next generation annual investment plan, informed by its ongoing architecture studies, for both space and ground elements to the MRB Secretary by the end of June 2017 in support of the FY 2019 and future budget requests.

CC:
PFO MRB Members

Attachment:

A. APMC Decision Memo

Appendix C: 2016 Joint NOAA and NASA Agency Program Management Council 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:

8DEC2016
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

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

FMJ 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 Department of Commerce Milestones 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

Appendix E: 2020 Joint NOAA AND NASA Agency Program Management Council Decision Memorandum

March 18, 2020

National Aeronautics and Space Administration (NASA) / National Oceanic and Atmospheric Administration (NOAA) Agency
Program Management Council (APMC)
Joint Polar Satellite System (JPSS)-3 and JPSS-4 Missions
Decision Memorandum

Summary: The joint National Oceanic and Atmospheric Administration (NOAA)/National Aeronautics and Space Administration (NASA) Agency Program Management Council (APMC) met on March 18, 2020 and evaluated the Polar Weather Satellite (PWS) Polar Follow On (PFO) proposed Life Cycle Cost (LCC) and schedule baseline. This APMC review and decision confirmed the Joint Polar Satellite System (JPSS) readiness to proceed with a recommendation of the baseline cost and schedule commitments to the Deputy Secretary of Commerce in accordance with the Department of Commerce milestone process. The PFO baseline includes the acquisition, development, and launch of the JPSS-3 and JPSS-4 missions according to the schedule in Table 1; and the operations, maintenance, and sustainment of JPSS on-orbit and ground assets from Fiscal Year (FY) 2026 to FY 2038. In order to maintain a comparison to the previous LCC estimates, the maintenance period ends at FY 2038, even though the notional life of the program may go beyond FY 2038.

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 hereby recommend to the Deputy Secretary of Commerce the refined baseline commitments for PFO as shown in Tables 1 and 2. The Department of Commerce Acquisition Management Independent Cost Estimate supports the recommendation.

Table 1: PFO Launch Commitment Dates

	Launch Commitment Date *
JPSS-3	1st Quarter FY2028
JPSS-4	1st Quarter FY2033

* Launch Commitment Dates will be re-evaluated based on annual appropriations, the performance of on-orbit assets, and the overall constellation risk posture. Target launch Date is only known after coordination with the launch services provider and in accordance with the NESDIS 1330 Polar-Orbiting Launch Policy.

Table 2: PWS PFO Budget ($M)

PFO Budget, with PWS Overall ($M)								
	FY2016-FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026-FY2038	
PFO**	1,750.8	386.3	200.0	225.0	225.0	205.0	3,845.9	6,838.0
PWS***		677.8	425.0	425.0	425.0	425.0		

** Fiscal Year Budget submissions will be based on current needs and requirements. Therefore, the PAC profile will be updated on an annual basis. ORF funds for the PFO LCC will not exceed $178.1M.
*** PWS includes JPSS Program of Record and PFO in the annual budget submission and are managed individually to account for each LCC. The Program of Record portion of the budget is provided for information only, and is not addressed in this Decision Memorandum.

March 18, 2020

National Aeronautics and Space Administration (NASA) / National Oceanic and Atmospheric Administration (NOAA) Agency
Program Management Council (APMC)
Joint Polar Satellite System (JPSS)-3 and JPSS-4 Missions
Decision Memorandum (continued)

Concurrence:

Gregory Mandt (affiliate) Digitally signed by Gregory Mandt (affiliate) Date: 2020.03.28 17:36:06 -04'00'

NOAA: Date
Director
Joint Polar Satellite System (JPSS) Program

4/1/2020

NASA: Date
Director
Goddard Space Flight Center

NOAA: Date
Assistant Administrator for
Satellite and Information Services

Thomas Zurbuchen Digitally signed by Thomas Zurbuchen Date: 2020.03.31 09:28:04 -04'00'

NASA: Date
Associate Administrator,
Science Mission Directorate

Approval:

Assistant Secretary of Commerce Date
for Environmental Observation and
Prediction, Performing the duties of Under
Secretary of Commerce for Oceans and
Atmosphere

Appendix F: Legislative Mandate

The Consolidated Appropriations Act, 2020, or P.L. 116-93, provided in part that the requirements set forth by Section 105 of P.L. 112-55 (33 U.S. Code § 878A), as amended by Section 105 of the Title I of Division B of P.L. 113-6, were adopted by reference and made applicable with respect to fiscal year 2020.

33 U.S. Code § 878A - Contract for development of a major program; costs; Major Program Annual Report for satellite development program

(a)DEFINITIONS 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 $250,000,000; and

(8)the term "baseline" means the program as set following contract award and preliminary design review of the space and ground systems.

(b)CONTRACT REQUIREMENTS FOR MAJOR PROGRAMS

(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)REPORTS

(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)NOTIFICATION TO UNDER SECRETARY OF EXCESS DEVELOPMENT COSTS

(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)DETERMINATION BY UNDER SECRETARY OF EXCESS DEVELOPMENT COSTS

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)COMPLETION AND TRANSMITTAL OF ANALYSIS

NOAA shall complete an analysis initiated under subsection (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.