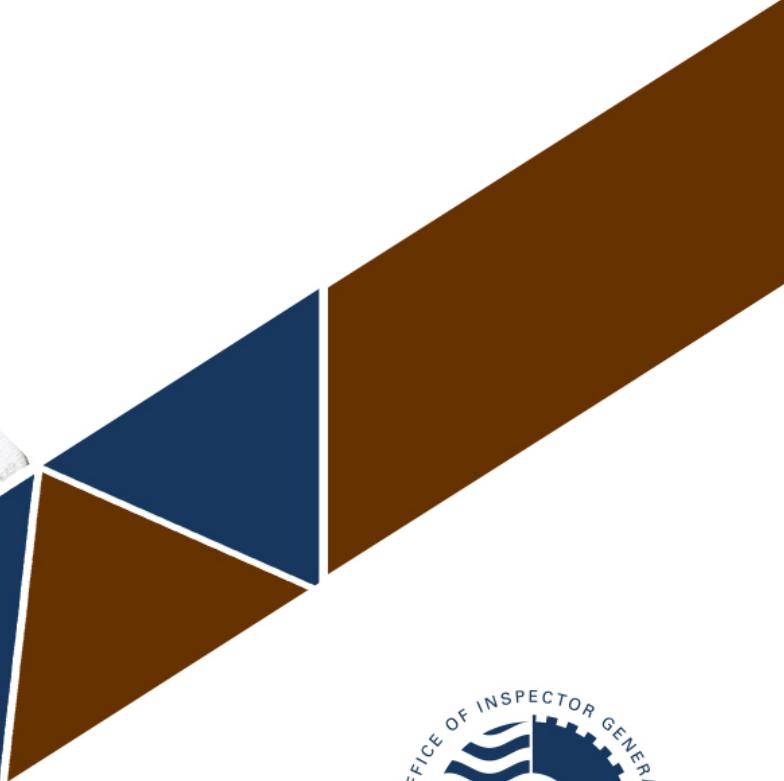


The Joint Polar Satellite System: Cost Growth and Schedule Delay of a Key Instrument Acquisition Highlight the Need for Closer Attention to Contractor Oversight

FINAL REPORT NO. OIG-20-047-A

SEPTEMBER 10, 2020



U.S. Department of Commerce
Office of Inspector General
Office of Audit and Evaluation



September 10, 2020

MEMORANDUM FOR: Neil Jacobs
Assistant Secretary of Commerce for Environmental Observation
and Prediction, performing the duties of Under Secretary of
Commerce for Oceans and Atmosphere
National Oceanic and Atmospheric Administration

Frederick J. Meny, Jr.
Assistant Inspector General for Audit and Evaluation

SUBJECT: *The Joint Polar Satellite System: Cost Growth and Schedule Delay of a Key Instrument Acquisition Highlight the Need for Closer Attention to Contractor Oversight*
Final Report No. OIG-20-047-A

Attached is our final report on our audit of National Oceanic and Atmospheric Administration's (NOAA's) Joint Polar Satellite System (JPSS) program. Our objective was to assess the cost, schedule, and technical performance of the Program's acquisition and development effort for selected instruments.

We found the following:

- I. The Program exceeded contract definitization timelines and conducted late and abbreviated baseline reviews.
- II. JPSS-2 Cross-track Infrared Sounder quality assurance did not adequately integrate contract risks into its surveillance activities.
- III. Award-fee determinations did not motivate the contractor toward exceptional performance.

In its August 3, 2020, response to our draft report, NOAA concurred with four recommendations and partially concurred with one. NOAA's formal response is included within the final report as appendix D.

Pursuant to Department Administrative Order 213-5, please submit to us an action plan that addresses the recommendations in this report within 60 calendar days. This final report will be posted on OIG's website pursuant to sections 4 and 8M of the Inspector General Act of 1978, as amended (5 U.S.C. App., §§ 4 & 8M).

We appreciate the cooperation and courtesies extended to us by your staff during our audit. If you have any questions or concerns about this report, please contact me at (202) 482-1931 or Kevin Ryan, Director for Audit and Evaluation, at (202) 695-0791.

Attachment

cc: Benjamin Friedman, Deputy Under Secretary for Operations, NOAA
Stephen Volz, Assistant Administrator for Satellite and Information Services, NOAA
Gregory Mandt, JPSS System Program Director, NOAA
Brian Doss, Acting Audit Liaison, NOAA
Lisa Lim, Alternate Audit Liaison, NOAA



Report in Brief

September 10, 2020

Background

National Oceanic and Atmospheric Administration's (NOAA's) Joint Polar Satellite System (JPSS) collects temperature and moisture data from satellites viewing the Earth from a height of approximately 512 miles. Environmental data collected by the satellites are critical inputs for weather models' 3- to 7-day forecasts, which help provide early warnings of significant weather and enable emergency managers to make timely decisions that protect lives and property.

The JPSS program (Program) is a collaboration between NOAA and the National Aeronautics and Space Administration (NASA). NOAA provides funding and retains overall responsibility and authority for development and operations of the entire Program. NASA manages the acquisition and development of the satellites (spacecraft and instruments) and launch services.

Why We Did This Review

Our objective was to assess the cost, schedule, and technical performance of the Program's acquisition and development effort for selected instruments. To satisfy our audit objective, we determined the extent to which costs and schedules changed from original project baselines, and identified challenges to the projects' technical baseline.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

The Joint Polar Satellite System: Cost Growth and Schedule Delay of a Key Instrument Acquisition Highlight the Need for Closer Attention to Contractor Oversight

OIG-20-047-A

WHAT WE FOUND

We found the following:

1. The Program exceeded contract definitization timelines and conducted late and abbreviated baseline reviews.
2. JPSS-2 Cross-track Infrared Sounder quality assurance did not adequately integrate contract risks into its surveillance activities.
3. Award-fee determinations did not motivate the contractor toward exceptional performance.

In addition, as a part of one of these findings, we identified \$14,354,642 in potential funds that could be put to better use.

WHAT WE RECOMMEND

We recommend that the NOAA Deputy Undersecretary for Operations do the following:

1. Require programs notify the Joint Agency Program Management Council before NOAA-funded NASA contracts exceed definitization timelines.
2. Require a Joint Agency Program Management Council assessment before an Integrated Baseline Review requirement is removed, abridged, or its timing adjusted, for NOAA-funded NASA contracts or major contract modifications requiring earned value management.

We recommend that the NOAA Assistant Administrator for Satellite and Information Services do the following:

3. Ensure the Program adequately incorporates contract risks and executes prevention-focused surveillance as part of its quality assurance activities.

We recommend that the NOAA Assistant Administrator for Satellite and Information Services coordinate with the Director of the NASA Goddard Space Flight Center to do the following:

4. Conduct a joint review of contractor performance evaluation practices and determine whether changes could more effectively motivate contractors to achieve desired outcomes for ongoing and future contract negotiations on NOAA-funded projects.
5. Establish a working definition of "significant" cost overrun to help inform strategies that progressively motivate contractors to improve before accumulating excessive cost and schedule performance deficits, for ongoing and future NOAA-funded NASA contracts.

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Cover: Herbert C. Hoover Building main entrance at 14th Street Northwest in Washington, DC. Completed in 1932, the building is named after the former Secretary of Commerce and 31st President of the United States.

Introduction

National Oceanic and Atmospheric Administration's (NOAA's) Joint Polar Satellite System (JPSS)¹ collects temperature and moisture data from satellites viewing the Earth from a height of approximately 512 miles. Environmental data collected by the satellites are critical inputs for weather models' 3- to 7-day forecasts, which help provide early warnings of significant weather and enable emergency managers to make timely decisions that protect lives and property.

The JPSS program (Program) is a collaboration between NOAA and the National Aeronautics and Space Administration (NASA). NOAA provides funding and retains overall responsibility and authority for development and operations of the entire Program. NASA manages the acquisition and development of the satellites (spacecraft and instruments) and launch services.

Missions and Status

The Program is composed of five satellites. Two of them are already in orbit—Suomi National Polar-orbiting Partnership (Suomi NPP) and JPSS-1 (renamed NOAA-20 after launch)—while missions in pre-launch development are JPSS-2, -3, and -4. Plans for each of these future missions will include the following four instruments:

1. Advanced Technology Microwave Sounder (ATMS)
2. Cross-track Infrared Sounder (CrIS)
3. Ozone Mapping and Profiler Suite (OMPS)
4. Visible Infrared Imaging Radiometer Suite.²

Under separate contracts independent of the spacecraft contract, the government procures these four instruments, which are then integrated with the spacecraft to become a mission-capable satellite.

The next satellite the Program plans to launch is JPSS-2, and CrIS is the last instrument the Program plans to integrate with the spacecraft. The next significant JPSS-2 mission milestone is integrated satellite testing beginning by the end of 2020, which will support a March 2022 launch readiness date.³

Instrument Acquisition Environment

The acquisition of each of the instruments is a significant technical effort, using many components produced in small quantities by specialized contractors. This can create a complex supply chain that is susceptible to interruption, where supplier production activities slow or stop. JPSS-2 ATMS, CrIS, and OMPS each experienced supply chain interruption between JPSS-1

¹ NOAA merged the JPSS missions into a unified line item in its fiscal year (FY) 2020 budget, now called *Polar Weather Satellites*, but references to individual missions (JPSS-1 through JPSS-4) remain for their durations.

² Suomi NPP and JPSS-1 each have a fifth instrument known as the *Clouds and the Earth's Radiant Energy System*.

³ JPSS-3 and JPSS-4 are planned to be ready for launch or storage by 2025 and 2028, respectively.

and JPSS-2 due to a funding lapse, contributing to a loss of contractors' specialized knowledge and capabilities.

For the CrIS instrument acquisition, the Program modified the original JPSS-1 CrIS contract to incorporate the follow-on JPSS-2 through JPSS-4 CrIS instrument requirements, procuring them as modifications to the original JPSS-1 CrIS contract. The total contract value for the four CrIS instruments was \$784,217,410 as of January 2020.

Objective, Findings, and Recommendations

Our objective was to assess the cost, schedule, and technical performance of the Program's acquisition and development effort for selected instruments. To satisfy our audit objective, we determined the extent to which costs and schedules changed from original project baselines, and identified challenges to the projects' technical baseline. See appendix A for a full description of our objective, scope, and methodology.

Cost

In its 2013 CrIS instrument acquisition plan, the Program's risk assessment stated that there was a low likelihood of JPSS-2 CrIS budget increases. But compared to the definitized contract values,⁴ the Program experienced cost overruns⁵ on both the JPSS-1 and JPSS-2 CrIS development projects due to unrecoverable schedule loss, valued at \$16.9 million and \$64.6 million, respectively (see table I).

Table I. JPSS-1 and JPSS-2 Cost Overruns

CrIS Mission	Definitized Value	Cost Overrun
JPSS-1	\$91 million ^a	\$16.9 million (June 2014)
JPSS-2	\$221 million	\$64.6 million (June 2018)

Source: OIG analysis of Program data

^a Accounting for cost overruns and government-directed requirements changes, the final JPSS-1 CrIS contract amount was \$164,515,926.

In 2019, the Defense Contract Management Agency (DCMA) found the current prime contractor's⁶ business systems were not compliant with the Federal Acquisition Regulations (FAR),⁷ revealing deficiencies in cost and schedule management controls, which the contractor was still addressing at the conclusion of our fieldwork.⁸

⁴ Definization is the determination of contract terms, specifications, and price, which converts the undefinitized contract action to a definitive contract.

⁵ A cost overrun is the amount by which a contractor exceeds the estimated cost and/or the final ceiling of the negotiated contract value.

⁶ The prime contractor is the entity with whom an agent of the government enters into a prime contract for the purposes of obtaining supplies, materials, equipment, or services of any kind. Lower-tier contractors (such as subcontractors and suppliers) would enter into contracts with the prime, but not directly with the government.

⁷ The FAR is codified in Title 48 of the Code of Federal Regulations (C.F.R.).

⁸ Defense Contract Management Agency, June 22, 2019. *Earned Value Management Systems (EVMS) Center Validation Review, Report # 20190612-3*. Fort Lee, VA: DCMA.

Schedule

The contract instrument delivery dates were both delayed for JPSS-1 and JPSS-2 CrIS. JPSS-1 was delivered 8 months later than originally planned and the JPSS-2 CrIS delivery milestone was delayed until April 2020⁹—a 21-month slippage from the original baseline schedule (see table 2).

Table 2. JPSS-1 and JPSS-2 Delivery Schedule Delays

CrIS Mission	Original Instrument Delivery Commitment Date	Actual or Projected Date	Schedule Slip
JPSS-1	June 2014	February 2015	8 months
JPSS-2	July 2018	April 2020	21 months

Source: OIG analysis of Program data

In its acquisition plan, the Program’s risk assessment stated that there was a low likelihood of a JPSS-2 CrIS delivery delay. It considered the low risk further mitigated because the instrument was expected to be a proven design from JPSS-1, and because schedule delay risk would be managed as part of award-fee determinations.

Technical and Other Challenges

Although the Program expected the JPSS-1 overall project to be a challenging transition from the troubled NPOESS¹⁰ program, it planned for JPSS-2 CrIS to be a production copy of the JPSS-1 instrument, with low risk likelihoods for significant cost increases, schedule delays, or technical issues. However, the Program found challenges on JPSS-2 CrIS to be greater than what it originally planned. One factor was the overall CrIS acquisition’s original prime contractor spun off or was acquired by new businesses three times during the JPSS-1 and JPSS-2 contract efforts. These corporate transitions forced the Program to handle multiple business process and culture changes. An extended procurement gap between JPSS-1 and JPSS-2 (i.e., 2010–2013), interrupted the supply chain—supplier production activities slowed or stopped, causing a loss of contractors’ specialized knowledge and capabilities. This impeded the startup of the JPSS-2 CrIS supply chain, resulting in issues with multiple subcontractors.

For the JPSS-2 CrIS effort, we found the Program exceeded contract definitization timelines, held late and abbreviated baseline reviews, did not adequately integrate supply chain risks into its contractor surveillance, and did not aggressively apply award-fee incentives to control contractor performance. None of these factors were the sole cause of the eventual cost, schedule, and technical performance issues. However, each added risk at progressive stages of the acquisition that helped create an environment for cost, schedule, and technical performance issues to proliferate as schedules were delayed and costs overrun. We identified management issues related to project inception, assurance, and control, with recommendations to put

⁹ Instrument completed and placed in storage; scheduled to be delivered to the spacecraft contractor in August 2020.

¹⁰ The National Polar-orbiting Operational Environmental Satellite System (NPOESS) program was restructured on February 1, 2010, due to cost overruns and schedule delays.

\$14,354,642¹¹ of Program funds for this acquisition to better use¹² and mitigate challenges of similar future acquisitions.

I. The Program Exceeded Contract Definitization Timelines and Conducted Late and Abbreviated Baseline Reviews

The FAR and NASA policy set timelines and guidance for finalizing (definitizing) contract actions and conducting initial project baseline reviews.¹³ The intent of the timelines and guidance is primarily to reduce risk and maximize government insight into cost, schedule, and technical performance when compared against a baselined plan.

The Program expected acquisition and development challenges with the JPSS-1 CrIS instrument given that it transitioned from the restructured NPOESS program. As previously mentioned, the Program also faced challenges greater than expected on JPSS-2 CrIS as a result of the supply chain interruption between the JPSS-1 and JPSS-2 procurements. Contractors had difficulties manufacturing heritage parts and maintaining continuity in technical processes for both projects.

The Program exceeded definitization timelines for the JPSS-1 CrIS contract and the JPSS-2 CrIS letter contract¹⁴ and conducted late and abbreviated baseline reviews. As a result, the Program had insufficient insight into cost, schedule, and technical risks.

A. *The Program exceeded timelines for definitizing the JPSS-1 and JPSS-2 CrIS contract efforts*

According to the FAR, the government will provide for definitization generally within 180 days after the date of a letter contract¹⁵ or undefinitized contract action.¹⁶

Compared with this approximate 6-month timeline, the Program definitized the contract actions for JPSS-1 and JPSS-2 CrIS late—15 months and 10 months, respectively (see table 3).¹⁷

¹¹ Based on a total contract value of \$784,217,410 as of January 2020. An accounting of monetary benefits we have identified in this report can be found in appendix C.

¹² Recommendations for funds put to better use is in accordance with Section 5(f)(4) of the Inspector General Act of 1978, as amended (5 U.S.C. App.).

¹³ 48 C.F.R. § 16.603-2(c)(3), *Letter contracts*, and 48 C.F.R. § 1852.234-2(c), *Earned Value Management System*.

¹⁴ The JPSS-2 CrIS letter contract was not strictly a separate contract, but an undefinitized contract action, authorized by a modification to the original JPSS-1 CrIS contract.

¹⁵ 48 C.F.R. § 16.603-2(c), *Letter contracts*. Except for extreme cases, letter contracts will be definitized within 180 days or before completion of 40 percent of the work to be performed, whichever occurs first. A letter contract is a written preliminary contractual instrument that authorizes the contractor to begin immediately manufacturing supplies or performing services.

¹⁶ *Undefinitized contract action* (UCA) means a unilateral or bilateral contract modification, or a delivery/task order in which the final price or estimated cost and fee have not been negotiated and mutually agreed to by NASA and the contractor. Per 48 C.F.R. § 1843.7001, *Contract Modifications*, letter contracts are considered to be UCAs for purposes of tracking definitization schedules.

¹⁷ For more information on NOAA satellite contracts where OIG identified delayed definitization, see the following:

Table 3. JPSS-1 and JPSS-2 Late Contract Definitization

CrIS Mission	Letter Contract Date	Finalized Contract Date	Time to Define (6-mo standard)	Time in Excess of Standard	Definitized Contract Amount
JPSS-1	September 2010	December 2011	15 months	9 months	\$91 million
JPSS-2	November 2013	September 2014	10 months	4 months	\$221 million

Source: OIG analysis of Program data

While an undefinitized contract effort is being funded, the contractor does not report its progress within an earned value management system (EVMS),¹⁸ so government cost control and insight into contractor performance is limited. Reimbursing work without definitized contract terms increases cost and schedule risk because contractor efforts are not baselined to a negotiated price and work plan.

There were several explanations for the delayed definitizations. The CrIS instrument builds are significant state-of-the-art technical efforts, and unexpected challenges beyond the Program's control have arisen. JPSS-1 CrIS was a difficult acquisition to transition from NPOESS to NASA, requiring transfer and review of technical documentation, proposals, requirements, and alignment with NASA policies. By the time JPSS-2 CrIS work started, the Program was highly focused on JPSS-1 CrIS performance issues. However, we found that timelier definitization of one or both of the contract actions could have given the Program earlier insights to cost and schedule performance that may have potentially reduced subsequent cost overruns and schedule delays that occurred in both projects.

B. The Program conducted late and abbreviated baseline reviews

Similar to the purpose of adhering to definitization timelines, Integrated Baseline Reviews (IBRs)¹⁹ are risk-based reviews conducted to gain insight and agreement for cost, schedule, technical, resource, and management risk areas. They also ensure mutual understanding between the government and contractor of the risks inherent in the

(1) U.S. Department of Commerce Office of Inspector General, April 25, 2013. *Audit of Geostationary Operational Environmental Satellite-R Series: Comprehensive Mitigation Approaches, Strong Systems Engineering, and Cost Controls Are Needed to Reduce Risks of Coverage Gaps*, OIG-13-024-A. Washington, DC: DOC OIG; and

(2) DOC OIG, February 2, 2017. *Audit of the Geostationary Operational Environmental Satellite-R Series: Improvements in Testing, Contract Management, and Transparency Are Needed to Control Costs, Schedule, and Risks*, OIG-17-013-A. Washington, DC: DOC OIG.

¹⁸ EVMS integrates the cost, schedule, and technical aspects of work into a baseline plan; objective measurement of progress (earned value) and variances from plans; performance reporting and forecasts; and structured baseline maintenance.

¹⁹ See NASA Office of the Chief Engineer, August 14, 2012. *NASA Space Flight Program and Project Management Requirements*, NASA Procedural Requirements (NPR) 7120.5E. Washington, DC: NASA, appendix A, 60. An IBR is defined as a risk-based review conducted by program/project management to ensure a mutual understanding between customer and supplier of the risks in the supplier's performance measurement baseline and to ensure the performance measurement baseline is realistic for completing all of the authorized work within the authorized schedule and budget.

Performance Measurement Baseline,²⁰ as well as to ensure understanding of the baseline's relationship to the underlying EVMS²¹ and processes that will operate during the lifecycle of the project.²²

According to the NASA supplement to the FAR, programs shall conduct IBRs as early as practicable, and if a pre-award IBR has not been conducted, a post-award IBR should be done within 180 calendar days after contract award, or the exercise of significant contract options, or within 60 calendar days after distribution of a supplemental agreement that implements a significant funding realignment or effects a significant change in contractual requirements (e.g., incorporation of major modifications).²³ If a project requires EVMS, such as the JPSS CrIS projects, then it generally requires IBRs.

After transitioning from the troubled NPOESS acquisition, many programmatic adjustments needed to be made in order to bring the procurement under NASA management. This contributed to the JPSS-1 CrIS project's initial IBR occurring 18 months late (compared to the 6-month timeline). But later as an established NASA acquisition, the Program's initial reviews for the JPSS-2, JPSS-3, and JPSS-4 CrIS projects were also late and consisted of abbreviated processes that did not constitute an IBR.²⁴ Program personnel told us that resource availability and alignment with other reviews contributed to the delay. Table 4 details the timing of the reviews conducted for JPSS-1 through JPSS-4.

Table 4. Timeframes of JPSS-1 through JPSS-4 CrIS Baseline Review

CrIS Instrument	Contract Date ^a	Baseline Review Date	Time from Contract Date to Baseline Review (months)	Time in Excess of 6 month Standard (months) ^b
JPSS-1	September 2010	September 2012 (IBR)	24	18
JPSS-2	November 2013 ^c	March 2015	16	10
JPSS-3	January 2016	November 2016	10	4
JPSS-4	January 2016	November 2016	10	4

Source: OIG analysis of Program data

^a This may be contract award date or contract modification date.

^b The standard of 180 calendar days (approximately 6 months) applies from contract award or within 60 calendar days after incorporation of major modifications.

^c This is the date of the JPSS-2 letter contract, but the Program considers the award date to be the definitization date (i.e., September 2014).

²⁰ *Ibid*, appendix A, 63. A Performance Measurement Baseline is a “time-phased cost plan for accomplishing all authorized work scope in a project’s life cycle, which includes both NASA internal costs and supplier costs.”

²¹ A contractor’s EVMS is sometimes also referred to as their business system.

²² NASA, March 2016. *Integrated Baseline Review (IBR) Handbook*, NASA/SP-2016-3406. Washington, DC: NASA, 9.

²³ 48 C.F.R. 1852.234-2, *Earned Value Management System*.

²⁴ The Program called this a *Performance Measurement Baseline Verification Review*. It is not defined in NASA regulations and was a tailored project-level review, so we refer to it in this report as a *baseline review*. This abbreviated review process was conducted for JPSS-2, -3, and -4 CrIS missions.

After a \$16.9 million contract modification to cover a cost overrun for JPSS-1 CrIS in June 2014, the Program did not conduct a JPSS-1 CrIS IBR. The Program's next review was an abbreviated JPSS-2 CrIS baseline review in lieu of an IBR. For JPSS-2 CrIS, Program personnel believed the acquisition did not require a separate IBR because it was a line item addition to the JPSS-1 CrIS contract. Instead, the Program tailored a project-level review process that personnel considered appropriate based on available resources and the state of the Program at the time.

However, we concluded that the JPSS-2 CrIS acquisition was a major modification due to the cost and scale of the instrument development and circumstances that increasingly differentiated JPSS-2 CrIS from JPSS-1, such as parts obsolescence and loss of contractor expertise.²⁵ Whether technically required for the JPSS-1 CrIS cost overrun modification or the JPSS-2 CrIS initial contract action, a full NASA IBR—including a detailed review of the prime contractor's business system and how it interfaced with its subcontractors—was warranted on the JPSS CrIS contract actions.

Program personnel learned in June 2019 that the CrIS prime contractor was operating with significant business practice deficiencies. DCMA conducted an audit of the CrIS prime contractor's EVMS from April 23 to May 2, 2019. This occurred 4 years after the abbreviated JPSS-2 CrIS baseline review, and DCMA found significant deficiencies with contractor schedule integration and material management that potentially impacted cost and schedule performance analysis. Examples of deficiencies DCMA identified included multiple instances of misalignment between the prime contractor and subcontractors' schedules and mismatched task identifications that made it nearly impossible to ascertain subcontract work status.

Subsequently, DCMA did not accept the prime contractor's initial audit action plan, but the contractor was working toward achieving DCMA validation by the end of our audit. DCMA's findings correlated with the Program's subcontractor challenges, as well as with concerns the Program developed about the prime contractor's cost and schedule estimates. The estimates proved to be unreliable, with cost overruns and schedule replans across the projects.²⁶

By not following the FAR and agency guidance for definitization and baseline reviews, the Program added to the risk of contract cost increases and schedule delays.

Recommendations

We recommend that the NOAA Deputy Undersecretary for Operations do the following:

- I. Require programs notify the Joint Agency Program Management Council before NOAA-funded NASA contracts exceed definitization timelines.

²⁵ This is related to the supply chain challenges previously discussed in this report.

²⁶ JPSS-3 and JPSS-4 were replanned in December 2018 as a result of downstream effects from JPSS-2 issues.

2. Require a Joint Agency Program Management Council assessment before an IBR requirement is removed, abridged, or its timing adjusted, for NOAA-funded NASA contracts or major contract modifications requiring earned value management.

II. JPSS-2 CrIS Quality Assurance Did Not Adequately Integrate Contract Risks into Its Surveillance Activities

According to NASA policy, quality assurance functions should be planned and conducted based on risk.²⁷ Identifying risks during contract development, source selection, contract award negotiation, and contract performance should be a primary area of consideration. Additionally, the Program’s flight project quality assurance surveillance plan (PQASP) states that overall surveillance focus should be on prevention rather than detection, avoiding sole reliance on inspections and testing to identify problems. The Program is also required to collect and analyze appropriate metrics to ensure adequate management visibility of adverse trends and adjust quality assurance activities as needed. To enable these functions, mission assurance requirements for the JPSS instruments provide the government authority to randomly audit any contractor²⁸ processes, including any lower-tier contractors, in order to verify the integrity of manufacturing and quality systems.

We found the Program’s surveillance activities were not adequately adjusted for supply chain and other contract risks. In addition, the Program’s activities were reactive rather than prevention-focused, as evidenced by Program documentation and personnel’s description of their approach. The Program conducted some routine (timeline-driven) contractor audits, but—compared to the event schedule—we did not find documentation of all scheduled audit activities.

As one example, for JPSS-2 CrIS, the prime contractor began experiencing quality challenges with subcontractors²⁹ in 2014. The contractors experienced loss of ability to replicate previous designs, lack of configuration control, and a failure to apply required standards during manufacturing, causing damage to components. There were also process control lapses resulting in preventable test incidents that put instrument hardware at risk. Other suppliers lost instructions and capabilities for fabricating part assemblies, or used improper processes that contaminated components.

During this effort, the Program was performing mandatory inspections at various points of manufacturing processes, including on-the-spot verification of specific requirements. However, this *reactive* surveillance focused on detection, relying primarily on inspection and testing as problems occurred, which were a downstream effect of potentially flawed

²⁷ NASA Office of Safety and Mission Assurance, October 27, 2005. *NASA Quality Assurance Program Policy*, NASA Policy Directive (NPD) 8730.5B. Washington, DC: NASA.

²⁸ When used without qualification, *contractor* refers to all contractors, subcontractors, and suppliers, similar to the PQASP definition.

²⁹ Subcontract and supplier material costs accounted for roughly 50 percent of the contract value.

processes. As late as 2018—5 years already into the JPSS-2 CrIS project—manufacturing inconsistencies were still occurring.

As identified in the PQASP, examples of risk-adjusted (i.e., prevention-focused) surveillance include collecting tailored performance metrics, audits of subcontractor work instructions such as coating and painting procedures, or configuration control measures to verify work integrity before problems occur. Process audits that occur apart from normal periodic schedules are another method for prevention of manufacturing problems before they occur. However, the program predominantly relied on reactive surveillance rather than the prevention-focused measures called for in the PQASP.

The most significant single example of reactive quality assurance oversight was the prime contractor's customer furnished material (CFM)³⁰ plan execution. Early in the project during JPSS-2 contract negotiations in 2014, the prime contractor's plan for managing CFM was tracked as a project risk. By March 2015, the government's JPSS-2 CrIS baseline review cited the prime contractor's CFM plan as an area of concern due to potential delays not accounted for in the schedule. An action item from the review was for the prime contractor to deliver a copy of the plan to the Program. However, Program personnel told us they had no role in the plan, and thus did not review it because it was the responsibility of the contractor and not a contract deliverable.

As the prime contractor began to execute the CFM plan, processing and delivery delays denied some subcontractors the components they needed for instrument assembly. Some of the delays were due to a significant amount of unanticipated work not accounted for in the plan, such as the conversion of technical drawings to the prime contractor's format and specifications, which led to significant rework efforts. Although part of the prime contractor's surveillance responsibilities, oversight of the intermediary contractor's operation responsible for the precision machining of the CFM was insufficient. Prime contractor personnel told us the CFM plan's execution was one of the most significant cost and schedule impacts. If the Program would have adjusted its oversight, for example, following up more closely on its initial concerns with the CFM plan, it may have addressed issues before there was a significant impact to cost or schedule.

As previously discussed in this report, the Program faced a challenging development environment that was complicated further by the transition from NPOESS and the time delay between JPSS-1 and JPSS-2 CrIS procurements. An effective quality assurance system would help the Program mitigate the extent of such challenges by revealing and preventing some issues before they have significant impact. Based on our assessment, the majority of the Program's contractor risks and issues were not integrated with its quality assurance activities until after manufacturing problems occurred. As such, the quality assurance surveillance measures did not provide the Program with early preventative insights to

³⁰ CFM is specialized material centrally procured by the prime contractor, then provided to an intermediary contractor for precision-machining into parts that would be further distributed to lower-tier contractors for building CrIS subcomponents.

contractor and supply chain challenges and vulnerabilities, potentially missing opportunities to decrease the likelihood or severity of negative cost and schedule impacts.

Recommendation

We recommend that the NOAA Assistant Administrator for Satellite and Information Services do the following:

3. Ensure the Program adequately incorporates contract risks and executes prevention-focused surveillance as part of its quality assurance activities.

III. Award-Fee Determinations Did Not Motivate the Contractor Toward Exceptional Performance

According to the FAR, among the different criteria for when an award-fee contract is suitable includes when the likelihood of meeting acquisition objectives is enhanced by motivating the contractor toward exceptional performance.³¹ An award-fee contract also gives the government flexibility to evaluate both actual performance and the conditions under which it was achieved (efforts).

Under a cost-plus award-fee (CPAF) contract, the government develops a performance evaluation plan (PEP) to administer the determination and payment of contractor award-fees. The PEP for the JPSS-2 CrIS has four weighted evaluation categories that the Program assesses at the end of approximately 6-month periods:³²

1. Technical Performance (30 percent)
2. Cost Control (30 percent)
3. Schedule Performance (25 percent)
4. Business Management (15 percent)

See appendix B for more information on the overall evaluation grading criteria.

We found the CrIS contractor earned at least 50 percent of the available award fee in all JPSS-1 and JPSS-2 instrument award periods from 2012 to 2019, although both projects had cost overruns of \$16.9 million and \$64.6 million, respectively.

A. Award-fee evaluations favorably graded periods of sub-optimal performance

For JPSS-1 CrIS, its \$16.9 million cost overrun occurred 4 years after the letter contract award. However, from the first award period up until the cost overrun, the contractor's average scores for overall performance were "Very Good" (88 percent).³³ Then, in the

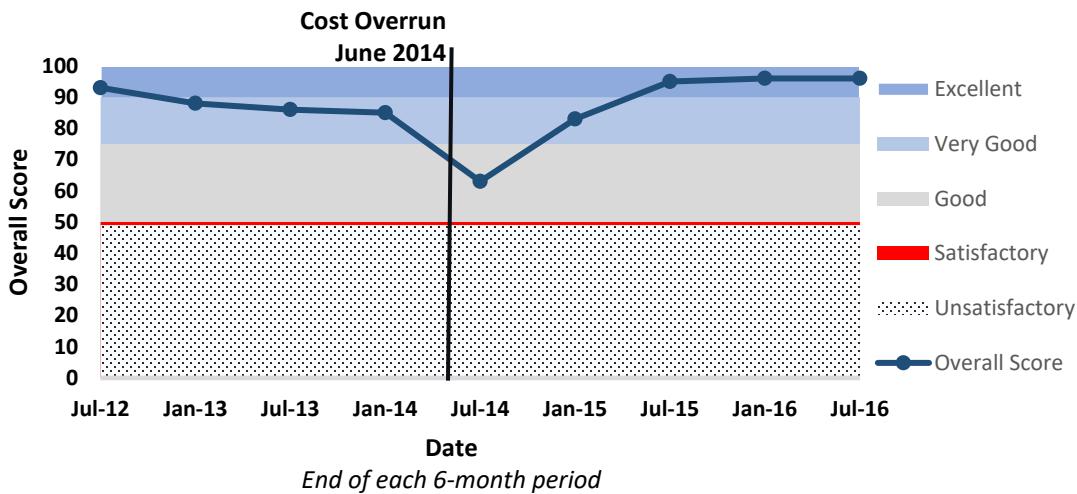
³¹ 48 C.F.R. § 16.401(e)(1)(ii), *Incentive Contracts*.

³² The 6-month JPSS CrIS award-fee periods are approximately January–June and July–December of each year.

³³ According to the contract PEP (see appendix B), this meant the Program considered the contractor to have more than satisfied many of the significant award-fee criteria and met overall performance requirements of the award-fee plan for the evaluation period.

award period containing the cost overrun, the Program awarded the contractor an overall “Good,” which meant the Program determined the contractor still met overall performance requirements, and even excelled in some areas.³⁴ The overall JPSS-I CrIS award period scores are detailed in figure 1, and compared with the descriptive evaluation categories.

Figure 1. JPSS-I CrIS Prime Contractor Evaluations



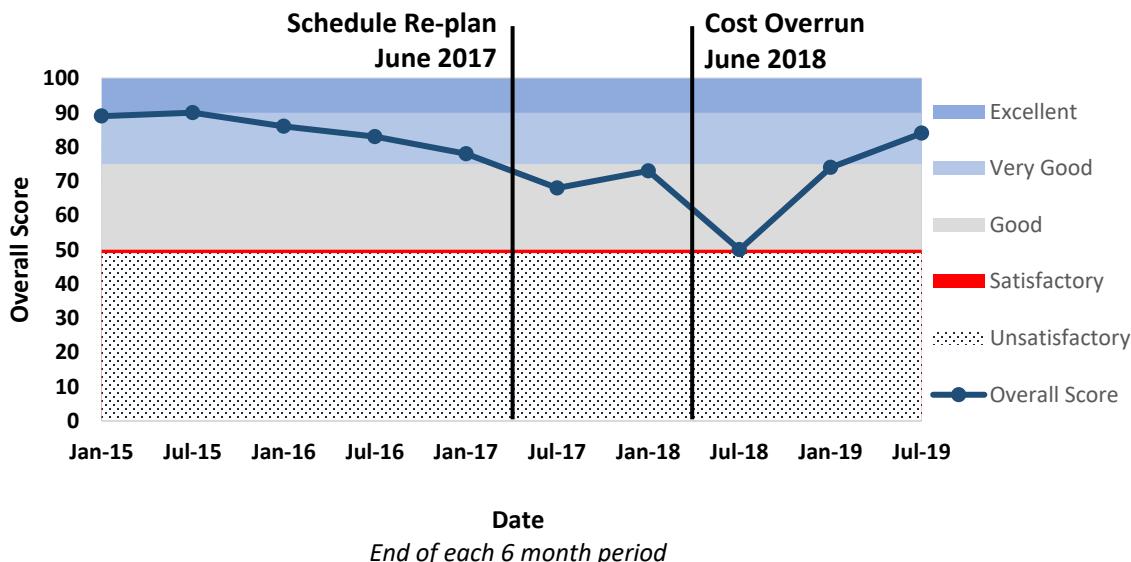
Source: OIG analysis of Program data

Following the JPSS-I CrIS cost overrun, challenges continued on the JPSS-2 CrIS project’s manufacturing and assembly as well. For example, fee determination letters cited multiple persistent concerns, including unreliable cost estimation practices, inadequate subcontract management, and preventable process, test, and mishap issues. Multiple years of performance issues culminated with a JPSS-2 CrIS schedule replan in mid-2017 and a \$64.6 million cost overrun in 2018.

Similar to JPSS-I CrIS, the Program awarded the contractor an average overall rating of “Very Good,” or an 81 percent award fee average score in the seven periods preceding the JPSS-2 CrIS cost overrun.³⁵ For the same award period with the cost overrun, the Program evaluated the contractor’s performance overall as “Satisfactory,” which meant the Program determined that the contractor met cost, schedule, technical, and business performance requirements overall (see figure 2).

³⁴ In that period, the Program awarded the contractor \$936,127 in award fee (approximately 63 percent of available). Within a month after this \$16.9 million cost overrun, the Program was concerned as the contractor had already accumulated another cost performance deficit of \$813,000.

³⁵ The seven periods preceding the cost overrun were from July 2014–January 2018.

Figure 2. JPSS-2 CrIS Prime Contractor Evaluations

Source: OIG analysis of Program data

Although the evaluation ratings were allowable under the FAR, the ratings and award fees effectively rewarded the contractor for accumulating cost and schedule deficits spanning multiple award periods. For JPSS-2 CrIS, the contractor earned a “Satisfactory” overall evaluation³⁶ in the period of the cost overrun, even though the overrun represented almost 30 percent growth from the original negotiated contract value. Program personnel explained their intent was to strike a balance between strict evaluation of performance outcomes and consideration of efforts, so that a poor score did not discourage the prime contractor’s employees.

However, we found evidence of scoring that rated the contractor well above “Satisfactory” for performance that was still deficient. One example from a 2018 award fee evaluation period’s technical assessment was the award of an 87 percent “Very Good” score where the contractor was given positive credit for partially fixing problems it caused over multiple periods. In the award determination letter, the government’s bottom line rationale for the score was that overall technical performance had improved, and that preventable process and test problems had decreased. This was not the first award determination letter that identified preventable process and test problems, as preceding periods contained comments regarding poor test planning, execution, and mishaps.

We concluded, based on an extensive review of performance documentation, the Program placed too much emphasis on evaluating contractor effort instead of results. Similar to the JPSS-1 CrIS sequence of events, the JPSS-2 CrIS project actions did not provide a strong incentive for the contractor to deliver exceptional performance, nor

³⁶ A “Satisfactory” rating is the minimum required for earning fee (award and base). The Program paid \$1,064,343 of \$2,148,018 available award fee in the cost overrun period and \$13,825,736 of \$18,190,419 (76 percent) in total JPSS-2 CrIS award fees through July 2019, not including approximately \$4 million in base fees.

even nominal performance, prior to the cost overrun. The Program missed opportunities to best leverage award fees before the early challenges of the projects had a significant impact on cost and schedule.

B. *Program does not have a working definition for what constitutes a significant cost overrun*

According to the NASA supplement to the FAR, the contractor should normally be given an unsatisfactory rating for the cost category when there is a significant cost overrun within its control.³⁷ However, the Program did not consider the \$16.9 million JPSS-1 cost overrun significant within the context of the PEP—an amount that was 19 percent of the originally negotiated contract value. Accumulations of cost and schedule performance deficits were not considered significant until the \$64.6 million JPSS-2 cost overrun in June 2018.

The Program does not define what a *significant cost overrun* is in the PEP, and it does not have a common working definition to help guide its performance management approach. The Program consistently assessed the contractor as meeting or exceeding overall cost, schedule, technical, and business performance requirements for all JPSS-1 and JPSS-2 award periods, while accumulating cost and schedule performance deficits totaling \$81.6 million in cost overruns (i.e., 26 percent of the original definitized contract values). A prescriptive or formulaic scoring approach is not appropriate for a CPAF contract, but a working definition of what defines a significant cost overrun within an award period or contract term could help the Program determine an incremental approach to proactively address performance deficits before they become unsatisfactory in later award periods. A working definition of *significant cost overrun* would enable the Program to better address performance deficits and thereby put \$14,354,642 of remaining available award fees to better use.

Recommendations

We recommend that the NOAA Assistant Administrator for Satellite and Information Services coordinate with the Director of the NASA Goddard Space Flight Center to do the following:

4. Conduct a joint review of contractor performance evaluation practices and determine whether changes could more effectively motivate contractors to achieve desired outcomes for ongoing and future contract negotiations on NOAA-funded projects.
5. Establish a working definition of “significant” cost overrun to help inform strategies that progressively motivate contractors to improve before accumulating excessive cost and schedule performance deficits, for ongoing and future NOAA-funded NASA contracts.

³⁷ 48 C.F.R. § 1816.405-274, *Types of Contracts, Award Fee Evaluation Factors*.

Summary of Agency Response and OIG Comments

In response to our draft report, NOAA emphasized that JPSS management and its Configuration Control Board approved the replacement of the standard IBR process as discussed in finding I.B. NOAA concurred with recommendations 1–4, and described actions it has taken, or will take, to address them. NOAA partially concurred with recommendation 5, by agreeing to reinforce appropriate use of cost performance criteria in award fee evaluations, but expressed concern that establishing a working definition of “significant” cost overrun would not be consistent with existing regulations and would reduce the discretion available to the Fee Determination Official (FDO).

We concur with NOAA’s comments regarding the IBR process. However, our finding focused on the fact that the non-standard process added cost and schedule risks to the project. Our recommendations 1 and 2 intend to bring greater transparency to similar, future decisions and we are pleased that NOAA concurs with them.

With respect to recommendation 5, we maintain that in order to apply FAR criteria for award fees under 48 C.F.R. § 1816.405-274, it must be determined if a cost overrun within control of the contractor was “significant.” We found the Program did not have a common understanding of “significant” cost overrun within the existing process. As normal management practice, the Program already uses objective data to inform its evaluation process, such as assessing numerous earned value management cost and schedule metrics for significant trends. Our recommendation intends to help the performance evaluation boards (PEBs) provide FDOs with more refined contextual awareness for award fee evaluations to address, proactively, performance deficits before they become unsatisfactory in later periods. It does not intend to limit PEB or FDO discretion in determining the significance of a cost overrun within the contractor’s control. Further, we believe the recommendation is consistent with existing regulations.

We are pleased that NOAA concurs or partially concurs with our recommendations and look forward to reviewing its audit action plan. For recommendation 5, we believe the plan can be both responsive to our recommendation and still allow for subjectivity in award fee determinations, consistent with existing regulations and guidance. To this end, we will be available to the Program for further dialog.

Appendix A: Objective, Scope, and Methodology

Our objective was to assess the cost, schedule, and technical performance of the Program's acquisition and development efforts for selected instruments. We announced this audit on April 18, 2019, and completed our fieldwork on December 20, 2019. We discussed our tentative findings with the auditee on February 10, 2020.

To determine an instrument for focus, we interviewed Program personnel and reviewed historical and projected performance data for the mission instruments. At the conclusion of the survey phase, we determined the CrIS instrument(s) contained the most challenges and performance risks for the Program, so we selected it for our focus. However, our recommendations may have some applicability to challenges of the other instrument acquisitions. We determined the extent to which cost and schedule changed from the original project baselines, and identified changes and challenges to the project's technical baseline.

To assess cost and schedule performance, we reviewed the JPSS CrIS contract, contractor performance and business system reports, and the rationale for contract modifications to determine changes and trends. We also reviewed selected contractor and program milestone briefings, status reviews, and Joint Agency Program Management Council Reviews from September 2010 through November 2019 to understand baseline milestone dates and assess how and why they changed over time.

To assess technical performance and challenges, we interviewed JPSS program and contractor personnel and reviewed project risk data, nonconformance reports, and award-fee determinations. We reviewed acquisition planning documentation, contract statements of work, and mission assurance requirements. We compared Program activities with requirements for contractor performance evaluation and oversight. We identified relevant FAR and NASA requirements and guidelines for integrated baseline reviews, earned value management, and quality assurance management. We compared government management of contractor performance with applicable contract and NASA requirements, and assessed effectiveness based on results.

We requested all documentation of government and contractor audit plans, schedules, activities, and reports. Some quality assurance data, metrics, audit schedules, and report documentation were not made available for our review when requested. Combined with testimonial evidence, we made reasonable, but limited, assessments of activities based on what was readily available without causing excessive burden to the Program.

In addition, we assessed internal control significant within the context of our objectives. This included examining the design of management controls as documented in management control plans, which incorporate NASA procedural requirements. We assessed the implementation of internal control through document reviews and observations of program and project management life-cycle reviews to determine adherence to standards, procedures, and plans. In satisfying our objectives, we did not rely on computer-processed data; therefore, we did not

test the reliability of NOAA and NASA information technology systems. The findings and recommendations in this report include our assessments of internal control.

Although we could not independently verify the reliability of all the information we collected, we compared it with other available supporting documents to determine data consistency and reasonableness. Based on these efforts, we believe the information we obtained is sufficiently reliable for this report.

We conducted our review from April 2019 through December 2019 under the authority of the Inspector General Act of 1978, as amended (5 U.S.C. App.), and Department Organization Order 10-13, dated April 26, 2013. We performed our fieldwork at the JPSS program offices in Lanham, Maryland and at OIG offices in Washington, D.C.

We conducted this performance audit in accordance with generally accepted government auditing standards. These standards require that OIG plans and performs the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for its findings and conclusions based on its audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

Appendix B: CrIS Contract Grading Criteria

Adjectival Rating ^a	Range of Performance (%)	Description
Excellent	100–91	Contractor has exceeded almost all of the significant award-fee criteria and has met overall cost, schedule, business, and technical performance requirements of the contract in the aggregate as defined and measured against the criteria in the award-fee plan for the award-fee evaluation period.
Very Good	90–76	Contractor has exceeded many of the significant award-fee criteria and has met overall cost, schedule, business, and technical performance requirements of the contract in the aggregate as defined and measured against the criteria in the award-fee plan for the award-fee evaluation period.
Good	75–51	Contractor has exceeded some of the significant award-fee criteria and has met overall cost, schedule, business, and technical performance requirements of the contract in the aggregate as defined and measured against the criteria in the award-fee plan for the award-fee evaluation period.
Satisfactory	50	Contractor has met overall cost, schedule, business, and technical performance requirements of the contract in the aggregate as defined and measured against the criteria in the award-fee plan for the award-fee evaluation period.
Unsatisfactory	Less than 50	Contractor has failed to meet overall cost, schedule, business, and technical performance requirements of the contract in the aggregate as defined and measured against the criteria in the award-fee plan for the award-fee evaluation period.

Source: JPSS-2 CrIS Contract PEP

- ^a Any factor receiving an adjectival rating of “Unsatisfactory” (less than 50 percent) will be assigned a numerical score of zero (0) for purposes of calculating the award-fee amount to be earned (includes cost control). The contractor will not be paid any award fee when the total award-fee rating in the aggregate is “Unsatisfactory” (less than 50 percent). As a benchmark for evaluation, in order to be rated “Excellent” overall, the contractor would typically be under cost, on or ahead of schedule, and provide outstanding technical performance. If all of these criteria are not met, the PEB or FDO must include justification for an overall “Excellent” rating.

Appendix C: Potential Monetary Benefits

Source	Questioned Costs	Unsupported Costs	Funds to Be Put to Better Use
Recommendation 5 applied to: remaining available award fees (as of January 2020)			\$14,354,642

Source: OIG analysis of NOAA and NASA documentation

In accordance with Section 5 of the Inspector General Act of 1978, as amended (5 U.S.C. App.), implementing recommendation 5 would improve performance management of the CrIS cost-plus award fee contract, putting \$14,354,642 of remaining available award fees to better use.

Appendix D: Agency Response



UNITED STATES DEPARTMENT OF COMMERCE
The Deputy Under Secretary for Operations
Washington, D.C. 20230

AUG 3 2020

MEMORANDUM FOR: Frederick J. Meny, Jr.
Assistant Inspector General for Audit and Evaluation

FROM: Ben Friedman 
Deputy Under Secretary for Operations

SUBJECT: *The Joint Polar Satellite System: Cost Growth and Schedule Delay of a Key Instrument Acquisition Highlight the Need for Closer Attention to Contractor Oversight*
Draft OIG Audit Report

The National Oceanic and Atmospheric Administration (NOAA) is pleased to submit the attached response to the Office of Inspector General's draft report on NOAA's Joint Polar Satellite System. We reviewed the report and concurred with four recommendations and partially concurred with one recommendation.

We appreciate the opportunity to review and respond to your draft report. If you have questions, please contact Brian Doss, Acting Director, Audit and Information Management Office at (301) 628-0945.

Attachment



**Department of Commerce
National Oceanic and Atmospheric Administration
Comments to the OIG Draft Report Entitled
“The Joint Polar Satellite System: Cost Growth and Schedule Delay of a Key Instrument
Acquisition Highlight the Need for Closer Attention to Contractor Oversight”
(June 2020)**

The Department of Commerce’s National Oceanic and Atmospheric Administration (NOAA) appreciates the opportunity to review and comment on the Office of the Inspector General’s (OIG) draft report on the Joint Polar Satellite System (JPSS). NOAA reviewed the report and concurs with four recommendations and partially concurs with one recommendation. The response to each recommendation and general comments are provided below.

General Comments

Pages 6 – 8, Finding I, part B, discussion of Integrated Baseline Reviews (IBRs)
The decision to replace the Integrated Baseline Review (IBR) with the Performance Measurement Baseline Verification Review (PMBVR) was thoroughly considered and appropriately reviewed by JPSS management. For any change to a contract, a Configuration Control Request (CCR) is required. The Configuration Management process requires that all documents or changes to a document be recorded via CCR. The CCR describes the change to the document as well as the reasoning for the change. The CCR must be approved by the Configuration Control Board (CCB). The CCB is composed of JPSS Flight Project management as well as NOAA and JPSS Program representatives. The CCB members have to concur to changes to the documents before a change can be implemented.

When the JPSS-2 Instrument Statements of Work (SOWs) were created, all SOWs went through the CCB process. The PMBVR was spelled out in both the SOW and the Contractual Document Requirements List documents. The PMBVR was shown as replacing the IBR. This change was approved through the CCB.

NOAA Response to OIG Recommendations

Recommendation 1: “Require programs notify the Joint Agency Program Management Council before NOAA-funded NASA contracts exceed definitization timelines.”

NOAA Response: We concur. All undefinitized NOAA-funded NASA contracts are already tracked and regularly reported to NASA’s Goddard Space Flight Center (GSFC) and NASA leadership. JPSS will include a Contract Actions Executive Summary for Undefinitized Contract Actions to the Joint Agency Program Management Council in future briefing packages.

Recommendation 2: “Require a Joint Agency Program Management Council assessment before an IBR requirement is removed, abridged, or its timing adjusted, for NOAA-funded NASA contracts or major contract modifications requiring earned value management.”

NOAA Response: We concur. NOAA will direct projects that have NOAA-funded NASA contracts to provide updates on changes to IBR requirements to the Joint Agency Program Management Council.

Recommendation 3: “Ensure the Program adequately incorporates contract risks and executes prevention-focused surveillance as part of its quality assurance activities.”

NOAA Response: We concur. The JPSS Program agrees that contract risks and prevention-focused surveillance are key facets of a successful quality assurance program. As of July 2020, the JPSS-2 CrIS instrument is complete, and the instruments for JPSS-3 and -4 are well advanced in their production. JPSS reviews the subcontractor status monthly between JPSS and the CrIS team, including an L3Harris determination of risk for component quality and schedule. By conducting monthly reviews of the contractor status and by incorporating a risk-based approach to assessing sub-contractor performance, JPSS increased its vigilance of sub-contractor performance.

These reviews will be included in the lessons learned, which will be captured in a Pause-and-Learn (PaL) event, planned for late July 2020. It is standard practice for NASA GSFC missions to perform PaL sessions after Key Decision Point meetings, and these sessions are made available for all missions to review. As the Space Weather Follow On (SWFO) spacecraft contract has just been awarded, the JPSS team will invite the SWFO team to the session, to provide immediate feedback for their upcoming contracts.

Recommendation 4: “Conduct a joint review of contractor performance evaluation practices and determine whether changes could more effectively motivate contractors to achieve desired outcomes for ongoing and future contract negotiations on NOAA-funded projects.”

NOAA Response: We concur. There are, and will continue to be, periodic executive dialogs between NESDIS and NASA GSFC. These NOAA/NASA executive dialogs will include discussions of how the award fee process can be used to better motivate contractor performance.

Recommendation 5: “Establish a working definition of “significant” cost overrun to help inform strategies that progressively motivate contractors to improve before accumulating excessive cost and schedule performance deficits, for ongoing and future NOAA-funded NASA contracts.”

NOAA Response: NOAA partially concurs. NOAA will reinforce with the Performance Evaluation Boards (PEBs) the appropriate use of cost performance in consideration of award fee based on the guidance provided by the Federal Acquisition Regulation (FAR) and NASA FAR Supplement (NFS). However, NOAA does not believe it is appropriate or consistent with existing regulations to specifically create a working definition as recommended. The PEB and the Fee Determination Officer (FDO) are bound to operate within the Award Fee parameters established in the FAR, NFS, and the NASA Award Fee guide. These regulations make it clear that Award Fee determinations must be subjective and take into account a multitude of factors. As the IG noted in the report, a prescriptive or formulaic approach is not appropriate for Cost Plus Award Fee contracts. Thus it is not possible to comply with current regulations and create alternate guiding language to shape evaluations such as a definition of “significant.” Further, if this type of guidance was created, it would limit the FDO’s ability to examine all of the mitigating factors which occur on complex programs and is the very reason that the Award Fee incentive was created. This is why the NFS specifically states that the contractor should only be held accountable for overruns within its controls. To try and incorporate these types of factors within a working definition of significant would be impractical and limit the FDO’s discretion, which is a fundamental feature of the Award Fee process.