



NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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

FINAL REPORT NO. OIG-13-024-A

APRIL 25, 2013

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

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April 25, 2013

MEMORANDUM FOR: Dr. Kathryn D. Sullivan
Acting Under Secretary of Commerce for Oceans
and Atmosphere

FROM: Allen Crawley 
Assistant Inspector General for Systems Acquisition
and IT Security

SUBJECT: *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*
Final Report No. OIG-13-024-A

Attached is our final audit report on the Geostationary Operational Environmental Satellite–R Series (GOES-R) acquisition and development effort. Our audit objectives were to assess (1) the adequacy of contract management and administration and (2) the effectiveness of management's direction, monitoring, and collaboration for development of select components of the GOES-R program.

We found that:

- NOAA needs to develop a comprehensive plan to mitigate the risk of potential launch delays and communicate to users and other stakeholders changes that may be necessary to maintain the first GOES-R satellite's launch readiness date.
- Program systems engineering has been strengthened; however, early in system development, it contributed to ground system schedule compression and increased costs. To ensure continued strength, NOAA must report on the adequacy of program systems engineering (including National Aeronautics and Space Administration support) for the integration and test phase of the program.
- NOAA needs to ensure NASA's evaluation of contractors' proposals and subsequent plans is effective in assessing technical readiness to reduce delays and cost increases.
- The award fee structures for some NASA contracts did not incentivize contractors to perform at exemplary levels; in one case, a contractor received award fees that were not commensurate with its performance.
- NOAA lost the opportunity to negotiate on a significant amount of costs for ground system contract changes because it did not finalize these changes in a timely manner.

In responding to the draft report, NOAA concurred with five of our seven recommendations. NOAA did not concur with two of the seven recommendations, or with our assessment that these particular recommendations would improve the effectiveness of contractor incentives for controlling cost overruns and improving performance. However, we affirm our position and stand behind all of our findings and recommendations. Where necessary, we modified the final report to address relevant comments. We have summarized NOAA's response and included its entire formal response as appendix E. The final report will be posted on OIG's website pursuant to section 8L of the Inspector General Act of 1978, as amended.

In accordance with Department Administrative Order 213-5, please provide us your action plan within 60 days of this memorandum. The plan should outline the actions you propose to take to address each audit recommendation.

Please direct any inquiries regarding this report to me at (202) 482-1855, or Fred Meny, Director, Satellites and Weather Systems, at (202) 482-1931.

Attachment

cc: David Kennedy, Deputy Under Secretary for Operations, NOAA
Mary E. Kicza, Assistant Administrator for Satellite and Information Services, NOAA
Geovette E. Washington, Deputy General Counsel
Mack Cato, Director, Office of Audit and Information Management, NOAA



Report In Brief

APRIL 25, 2013

Background

One of the primary functions of NOAA's National Environmental Satellite, Data and Information Service (NESDIS) is to acquire and manage the nation's operational environmental satellites. One type of satellite NESDIS operates is the geostationary operational environmental satellites (GOES)—which orbit approximately 22,300 miles above Earth, producing images every 15 minutes. They provide cloud, land, and ocean temperatures; monitor sun activities; and assist with search and rescue activities.

NOAA, in conjunction with the National Aeronautics and Space Administration (NASA), is developing the next generation of GOES satellites known as the GOES-R Series of four satellites (GOES-R, -S, -T and -U). The first satellite in the series, GOES-R, is scheduled for launch in October 2015.

Why We Did This Review

The GOES-R program is a mission-critical acquisition and development effort with a life-cycle cost of \$10.9 billion. The program engages multiple contractors and as it prepares for its integration and test phase, close management attention is required. The increasing risk associated with meeting key milestones in preparation for the first satellite's launch readiness date of October 2015 necessitated our review.

Our audit sought to assess (1) the adequacy of contract management and administration and (2) the effectiveness of management's direction, monitoring, and collaboration for development of select components of the GOES-R program.

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OIG-13-024-A

WHAT WE FOUND

We found that:

NOAA needs to develop a comprehensive plan to mitigate the risk of potential launch delays and communicate to users and other stakeholders changes that may be necessary to maintain the first GOES-R satellite's launch readiness date. Schedule slips and a potential reduction in testing activities have raised concerns about the satellite's readiness to launch. Cost increases and budget shortfalls may also delay development and launch. Further, scope reductions and delays are diminishing the satellite's operational capabilities.

Program systems engineering has been strengthened; however, early in system development, it contributed to ground system schedule compression and increased costs. NOAA accepted a core ground system development approach that was not flexible, resulting in increased costs. To re-plan the core ground system increases schedule risks. A lack of program systems engineering leadership further prolonged the coordination problem.

NOAA needs to ensure NASA's evaluation of contractors' proposals and subsequent plans is effective in assessing technical readiness to reduce delays and cost increases. Contract award prices were significantly less than program estimates. The technical evaluation of an important contractor-designed instrument was inadequate. And award fees did not effectively incentivize exemplary performance or sufficient cost control.

NOAA lost the opportunity to negotiate on significant costs for ground system contract changes because it did not finalize these changes in a timely manner. The lack of undefinitized contract action (UCA) time limit and cost incurred tracking policy—as well as the UCAs' large scope—led to definitization delays. Further, the high UCA cost limits create disincentive for timely definitization.

WHAT WE RECOMMEND

We recommend that the NOAA Deputy Under Secretary for Operations:

1. Develop a comprehensive set of tradeoff approaches to mitigate launch delays and communicate approaches to stakeholders and users.
2. Keep stakeholders and users informed of tradeoffs made to meet the launch date.
3. Direct NESDIS to report periodically on the adequacy of program systems engineering integration and NASA systems engineering support.

We also recommend that the NOAA Assistant Administrator for Satellite and Information Services ensure that NASA:

4. Effectively validates contractors' proposals and subsequent plans, to verify that technical designs meet readiness requirements per NASA standards.
5. Modifies contract award-fee structures to reduce award fee percentages and clearly articulates how scores should be adjusted based on the magnitude of cost overruns.
6. Adjusts future award fees to be more commensurate with contractor performance.

We further recommend that the NOAA Deputy Under Secretary for Operations:

7. Direct the development of a policy for managing undefinitized contract actions to definitize change orders in the shortest practicable time.

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Introduction

One of the primary functions of the National Oceanic and Atmospheric Administration's (NOAA's) National Environmental Satellite, Data and Information Service (NESDIS) is to acquire and manage the nation's operational environmental satellites. NESDIS operates two types of satellite systems for the United States: geostationary operational environmental satellites (GOES) and polar-orbiting operational environmental satellites (POES). GOES satellites are in geosynchronous orbit, approximately 22,300 miles above Earth, producing images every 15 minutes.¹ They provide cloud, land, and ocean temperatures; monitor activities of the sun; and relay emergency locator beacon signals to assist with search and rescue activities.

NOAA simultaneously operates two primary GOES satellites, GOES-East and GOES-West. As part of its coverage policy, NOAA also maintains one satellite in on-orbit storage in the event of a failure of one of the operational satellites (see figure I).

Figure I. Location and Area of Coverage of the GOES Fleet



Source: NOAA, GOES-R program documentation

On September 23, 2012, the GOES-East satellite (GOES-13)² was placed on standby due to anomalies in its instruments, causing NOAA to activate the on-orbit spare (GOES-14) to collect and provide data. NOAA began moving GOES-14 on October 1, 2012, toward the

¹ The satellites orbit the equatorial plane of the Earth at speeds matching the Earth's rotation. The satellites continually view the continental United States, the Pacific and Atlantic Oceans, Central and South America, and southern Canada.

² When satellites are being developed, they are identified by letters; after they are launched, they are identified by numbers. For example, GOES-R will be GOES-16 once it is launched.

GOES-East 75 degree longitude position to maintain data collection coverage. On October 18, 2012, movement of GOES-14 was stopped at 89.5 degrees west because GOES-13 was successfully restored to service.

NOAA, in conjunction with the National Aeronautics and Space Administration (NASA), is developing the next generation of GOES satellites known as the GOES-R Series of four satellites (GOES-R, -S, -T and -U). The first satellite in the series, GOES-R, is scheduled for launch in October 2015.

The overall GOES-R program is managed by NOAA with two integrated NOAA/NASA project offices—the Ground Project and the Flight Project—as well as integrated supporting offices such as Program Systems Engineering and Program Contracts. NOAA manages the acquisition and development efforts for the entire Ground Project—including the facilities; antenna sites; software and hardware for satellite command and control, as well as generating and distributing end-user products; and the remote backup unit for backup of mission-critical functions. NASA manages development and acquisition of the Flight Project, which consists of the spacecraft,³ instruments, launch vehicle, and auxiliary communication payloads.

The GOES-R series will deploy advanced instruments that will provide data used to generate more timely and accurate weather forecasts (see appendix B for instrument details). The primary instrument, the advanced baseline imager (ABI), is expected to introduce new GOES data products and improve on the existing products. NOAA projects the expected series lifetime benefit from ABI to be \$4.6 billion⁴ due to improved tropical cyclone forecasts, fewer weather-related flight delays, and improved production and distribution of electricity and natural gas. Another instrument that will provide life and property benefits is the Geostationary Lightning Mapper (GLM). GLM is expected to provide early indication of growing, active, and potentially destructive thunderstorms over land as well as ocean areas, early warning of lightning ground strikes, and potentially improved tornado warning lead time of up to 21 minutes. It is also expected to provide improved routing of commercial, military, and private aircraft over limited oceanic regions where observations of thunderstorm intensity are scarce.

To reduce risk, the GOES-R program in 2004 initiated development of its most important and complex instrument, the ABI, years in advance of the other instruments and spacecraft. The program has also implemented risk reduction activities to improve the quality of the instruments and the spacecraft.⁵ Following the recommendation of an independent review team,⁶ the GOES-R program budgeted reserves for addressing risks, reducing the probability of

³ The spacecraft, the platform for GOES-R's instruments, is designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage.

⁴ ABI lifetime benefits are noted on the GOES-R public-facing Web site, last updated April 4, 2013. GOES-R. *Advanced Baseline Imager (ABI)* [Online]. www.goes-r.gov/spacesegment/abi.html (accessed April 10, 2013).

⁵ For example, the ABI contractor built a prototype model to test the instrument's design.

⁶ The independent review team was a NOAA-appointed team of senior satellite, ground, and operations acquisition experts that assess GOES-R (and other NOAA satellite programs) for the NOAA Program Management Council; Goddard Space Flight Center Management Council; and, upon request, the Department of Commerce Office of the Secretary.

exceeding the life-cycle budget. Predictive models show that GOES-R is in fact likely to stay within its life-cycle budget of \$10.9 billion for four satellites, the ground system, and supporting operations through 2036.⁷ However, the program is facing near-term budget challenges in FY 2013 and FY 2014.

In May 2012, after the mission preliminary design review (MPDR),⁸ NOAA executives (in concurrence with NASA and the standing review board⁹) gave the program approval to continue on course with its efforts to meet the October 2015 launch readiness date, despite acknowledging that the confidence level in meeting this deadline is less than 50 percent. It was determined that this course of action had the highest potential for maintaining GOES constellation availability.

⁷ In its FY 2012 program budget submission, NOAA added 2 satellites (GOES-T and -U) to the program's existing two GOES-R satellites (GOES-R and -S), which increased the program's life-cycle budget from \$7.7 billion to \$10.9 billion.

⁸ The purpose of the MPDR is to (a) demonstrate project readiness to proceed with the detailed design and (b) complete the flight and ground system development and mission operations in order to meet mission performance requirements within the identified cost and schedule constraints.

⁹ The standing review board is comprised of experts in both NASA and NOAA systems that are fully independent of the GOES-R Program Office. Members provide expert technical review of the mission, including the adequacy of the planning, design, and implementation processes.

Findings and Recommendations

Our audit objectives for reviewing the GOES-R acquisition and development effort were to assess (1) the adequacy of contract management and administration and (2) the effectiveness of management's direction, monitoring, and collaboration for development of select components of the GOES-R program (for further details regarding our objectives, scope and methodology, see appendix A).

We concluded that NOAA needs to develop a comprehensive plan to mitigate the risk of potential launch delays, as well as communicate changes to users and other stakeholders that may be necessary to maintain the first GOES-R satellite's launch readiness date. Program systems engineering has been strengthened; however, early in system development, it contributed to ground system schedule compression and increased costs. To ensure continued strength, NOAA must periodically report on program systems engineering adequacy, to include NASA Goddard Space Flight Center (GSFC) and its headquarters' support, for the crucial integration and test phase of the program.

We also concluded that NOAA needs to ensure that NASA effectively validates contractor proposals and any subsequent plans to verify technical designs for readiness, to reduce delays and cost increases. Further, NOAA must work with NASA to improve its use of financial incentives in encouraging contractors to limit cost overruns and strive for exemplary performance. Appendix C summarizes past incentive costs we question as justifiable and the potential monetary benefits we identified if these incentives are improved. Lastly, NOAA does not have a policy in place to manage significant delays in finalizing certain cost contract actions, which may have resulted in increased costs to the program.

I. NOAA Must Keep Stakeholders Continuously Apprised of Approaches to Mitigate the Likelihood of a Two-Imager Coverage Gap

There is growing concern about a potential GOES-R launch delay, increasing the likelihood of a GOES two-imager¹⁰ data coverage gap that could impact the National Weather Service's ability to issue severe weather alerts. The potential delay is due to both a diminishing program schedule reserve and budget challenges that could slow development. The GOES-R joint cost and schedule confidence level (JCL) assessment that is used to predict the likelihood of a program's success indicated that GOES-R has only a 48 percent chance of an on-time launch.¹¹

If GOES-R launches on time, the GOES constellation (currently GOES-13, -14, -15) will still be at an unacceptable level of risk—only 64 percent probability of having two imagers in operation, whereas NOAA's minimum acceptance level is 80 percent. The JCL assessment

¹⁰ An imager is a satellite instrument that measures and maps the Earth and its atmosphere. Imager data are converted by computer into pictures.

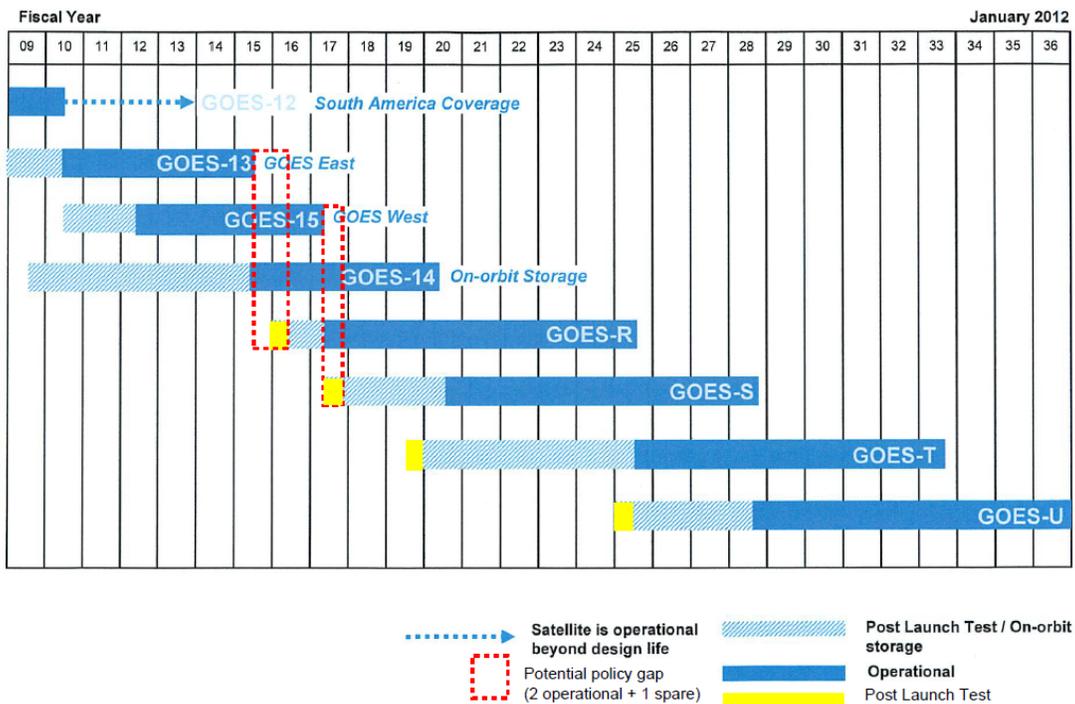
¹¹ NASA programs typically require a 70 percent confidence level to move forward.

projects that GOES-R is more likely to launch in February 2016, increasing the risk of a two-imager gap by 7 percent, leaving only a 57 percent chance of having two imagers in operation. However, even if GOES-R and GOES-S launch as planned, there will not be an on-orbit backup available while these satellites go through post-launch testing (based on GOES-13 and GOES-15 operational design lives; see figure 2).

Satellite instruments are susceptible to data degradation and complete failures. For example, on September 23, 2012, NOAA had to place the GOES-13 satellite on standby due to problems with its imager and sounder. NOAA activated the GOES-14 on-orbit spare satellite to replace GOES-13, but the reliability of hurricane forecasts was potentially subject to degradation because some GOES-14 data would not have been available for use until a 30-day test period was completed. GOES-13 service was restored on October 18, 2012, after more than 3 weeks of being in standby mode.

Because significant uncertainties have emerged since FY 2011 with the GOES-R development schedule, annual funding, and operational capability, NOAA needs to ensure that stakeholders in Congress, the Office of Management and Budget, and the Department stay informed of alternative approaches needed during development activities to mitigate the likelihood of a two-imager data coverage gap.

Figure 2. Backup Satellite Policy



Source: OIG, adapted from NOAA geostationary satellite schedules

A. Schedule Slips and Potential Reduction in Testing Activities Raise Concerns About GOES-R Readiness to Launch

In February 2012, at the MPDR, management identified the core ground system as the development effort to closely monitor for the next 3 years because it was most likely to threaten the launch readiness date. By June 2012, delays fabricating the GOES-R spacecraft caused schedule reserve for the entire program to significantly decrease to below the recommended level for meeting the launch readiness date.¹² The spacecraft replaced the core ground system on the program's critical path. By August 2012, at the initial MCDR,¹³ the program office reported that the spacecraft was 3 months behind schedule, the ABI was 6 months behind schedule, and the GLM was 4 months behind schedule.

At the initial MCDR, program management had not presented its detailed plan for system integration and test and the standing review board was concerned about fitting the plan into a constrained schedule. If system integration and test are reduced due to insufficient schedule, NOAA needs to inform stakeholders of any cutbacks to test activities needed to meet the launch readiness date that could result in changes to operational performance. Testing on the ground is crucial to minimizing problems in space, where corrective actions are limited and satellite performance may degrade or completely fail.

B. Cost Increases and Budget Shortfalls May Delay GOES-R Development and Launch

GOES-R funding stability is now the top risk in the program's risk charts.¹⁴ The program needs substantial annual budget increases of \$186 million in FY 2013 and an additional \$150 million in FY 2014 (see table I, below). Available funds are scarce due to significant contract cost increases of over \$1 billion¹⁵ and budget adjustments in previous years amounting to \$264 million;¹⁶ however, the program is not expected to exceed its life-cycle budget of \$10.9 billion. According to the standing review board and NOAA, if the

¹² At the end of 2011, the program schedule reserve was 61 days above the NASA Goddard Space Flight Center minimum requirement at that stage of system development. Six months later (in June 2012), schedule reserve had dropped by 66 days to 5 days below the recommend level. The Goddard Space Flight Center recommends allocating 1 month of funded schedule reserve per year up to the start of integration and test of the spacecraft and instruments.

¹³ The program office held the MCDR prematurely, before a detailed schedule for the spacecraft's integration and test was available. As a result, the standing review board could not complete its evaluation of the program's schedule and cost, necessitating a follow-up review (MCDR part II) held November 8–9, 2012.

¹⁴ NOAA is currently assessing impacts to the GOES-R schedule due to sequestration and rescission of funds in the recently enacted FY 2013 appropriations law.

¹⁵ Contract cost increases include the sum of executed modifications and estimated change proposals, due to both contractor cost overruns and government directed contract changes. Unexercised options are not included in this calculation.

¹⁶ Budget reductions in FY 2009, FY 2010, and FY 2011 amount to \$106 million and the re-phasing of program funding in FY 2012 due to delays in spacecraft and ground contract awards totaled \$158 million for an overall shortfall of \$264 million.

GOES-R annual budget plan is not sustained, then GOES-R will not be ready to launch and delays will require keeping the contractor labor force working on the project longer. At the current rate of \$71 million per month, a protracted contract labor force will further increase life-cycle costs.

Table I. GOES-R Program Budget Plan (in \$ Millions)

	Prior Years	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	To Complete	Total
Total	1,489	642	662	616	802	951	845	782	4,071	10,860

Source: OIG, adapted from GOES-R program documentation

C. Scope Reductions and Delays Are Diminishing GOES-R Operational Capabilities

Due to development delays, the GLM instrument may not be on the GOES-R satellite when it launches. NOAA research has demonstrated that the GLM could potentially improve tornado warning lead times from the current average of 13 minutes up to 21 minutes. However, NOAA does not plan to delay the GOES-R launch if the GLM is not ready in time because the GLM does not provide the key environmental data products for the mission. Realizing the benefits of the GLM would have to wait until the launch of the next satellite, GOES-S. The program is studying modifications to the spacecraft necessary if the GLM is not on board.

GOES-R has already had significant reduction in capabilities (or scope). In 2006, NOAA removed from the program the hyperspectral sounder instrument,¹⁷ expected to provide data for enhanced weather forecasts and severe weather warnings, due to the cost risk of readying a new technology for operational use in a geostationary orbit.¹⁸ Additionally, in 2011, GOES-R management decided to terminate two core ground system contract options it had initiated in 2010—the option to complete the full set of environmental data products planned for the GOES-R series (only half of the planned products will be developed¹⁹) and the option to improve the speed of processing of incoming instrument data. NOAA is deferring development of the full set of data products to a later date. The agency terminated these options, valued at \$51 million, due to budget constraints. NOAA must clearly communicate to stakeholders any additional changes to scope necessary to keep the launch schedule on track.

¹⁷ NOAA planned on the hyperspectral sounder instrument providing atmospheric moisture and temperature data to support forecasts and warnings of high-impact weather.

¹⁸ A sounder is not flying on the GOES-R series; instead data from the ABI will be used to produce data products similar to those from GOES-13, -14, and -15.

¹⁹ The partial set of products that GOES-R will generate is a significant improvement over the products generated by the current orbiting GOES satellites.

D. A Comprehensive Set of Alternative Approaches for Mitigating a Launch Delay Has Not Been Developed

The GOES-R program is entering the crucial stage of system development: completing fabrication of instruments and spacecraft, the ground system releases, and integration and tests in preparation for launch. There are numerous factors—a pessimistic JCL assessment, compressed schedule, and funding shortages—indicating that the October 2015 launch readiness date is threatened. Nonetheless, the NOAA and NASA management councils, with concurrence of the standing review board, have decided that the best course of action is for the program to proceed as planned.

Stakeholders need to understand whether the program is able to keep pace with its challenging schedule. However, program status information is not always kept up-to-date or may not reveal issues with the program.²⁰ Further, if the schedule remains threatened, stakeholders need to know what approaches are available to keep the program on track to meet the launch readiness date. For example, the standing review board recommended that GOES-R program management consider—as one approach to alleviate schedule pressure—consulting the GOES-R user community about relaxing operational requirements, particularly for the GLM that is significantly behind schedule.²¹ Another approach to consider would be redirecting funds to more important activities, such as moving funds from core ground system development to the Flight Project, since some functions of the core ground system are not necessary until after launch.²²

Although GOES-R program management has identified approaches for resolving potential launch readiness date slips as problems arise, we believe NOAA should ensure that it develops a comprehensive set of tradeoff approaches—which identify impacts to cost, schedule, and satellite performance, along with a timetable to implement a change in course—and vets the approaches with users and stakeholders. This comprehensive set of approaches should identify trigger points for alternative action in the event that critical problems occur during fabrication and integration and test. As a precaution, NOAA should be prepared to implement a plan for obtaining alternative sources of data in the event of a GOES coverage gap.

²⁰ Examples of outdated status and other information that does not reveal the full breadth of program issues include (1) the GOES program did not update core ground system schedule variances for the Office of Management and Budget information technology dashboard; and (2) the earned value management variance reports reflect only contractor cost overruns, not government-directed cost growth.

²¹ The GLM contractor is working to lower the error rate in detection of lightning events (i.e., decrease detection of false positives), but the user community may be satisfied with the current error rates since the GLM is a new GOES capability that could still provide valuable data to increase the warning time for tornados.

²² Development of derived data product generation and distribution functions could be deferred until after launch.

II. NOAA Needs to Ensure That Systems Engineering Remains Engaged in Coordinating the Flight and Ground Projects

NOAA accepted a core ground system development approach at contract award that was not flexible. From contract award in May 2009 until January 2011, GOES-R program management and its systems engineering organization had difficulty coordinating delivery of flight information necessary for core ground system development. The delay compressed the core ground system development schedule, and the plan to resolve the problem substantially increased core ground system costs. This delay was exacerbated by a lack of program systems engineering leadership. Since January 2011, the systems engineering organization has become more successful in facilitating coordination of the two projects. However, the GOES-R program is entering the final phases of development—completing satellite component fabrication, then integrating and testing the system—that are periods of peak spending and when schedule delays are most costly. Therefore, the GOES-R systems engineering organization needs to remain fully engaged.

A. NOAA Accepted a Core Ground System Development Approach That Was Not Flexible, Resulting in Increased Costs

The GOES-R core ground system development is performed under a contract, awarded May 27, 2009, for \$736 million²³ over a 10-year period. The ground system will control the GOES-R series satellites and generate and distribute environmental data products to the National Weather Service and other users. This large-scale and complex system entails demanding processing, availability, and security requirements: for example, the core ground system must process 1.37 terabytes of data daily while remaining available all but two hours per year.

The contractor's development plan that NOAA accepted could not accommodate changes in information dependencies between the Flight Project and core ground system. The contractor's "waterfall" system development approach,²⁴ which assumed that Flight Project deliverables would be available in time to build the ground system, was not flexible enough to accommodate late delivery of flight information. However, due to NOAA's plan to award the contracts only 2 months apart

The Re-Plan

More flexible, but also more complicated to manage because of an increase in parallel development and integration and test activities, the re-plan allows development of partial capabilities (increments). The contractor can develop as much of a capability as possible with available flight information and then shift staff to developing other capabilities while waiting for the remaining information. An added extra step combines and tests capabilities into "capability-based builds," which are then integrated into releases for end-to-end flight and ground tests. This approach aims to utilize contractor time efficiently and reduce rework.

²³ The contract includes award fees and two options valued at \$51 million.

²⁴ The fundamental problem with the contractor's waterfall approach was that the ground system was divided in large development blocks; each required a substantial amount of flight information.

(and a subsequent protest that delayed the award of the spacecraft contract by 8 months), not enough time was left for the spacecraft contractor to plan or develop deliverables before the ground contractor needed them.

To address the information dependency problem, the ground system contractor submitted a formal engineering change proposal (ECP) in October 2011 to “re-plan” the development effort. The program incorporated the re-plan into the ground system contract as part of the seventh ECP. In total, the proposal added \$170 million to the contract cost. The re-plan amounted to \$89 million of the total. Overall, the core ground system contract cost, including ECPs 1–7, has grown by \$245 million to \$981 million.

B. Prolonged Time to Re-plan the Core Ground System Introduced New Schedule Risks

The prolonged wait to resolve flight-to-ground dependencies compressed a 3-and-a-half-year development schedule by 7 months and did not fully resolve the information dependency problem. Also, according to the ground contractor, the re-plan has introduced new risks, including

- the need for increased parallel development and integration and testing, which is more complicated to manage, and
- the contractor may not have sufficient staff to perform the increased testing planned for this approach.

The GOES-R program office, including program systems engineering, tried to coordinate flight-to-ground dependencies starting in October 2009, after the spacecraft and ground system contract awards, by arranging technical interchange meetings between the Flight Project and ground system contractors.

However, by January 2011, a year and a half after awarding the ground system contract, the flight-to-ground dependencies had still not been reconciled. The GOES-R program office and the contractor concluded that following the original development plan would result in delaying the launch of GOES-R by 15 months (from October 2015 to January 2017) and decided that the best course of action was to re-plan the development approach.

The time it took to recognize the need for a re-plan and the time needed to develop the re-plan delayed the preliminary and critical milestone reviews. As a result, this delay reduced the time available for ground system development.

Although the re-plan provided flexibility to adjust the ground system development schedule to variability in the Flight Project’s delivery schedule, not all flight information delivery dates were mapped to ground need dates. As a means to better track interdependencies, program systems engineering developed the Giver–Receiver Inter-Segment Database to map out Flight and Ground Project dependencies and began a weekly update process to handle newly discovered dependencies and schedule changes. However, the compressed schedule and the increased complexity of managing the re-

plan have increased the risk that the ground system will not be ready in time to meet the October 2015 launch readiness date.

C. *Lack of Program Systems Engineering Leadership Prolonged the Coordination Problem*

The prolonged wait to coordinate flight-to-ground information dependencies was primarily due to inadequate program systems engineering and management's lack of recognition of this inadequacy. This delay has increased the risks of GOES-R performance, budget, and launch readiness issues.

According to the *GOES-R Management Control Plan* and the *Systems Engineering Management Plan*, the program systems engineering organization is responsible for ensuring the integration of Flight and Ground Projects. It is also responsible for maintaining a system-level perspective of both projects by facilitating coordination and communication between projects and resolving project conflicts.

Initially, the GOES-R program systems engineering organization only reviewed Flight and Ground Project deliverables rather than lead project integration. The NOAA Independent Review Team, at a key decision point review in July 2010, recognized that the program systems engineering organization lacked leadership and support for the Ground and Flight projects. It also noted that GOES-R did not receive adequate systems engineering support from NASA GSFC and its headquarters—which, according to the *GOES-R Management Control Plan*, should provide systems engineering expertise until NOAA developed the expertise in-house. In addition to the lead program systems engineer, GSFC was to provide oversight through its Center Management Council and the Code 400 Director of Flight Project Directorate, both of which the GOES-R program reports to monthly.

In January 2011, after it was clear that the contractor would have to implement a re-plan to resolve the Flight and Ground Project misalignment, a newly-placed lead program systems engineer exercised more leadership in integrating Flight and Ground projects. Subsequently, the lead program systems engineer initiated development of the Giver–Receiver Inter-Segment Database and instituted weekly database updates. With the re-plan's compressed ground system schedule, coupled with modifications to the Flight Project development, NOAA needs to monitor program systems engineering integration and NASA support activities to reduce risks of performance degradation, cost overruns, and launch delays.

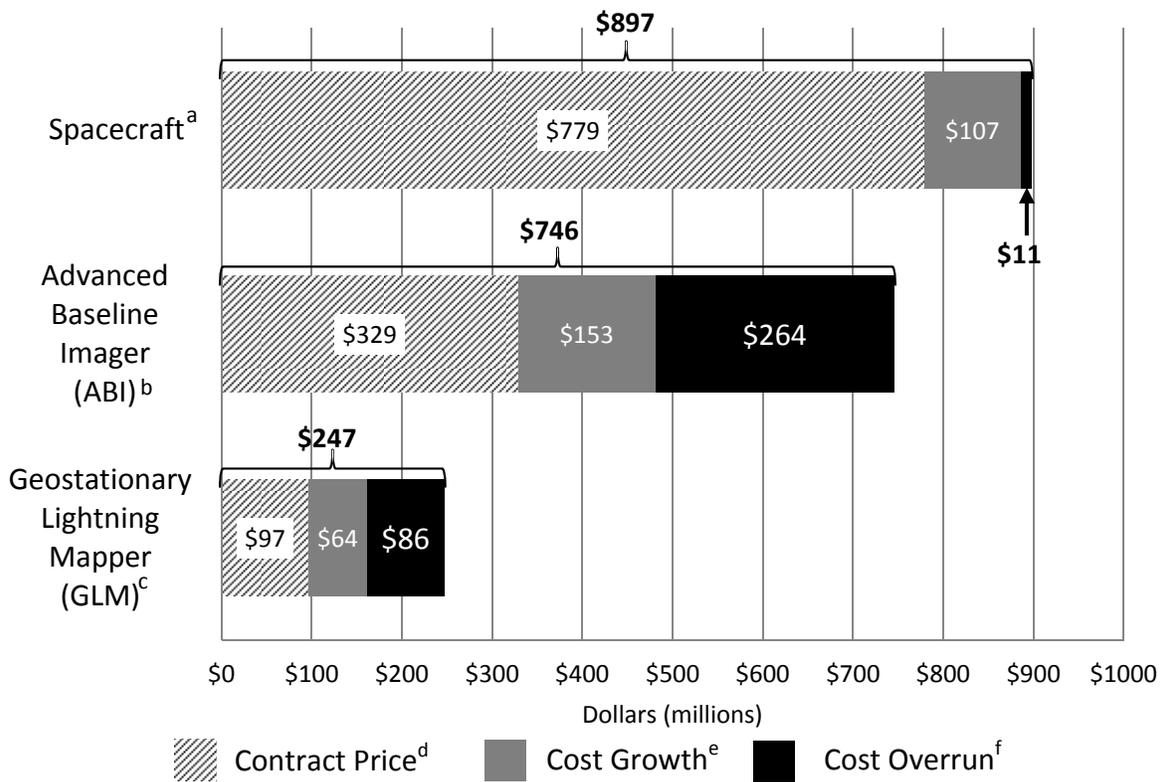
III. *NOAA Needs to Improve Flight Project Technical Oversight of NASA's Contractors and Award Fee Measures to Limit Further Cost Overruns*

NOAA is responsible for the success of the program and, therefore, the performance of the flight contracts, even though NASA is the primary acquisition agent and manager on the Flight Project. We found that NASA, at times, did not proactively address contractors' actions that ultimately contributed to cost overruns. Specifically, NASA accepted contractor bids that were significantly less than the program office estimates. Further, it did not

adequately evaluate contractor technical designs for the GLM. Also, its administration of award fees did not adequately incentivize contractors for exemplary performance. Improved contract oversight by NOAA over NASA contracts would help to minimize the risk of such problems occurring.

GOES-R costs increased more than \$685 million for the Flight Project’s most beneficial instruments (ABI, GLM) and the spacecraft. Cost overruns—which occur when contractors’ incurred and planned costs exceed the expected costs of their contracts—represent the largest category (\$361 million) of these increased costs.²⁵ The ABI, GLM, and the spacecraft are currently overrunning their contracts by \$264 million, \$86 million and \$11 million respectively. See figure 3, below, for a depiction of cost for the spacecraft, ABI, and GLM to date.

Figure 3. Costs of Spacecraft, ABI, and GLM, as of December 2012



Source: Adapted from GOES-R program and NASA contract documentation

^a Includes the spacecraft for the GOES-R and -S flight models; ^b includes instruments for GOES-R and -S flight models; ^c includes instruments for GOES-R, -S, and -T flight models; ^d the contract price (base cost + award fee) at award including exercised contract options; ^e costs negotiated and added to the contract for decisions made by program management (e.g., requirements changes, additional testing, and schedule adjustments); ^f contractor incurred and planned costs that exceed the expected costs of their negotiated contracts.

²⁵ NASA negotiated the other costs and added them to the contract for decisions made by program management (e.g., requirements changes, additional testing, and schedule adjustments).

The overruns were the result of contractors underestimating the effort and technical complexity of the instruments, immature designs, and difficulty managing subcontractors' cost increases and schedule slips. While the spacecraft contract overruns, compared to ABI and GLM, have been minimal as of November 2012, the program recently disclosed that it expects spacecraft overruns to reach \$140 million.

A. Contract Award Prices Were Significantly Less Than Program Estimates

The program accepted contractor bids that were significantly less than its own estimates. Altogether the ABI, GLM, and spacecraft contract awards totaled \$1.55 billion, or 28 percent less, than the program estimated (see table 2, below).

Table 2. Comparison of Program Cost Estimates Versus Contract Award Prices

Flight Project Contracts	GOES-R Program Office Estimate (POE), in Millions ^a	Winning Bid, in Millions ^b	Difference Between Estimate and Bid
Advanced Baseline Imager (ABI)	\$462	\$359	21%
Geostationary Lightning Mapper (GLM)	\$147	\$97	34%
GOES-R Spacecraft	\$1,538	\$1,094	29%
Totals	\$2,147	\$1,550	28%

Source: Adapted from GOES-R program and NASA contract data

^a Includes estimates for GOES-R through GOES-U flight models; ^b includes bids for GOES-R through GOES-U flight models.

The program office developed estimates before accepting contractor bids during the program's formulation phase.²⁶ Program experts (e.g., engineers, scientists) used trade studies, designs, and cost estimates, along with labor rates, to build the program office's estimates.

Flight Project officials acknowledged that they were aware the bids were too low but explained that getting better cost realism from contractors is arduous and risky. Typically, NASA only conducts a single round of discussions wherein they are permitted, though limited by counsel, to inform bidders that specific tasks are unrealistic. They explained that negotiation over cost realism is time-consuming, expensive, and potentially leads to protests from other vendors that provided higher bids. In an effort to compensate for awarding contracts that were underbid, the program stated that it had sufficient budget reserves to cover anticipated cost increases within the program's life cycle cost of \$10.9 billion. However, when contract prices do not reflect reasonable estimated costs, the costs and status of the effort become skewed as contractors

²⁶ During NASA's formulation phase, the program manager initiates and conducts the planning and analysis necessary to develop a program plan that establishes a cost-effective program demonstrably capable of meeting agency and mission directorate goals and objectives.

overrun their bids. Indeed, as the projects proceeded, significant cost increases and budget reductions eroded the reserves. The program reported, in November 2012, that program reserves for FYs 2012 and 2013 are below NASA recommended levels.

B. Technical Evaluation of GLM Design Was Inadequate

The initial GLM contractor's project team was more experienced in building instruments for research missions rather than operational missions like GOES-R. Thus, the contractor underestimated the manpower, time, and materials needed to develop an operational instrument. For example, as part of its best and final offer, the GLM contractor stated its intention to change its baseline design for an important sub-component (real time event processors) to a design that had a lower technology readiness level.²⁷ The program, 1 year later, identified that the design would not have been sufficiently mature by the next key technical milestone and thus rejected the proposal. This led to a re-design that was more costly than the contractor's initial estimate. Flight Project officials estimate that costs increased by approximately \$10 million. Had NASA proactively engaged its rigorous technical review process earlier—at contract review and award—perhaps the time lapse, re-design, and cost overruns that occurred later in development could have been mitigated.

Other technical issues also arose related to underestimation of the effort. For instance,

- the contractor's original design for a fully redundant backup solution for the electronics systems that processes collected data did not meet requirements and had to be redesigned, and
- the contractor's plans for reducing electromagnetic interference on the instrument did not meet operational standards and had to be redesigned.

Had NASA performed sufficient upfront validation of plans and designs including parts, other hardware, and supporting software as part of its evaluation of contractor proposals, these issues may have been identified sooner and the associated overruns reduced or eliminated.

C. Award Fees Did Not Effectively Incentivize Exemplary Performance or Sufficient Cost Control

The award-fee structure for the ABI, GLM, and spacecraft contracts do not incentivize the contractors toward exemplary performance. In addition, the program provided the ABI contractor more award funds than we believe is justifiable based on the contractor's performance.

With cost-plus-award-fee contracts such as those awarded for the GOES-R Flight Project, award fees are

²⁷ Per NASA standard NPR 7120.8 sections 4.6.1-3, technology readiness levels (TRLs) are measurements used to assess the maturity of technology.

- the government's primary tool to incentivize contractors to meet and possibly exceed performance goals,
- awarded based on the government's evaluation of the contractors performance (specifically technical, management, and cost performance for GOES-R), and
- provided to the contractor in excess of the costs of materials and work performed.

The award-fee structure for ABI, GLM, and the spacecraft do not incentivize exemplary performance. The award-fee structures for the ABI, GLM, and spacecraft contracts are problematic in two ways: (1) the scale for assigning award fee provides too much fee for average performance and (2) there are no criteria or metrics to determine what constitutes a significant versus an insignificant overrun. Both of these issues were also previously noted in our May 2012 report²⁸ which addressed the Ground Project contracts administered by NOAA.

1. *Award fee ranges*—The award fee structures for the ABI, GLM, and spacecraft contracts use a numerical rating system with adjectival ratings “Excellent,” “Very Good,” “Good,” “Satisfactory,” and “Poor/Unsatisfactory” to determine the percentage of award fee paid to the contractors for each performance period (see appendix D). The scale allows the contractor to receive significant award fees (up to 70 percent) for “Satisfactory” performance. Contractors receiving the lowest score in the “Satisfactory” range (61) are entitled to receive an award fee. This spread allows a contractor performing at the lowest level of acceptable performance to receive over half of the award fee (61 percent). For performance in the “Poor/Unsatisfactory” range (60–below), no award is provided. The numerical rating system should be adjusted such that contractors receive smaller percentages of award fee for non-exemplary performance.²⁹ For example, a satisfactory rating should receive a score of 50 percent as specified by the 2011 NASA Federal Acquisition Regulation (FAR) Supplement,³⁰ which provides a more appropriate award fee for satisfactory performance.
2. *Overrun materiality*—Within the program's performance evaluation criteria for award fees, contractors can receive fees even if they have overruns; however, the criteria's language is subjective. Specifically, the criteria allow granting award fees in the case of overruns if the overruns are “significant.” They do not, however, define what constitutes significant versus insignificant. Further, they allow the government to increase the

²⁸ U.S. Department of Commerce Office of Inspector General, May 18, 2012. *NOAA's Cost-Plus-Award-Fee and Award-Term Processes Need to Support Fees and Extensions*, OIG-12-027-A. Washington, DC: DOC OIG, 6.

²⁹ Although the ABI, GLM, and spacecraft contract award fee ranges were in compliance with NASA guidance when the contracts were awarded (2009 and earlier), the guidance was altered in 2011 after Federal Acquisition Regulations specified ranges that were lower. It is in the program's best interest to use the new ranges because they are more likely to incentivize contractors towards excellent performance. According to the contracts, the fee determining official has the option to alter the plans and methods for determining award fee.

³⁰ NASA FAR Supplement, 48 C.F.R. § 1816.405-275(b).

award fee based on consideration of the contractor's efforts to control or mitigate the overrun. OMB guidance requires tying awards to demonstrated results, as opposed to effort, in meeting or exceeding specified performance standards.³¹ Further, as stated in our May 2012 audit report on NOAA cost-plus-award-fee contracts, "without clearly defined metrics and outcomes, performance ratings are subject to interpretation and can result in unsupported contractor performance evaluations and awards."³²

NASA, by revising the performance evaluation plans for these contracts, will more effectively incentivize the contractors to strive for exemplary performance. We therefore expect NASA, through NOAA direction, to better use the funds remaining in the contract award fee pools (a combined total of approximately \$106 million funds put to better use for ABI, GLM, and the spacecraft). The contractors are still eligible to earn these funds (through 2016 for the majority of the funds) based on their performance. As a result, these changes may not lead to immediate cost savings. However, more effective award fee administration is likely to improve contractor technical, management, and cost performance which may result in lower contract costs in the future.

Fees awarded to the ABI contractor were not commensurate with contractor performance. Despite the ABI contractor's management problems and cost overruns, we believe NASA awarded more fees than justifiable.

Although the ABI contractor's technical performance has typically been "Very Good" (see appendix D for performance rating scale), it has struggled with both cost control and subcontractor management. The \$264 million ABI overruns are primarily the result of difficulties with managing subcontractor cost increases and schedule slips, as well as underestimating the amount of work and technical complexity of the instrument.

In addition to identifying these issues, NASA stated in some of its award fee reports that the contractor applied excessive manpower to the project, did not provide correct status on select tasks, and was not responsive to some NASA requests. For example, the contractor proceeded with its selected approach for vibration testing on ABI components despite NASA requests to use a different approach that would not result in schedule slippage and increased costs. NASA noted that, because the contractor had experienced significant issues on another contract, it was taking an overly conservative risk posture with ABI.

NASA evaluates performance and pays award fee to the ABI contractor for every six month period of contract performance. We evaluated 15 of these award fee periods and found that the fee determining official awarded the contractor a higher amount than

³¹ Office of Management and Budget, Office of Federal Procurement Policy, December 4, 2007. "Appropriate Use of Incentive Contracts," Memorandum. Washington, DC: OMB.

³² DOC OIG, May 18, 2012. *NOAA's Cost-Plus-Award-Fee and Award-Term Processes Need to Support Fees and Extensions*, OIG-12-027-A. Washington, DC: DOC OIG, 6.

justifiable by evaluation criteria in 4 periods. Because the documentation we reviewed did not demonstrate that these award fees were commensurate with actual contractor performance, we identified \$8.8 million paid across the four periods as questioned costs.³³

We recognize the challenge the program has with striking the right balance between maintaining constructive contractor relationships and assessment of performance through award fees. However, we conclude that correcting the award fee structures and ensuring award fees are commensurate with performance will address this challenge.

IV. NOAA Needs to Improve Management of Undefined Contract Actions (UCAs)

NOAA has delayed finalizing negotiations for almost a year to two years on its six significant changes to the core ground system contract. Because of these delays, the government lost the opportunity to negotiate costs on an estimated \$79.6 million (see table 3, below).

Table 3. GOES-R Core Ground System Contract Action Definitization Delays

ECPs	Total Days to Definitize	Estimated Costs Incurred Before Definitization (Millions)
1	448	\$ 3.3
2	342	\$ 0.3
4	695	\$10.3
5	492	\$ 0.9
6	769	\$ 3.5
7	467 ^a	\$61.3
Total		\$79.6

Source: Adapted from NOAA contract documentation

^a As of December 12, 2012.

The program issued seven engineering change proposals (ECPs) after the award of the core ground system contract in May 2009. Six of these ECPs, totaling an estimated \$245 million, included changes to the contract that required negotiating additional costs. Because NOAA

³³ An undetermined portion of the \$8.8 million paid across these four periods was provided to the contractor without adequate justification. Thus, rather than declaring a specific dollar amount as inappropriate spending, we instead question the appropriateness of the amount paid for the four periods.

needed the work to begin before it and the contractor could fully negotiate cost, NOAA chose to issue these ECPs as UCAs.³⁴

FAR specifies that agencies should definitize UCAs “in the shortest practicable time.”³⁵ In addition, the Department of Defense generally requires their agencies to definitize all UCAs in 180 days. Further, Government Accountability Office (GAO) reports³⁶ also stress the importance of definitizing UCAs in a timely manner. We found that NOAA experienced delays in definitizing its UCAs because

- it lacks policies for governing their time limits³⁷ and cost incurred tracking,
- the scope was too large, and
- cost limits were set too high.

While NOAA policy does not specify any time limit for definitizing UCAs, NOAA should make every effort to reduce the time that contracts remain undefinitized, given the risks of increased cost the longer they are delayed.

A. *Lack of UCA Time Limit And Cost Incurred Tracking Policy Led to Definitization Delays*

NOAA does not have a policy for how expeditiously UCAs should be definitized. On average, the core ground system contractor prepared the estimates and proposals for the UCAs in 86 days. However, it took NOAA an average of 348 days to evaluate the contractor’s proposal and identify its negotiation targets. NOAA does not have a mechanism to determine the amount of cost due to such delay. Its Acquisition and Grants Office (AGO) receives weekly reports that include the status of UCAs but not how much of the UCA costs have already been incurred. Further, the program office neglects to identify these costs until right before they are definitized. Thus, the significance of these delays is not communicated and their impact is not understood.

³⁴ An undefinitized contract action (UCA) is a federally-regulated contract instrument that allows the government to authorize contractors to begin work immediately before contract terms and conditions are completely negotiated. Once both parties can evaluate and negotiate the additional work and cost, the contract action is “definitized”—the contractor and the government agree upon the total work and its estimated cost.

³⁵ FAR 43.204(b)(1).

³⁶ U.S. General Accountability Office, September 2006. *Iraq Contract Costs: DOD Consideration of Defense Contract Audit Agency’s Findings*, GAO-06-1132. Washington, DC: GAO, 8.

U.S. GAO, June 2007. *Defense Contracting: Use of Undefinitized Contract Actions Understated and Definitization Time Frames Often Not Met*, GAO-07-559. Washington, DC: GAO, 4–6.

U.S. GAO, January 2010. *Defense Contracting: DOD Has Enhanced Insight into Undefinitized Contract Action Use, but Management at Local Commands Needs Improvement*, GAO-10-299. Washington, DC: GAO, 17–18.

³⁷ Although NOAA *Acquisition Handbook* 16.3(d) specifies a time limit for one type of UCA (letter contract), it does not do so for other UCAs, such as the ECPs issued for the core ground system contract.

B. The Large Scope of UCAs Resulted in Delays

Each UCA includes many configuration change requests (CCRs),³⁸ which include both major and minor changes to the contract. NOAA has grouped 68 CCRs with cost impacts—all of which, regardless of size, must be evaluated and negotiated—into only six UCAs. NOAA took this approach because it had limited acquisition staff, looking to reduce the effort needed to definitize CCRs. Despite NOAA's strategy, the effort needed to definitize CCRs increased. In contrast, NASA contracting officers minimized the need for UCAs by processing changes individually or in small groups on Flight Project contracts; when UCAs were necessary, NASA definitized them quickly.

C. High UCA Cost Limits Create Disincentive for Timely Definitization

NOAA set the government's limit of liability prior to definitizing UCAs to 50 percent of the contractor's estimated cost for all except the seventh. Because these UCAs cover multiple years of work, the contractor could perform work on an UCA for a year or more before reaching 50 percent of the estimated costs. Spending on the UCAs did not reach or exceed the 50 percent limit. However, we believe this approach neither provides incentive for the contractor nor motivates NOAA to quickly definitize because the government has already obligated money for the work to be performed. Fortunately, the program reduced the risk of this approach by significantly reducing the government's limit of liability for the seventh UCA and shortening the duration for performing authorized work.

Recommendations

To mitigate GOES two-imager coverage gap threats, we recommend that the NOAA Deputy Under Secretary for Operations ensure that NOAA

1. Develops a comprehensive set of tradeoff approaches (with impacts and implementation timetable) to mitigate launch delays and communicates approaches to stakeholders and users.
2. Keeps stakeholders and users informed of any tradeoffs that have to be made to meet the launch readiness date.

To maintain robust systems engineering for the GOES-R program, we recommend that the NOAA Deputy Under Secretary for Operations

3. Directs NESDIS to report periodically to the NOAA Program Management Council on the adequacy of program systems engineering integration and NASA GSFC and headquarters systems engineering support.

³⁸ A configuration change request is a documented request to issue, change, revise, or delete a controlled requirement, function, or item.

To limit cost overruns and improper award fees for GOES-R Flight Project contracts, we recommend that the NOAA Assistant Administrator for Satellite and Information Services ensure that NASA

4. Effectively validates contractors' proposals and any subsequent plans, to verify that technical designs meet technology readiness requirements per NASA standards.
5. Modifies ABI, GLM, and spacecraft contract award-fee structures to reduce award fee percentages in accordance with the current NASA FAR Supplement, as well as clearly articulates how scores should be adjusted based on the magnitude of cost overruns.
6. Adjusts future award fees for the ABI to be more commensurate with contractor performance, to incentivize the contractor to control costs.

To improve contract administration and management, we recommend that the NOAA Deputy Under Secretary for Operations

7. Directs the development of a policy for managing undefinitized contract actions and includes Federal Acquisition Regulation guidance on definitizing change orders in the shortest practicable time.

Summary of Agency Response and OIG Comments

In responding to our draft report, NOAA concurred with five of our seven recommendations. It also included suggested factual and technical changes to our findings and editorial comments. See appendix E for NOAA's complete response.

We address NOAA's responses to all of our recommendations and significant issues regarding the basis of our findings. We also address NOAA's recent decisions to restrict OIG access to critical meetings where major program issues are discussed.

We held several discussions with the GOES-R program management and staff before and after issuing the draft report in order to obtain feedback about all findings and recommendations. However, the GOES-R program focused these discussions only on the four award fees periods for the ABI contract that we identified in finding III. During these discussions, we reviewed the award fee periods in question, the issues that led to our finding, and offered to discuss the finding in more detail. In all of these discussions, the only information GOES-R managers and staff provided to substantiate the award fees paid was undocumented "verbal discussions" that occurred during the fee determination process which are not sufficient to justify award fees.

While GOES-R managers and staff have agreed that, in the future, "verbal discussions" should be documented, they disagree with our recommendation regarding award fees. If NOAA does not implement OIG's recommendation to modify contract award-fee structures in accordance with the current NASA Federal Acquisition Regulation (FAR) Supplement and articulate adjustments made for cost overruns, there will continue to be weaknesses in the award fee process.

In summary, based on our fieldwork and our discussions with NOAA, we reaffirm our findings and all of the recommendations.

Agency Response to Recommendations, with OIG Comments

Recommendations 1 and 2: NOAA concurs. NOAA indicates it has developed and presented cost and schedule tradeoff options in response to requests from the NOAA–NASA Program Management Council (PMC) based on numerous budget questions. The tradeoff options included supporting additional shifts for spacecraft integration and test activities and deferring development of ground capabilities—but what remains unclear, for example, are the conditions under which ground capabilities will be deferred or the plan for implementing this option.

In discussions with NOAA regarding our draft report recommendations, it became apparent that the GOES-R program and National Weather Service had conflicting views about postponing the launch of GOES-R based on GLM's readiness. Presenting and vetting a comprehensive set of tradeoff approaches with relevant parties would minimize such disagreements. NOAA needs to include all tradeoff options in one comprehensive set, and more importantly, indicate events that would trigger implementation of each option.

Recommendation 3: NOAA concurs. NOAA asserts, and we agree with independent reviewers, that program systems engineering has been strengthened. This reflects an improvement from June 2010 when the GOES-R independent review team criticized the lack of program systems engineering leadership integrating the flight and ground projects. However, we disagree with NOAA's assertion that the lack of adequate systems engineering leadership did not contribute to the delay in developing an approach (the re-plan) to resolve the flight and ground projects' information dependency issues.

Before the new lead program systems engineer was put into place, a significant communication barrier existed between the flight and ground projects and the lead program systems engineer did not have the technical leadership authority necessary to resolve issues. This lack of leadership—in identifying the extent of the misalignment of the availability of flight information needed by the ground project until the software requirements review—was a contributing factor that led to the need for a costly re-plan and schedule slip.

The GOES-R program will soon start its system integration and test phase, when program systems engineering plays an important role in ensuring proper integration of flight and ground systems. Periodic review of the effectiveness of systems engineering both within the program and at NASA Goddard Space Flight Center will contribute to having a robust satellite system and meeting the launch readiness date.

Recommendation 4: NOAA concurs. NOAA agrees with the spirit of our recommendation to validate contractors' proposals and subsequent plans; however, it misunderstands our recommendation's intent. NOAA discusses the rigor of NASA's instrument development and review process. We do not dispute the rigor of NASA's process. Instead, we recommend that NOAA ensure NASA applies this process more effectively and consistently during all stages of development, beginning with contract evaluation. In this instance, NASA did not identify an issue during the GLM acquisition. This omission, during contract evaluation, ultimately led to cost increases due to the need to later redirect the contractor to a proven design of sufficient technology readiness.

Specifically, as we discuss in finding III part B, the GLM contractor identified—in its best and final offer—its intent to change its baseline design, which had met the appropriate technology readiness level, to another technology which did not. This change was not identified by the source evaluation board or any of the subject matter experts tasked to help the board before the contract was issued.

As a result, the GLM contractor proceeded with conducting trade studies from contract award in December 2007, to the instrument's preliminary design review (PDR) in March 2009. (A PDR serves as an approval gate for the contractor to proceed with the instrument's design.) According to the program, on December 1, 2008—a year after contract award and prior to the PDR—NASA was provided with a draft trade study concerning this design change. However, it was not until just before PDR (i.e., over a year after the contractor changed its design) that NASA directed the contractor to go back to the original baseline design and technology. As we state in our finding, had this issue been identified at contract award as part of NASA's review process, impact to cost and schedule could have potentially been mitigated.

Recommendation 5: NOAA does not concur. NOAA does not concur with this recommendation to modify the ABI, GLM, and spacecraft contract award-fee structure in accordance with the 2011 NASA FAR Supplement and clearly articulate the adjustments made for cost overruns. NOAA asserts that the program was not expected to comply with the NASA FAR Supplement issued in 2011 because these contracts were awarded prior to the issuance of the Supplement. As part of its suggested factual and technical changes comments, NOAA explained that the contracts' limit of 61 percent for satisfactory performance is superior to the lower limit found in the current NASA FAR Supplement because contractors will receive no award fee for scores below 61 (the program's methodology pays the contractor a percentage of the award fee equal to its performance score). As it relates to modifying the fee structure in accordance with the current NASA FAR Supplement, our finding does not state a condition of noncompliance; rather, it encourages use of the current Supplement because it will improve contractor incentives. Regarding NOAA's assertions that the program's award fee structure for these contracts was superior to the current NASA FAR Supplement because of the higher limit for satisfactory performance—based on our analysis, we found GOES-R award fee plans could be more effective.

In addition to modifying the contracts' fee structure as we recommend, NOAA should ensure that NASA consistently adjusts scores based on cost overruns. For example, with the GLM contract, NOAA's award fee evaluation resulted in the replacement of the contractor project manager. We agree with the program's actions in that award period in which contractor performance was especially egregious (contract value more than doubled as the result of an overrun). However, on the ABI contract, despite the zero cost score given for the significant cost overrun, the contractor was still able to receive 62 percent of the available award fee—only 2 percent above the threshold for getting no award fee. In that instance, the contractor had an overrun of \$162 million (64 percent of the base contract cost)—which led the program to score the contractor zero points for cost performance and the fee determining official to conclude that “the amount of the overrun is so egregious that it overwhelms all the good technical work accomplished this period by the ABI Team and puts the entire GOES-R Program in a very bad light.” In our opinion, a higher limit for earning award fees coupled with lack of clear guidance on adjustment for cost overruns can lead to this type of situation. To address this situation, and to avoid inconsistency in the treatment of cost overruns, NOAA should ensure that NASA clearly articulates how scores should be adjusted based on the magnitude of cost overruns.

In its comments NOAA also asserts, and we agree, that NOAA is involved in the process of determining award fees for contractors. Because of its involvement in this process, NOAA should work with NASA to implement this recommendation for improving the methods and plans for determining award fee.

Recommendation 6: NOAA does not concur. NOAA does not concur with our recommendation to adjust future award fees for the ABI contract such that they are commensurate with contractor performance and incentivize the contractor to control costs. NOAA states that its method is clear, effective, and proven to incentivize contractors and provided an example where its feedback to the contractor effectively improved performance in one technical area. While the example is good, it occurred prior to the four periods addressed

in our finding. Our extensive analysis of the program contract documentation supporting the program's award fee determination decisions for ABI, GLM, and spacecraft contracts (over 28 award fee periods) reveals improvements should be implemented in the award fee process.

In our analysis, we reviewed documentation from the program and contracting officers' files which included award fee letters, performance evaluation reports, event monitor and event coordinator assessment reports, contract staff comments, contractor self-assessment reports, performance evaluation plans, and earned value metrics. Our analysis included three contracts (ABI, GLM, and spacecraft) with a combined total of 28 award fee periods. In all we found that, in four award fee periods specific to the ABI contract, the program did not provide the contractor with award fees that were commensurate with its performance. Specifically:

- The contractor advised the program in two periods that it would have overruns totaling \$86 million. However, the program gave little consideration of these overruns in its evaluation of the contractor. To date, the contract's total overruns have reached \$264 million on a contract priced around \$329 million.
- In three of the award fee periods, the program criticized the contractor for ineffective subcontractor management with statements such as "the cost and schedule issues at these suppliers continue to pose significant challenges to the program" and "subcontractor performance has been a challenge during this award fee period." However, in each period, the program scored the contractor higher than we believe is justifiable based on the contract's evaluation criteria.
- In two award periods, the program had issues interacting with the contractor. There were specific instances of the contractor not complying with government requests to cancel unnecessary testing and to use updated metrics, issuing incident reports that were difficult to understand, not providing promised resources, misrepresenting the status of a task, not providing immediate notification of problems, not holding planned meetings, and not providing feedback on assigned actions. However, the program did not adequately reflect these difficulties in its evaluation scores.
- In two award periods, the program evaluated contractor technical performance as "good" and "very good" respectively, meaning that at the very least there were "reportable deficiencies, but with little identifiable effect on overall performance." However, the program identified that technical issues had "major cost and schedule impact to the program" in one period. In the other period, the program noted that half of the technical milestones were missed and that "delivery of the PFM [Protoflight Model] has slipped five months." These assertions of significant impact to the program are not commensurate with the above description for a "good" rating.

Despite these issues, the program awarded the contractor 78 percent of the total award fee pool available for these four periods.

We informed the program as early as December 2012 that we had concerns that the award fees paid in four periods were not commensurate with contractor performance. As noted above, after sharing our concerns with the program, we discussed these award fees with

program staff in detail and gave them multiple opportunities to provide documentation supporting these award fees. However, they asserted that the award fee determinations included substantial undocumented subjective considerations. Because these considerations are undocumented, we were unable to include them in our review. We suggest that this recommendation could be implemented by ensuring that, in the future, evaluation scores and rationale are effectively validated against the program's evaluation criteria and all significant subjective rationale that affects the scores be documented.

Recommendation 7: NOAA concurs. NOAA concurs with this recommendation; however, in its response, it disagreed with each part of the finding supporting this recommendation. Because of this response, we are concerned about its understanding of the finding and recommendation. We therefore provide the following comments to address NOAA's misunderstanding of the finding and reiterate the need for the recommendation.

- NOAA asserts that the definitization timeline did not affect the government's ability to negotiate costs. However, the NOAA Acquisition and Grants Office (AGO) provided us documentation that specified that \$79.6 million was incurred prior to the determination of negotiated costs for the ECPs. Also, staff from the AGO explained that in circumstances where definitization is significantly delayed the government has very little room to negotiate because only the work that has not been completed can still be negotiated.
- NOAA states that it did not execute the ECPs under UCA authority; instead, they were issued as change orders. We were aware that the AGO did not use UCA authority to execute ECPs and have been careful in our report to only include FAR statements that are applicable to change orders. We have used the term UCAs in the report in an effort to use general concepts better understood by stakeholders so as not to delve into contracting minutia. The risks and impacts of lengthy delays definitizing change orders and contract actions is the same and, thus, using UCAs is reasonable in this context.
- NOAA states that limited staff resources in the AGO, coupled with managing mission requirements, primarily contributed to delays. However, AGO staff informed us that having insufficient staff has only contributed to delays by a matter of a few days.
- NOAA states that the significance of definitization delays was communicated and understood. However, as mentioned in our finding, the costs incurred by the contractor are not tracked by the AGO or reported in the weekly meetings. As a result, the AGO cannot fully understand the impact of definitization delays.
- NOAA comments that its use of 50 percent cost limits is supported by the inclusion of this limit in the Defense Federal Acquisition Regulation Supplement (DFARS). However, we agree with GAO's statements in a January 2010 report³⁹ that criticized the Department of Defense for immediately setting cost limits to the maximum 50 percent

³⁹ U.S. GAO, January 2010. *Defense Contracting: DOD Has Enhanced Insight into Undefined Contract Action Use, but Management at Local Commands Needs Improvement*, GAO-10-299. Washington, DC: GAO, 18, 20.

permitted by the DFARS. GAO stated “contractors may have little incentive to quickly submit proposals and agencies have little incentive to demand their prompt submission, since funds are available to proceed with the work” and “obligating at or above 50 percent may encourage extended periods of performance prior to definitization.”

NOAA Bans OIG and GAO Attendance at Program Management Council Meetings

On November 30, 2012, the NOAA Deputy Secretary for Operations informed the Inspector General via e-mail that his staff would not be invited to attend NOAA’s monthly Program Management Council (PMC) meeting. In the past, OIG and GAO have been routine observers at PMC meetings, where the NESDIS environmental satellite program management offices report progress and issues to NOAA (and NASA) executives. Because PMCs are the highest decision-level forum within NOAA for satellite programs, by attending these meetings, the OIG has been able to gain valuable insight into NOAA leadership’s direction and program execution for our ongoing satellite audits and oversight activities.

NOAA stated that one reason for banning OIG (and GAO) attendance at PMC meetings was a recommendation in July 2012 by the NESDIS Independent Review Team (IRT) to restrict satellite oversight activities. However, the IRT recommendation was directed specifically to Department and NOAA executive offices and the reporting they required of satellite programs. The IRT did not recommend restricting OIG oversight.

In an e-mail to the Inspector General on December 18, 2012, NOAA cited another reason for restricting OIG attendance—that NOAA program managers were not “free to bring their challenges to NOAA management without concern that pre-decisional actions or preliminary reports will be incorporated into external reviews before NOAA has had an opportunity to address them.” The OIG does not release predecisional material. Further, OIG’s ability to observe the NOAA decision-making process promotes higher-quality recommendations to improve the performance of the nearly \$24 billion GOES-R and Joint Polar Satellite System (JPSS) programs.

NOAA’s recent notification that they intend to restrict OIG attendance at other GOES-R meetings and reviews would, if implemented, create additional obstacles to effective oversight of the satellite programs. On February 8, 2013, we requested that NOAA provide us schedules and attendance information for upcoming GOES-R contractor and technical reviews in order to start planning our continued oversight and audit of the program. However, later that month, GOES-R program management presented a briefing slide to the PMC indicating that they intend to deny our request to attend these meetings. Again, the OIG has been a welcomed observer at technical and contractor meetings in the past—and have gained invaluable perspective on the GOES-R program that has made our reports more accurate and helpful to the program and stakeholders.

In response to two Congressional committee requests to the Department and NOAA to allow OIG attendance at PMC meetings,⁴⁰ the Inspector General directed his staff to attend the March 2013 PMC. At the March PMC, the Acting Undersecretary for NOAA, chairing the meeting, indicated that NOAA was still working to address the Congressional requests. As of the date of this report, OIG attendance at PMC meeting (as well as other NESDIS satellite oversight and technical meetings) is still restricted.

Over the past 3 months, while OIG has been banned from PMC meetings and waiting for NOAA to resolve this issue, NOAA has spent approximately \$429 million (based on NESDIS budget plans) on its GOES-R and JPSS programs. Restricting OIG attendance hampers our oversight of these high-cost, challenging, primary mission-essential programs and our ability to effectively provide independent assessments to Congress and our other stakeholders.

⁴⁰ Letters from House Science, Space, and Technology Committee, February 28, 2013, and House Appropriations Commerce, Justice, Science, and Related Agencies subcommittee, March 5, 2013.

Appendix A: Objectives, Scope, and Methodology

This audit was initiated in February 2012, with fieldwork ending in November 2012. Our objectives were to assess (1) the adequacy of contract management and administration and (2) the effectiveness of management's direction, monitoring, and collaboration for development of select components of the GOES-R program.

The scope of our review included assessment of key contracts' terms, modifications, and amendments, as well as their impacts on schedule and costs. After identifying the universe of GOES-R contracts and the values, risks, and challenges with each, we selected contracts for more in-depth analysis based on the magnitude of the challenges and impacts of known risks. We selected the ABI, GLM, core ground system (CGS), and spacecraft contracts; contract management and administration findings in this report pertain to the four aforementioned contracts. We also assessed integration efforts between the ground and space projects by evaluating management's ability to provide direction, monitoring, and collaboration in areas such as project management and program systems engineering.

We reviewed internal controls significant within the context of our audit objectives and employed a comprehensive methodology to achieve those objectives. Specifically, we

- identified and assessed the universe of GOES-R contracts,
- reviewed and assessed the impact of issues and risks with the program,
- interviewed NOAA, NASA, and contractor personnel, as well as observed selected program and project-level reviews locally and at contractor facilities,
- reviewed NOAA/NASA planning and project status documentation,
- reviewed past recommendations made by GAO, as well as NOAA's standing review board and independent review teams, and
- examined program activities and documentation supporting baseline development.

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 under the authority of the Inspector General Act of 1978, as amended, and Department Organizational Order 10-13. We performed our work in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence that provides a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix B: GOES-R Suite of Instruments

Instrument	Functional Purpose
Advanced Baseline Imager (ABI)	As the primary instrument, the ABI enables forecasters to use the higher resolution images to track the development of storms in their early stages; it offers a wide range of applications related to weather, oceans, land, climate, and hazards such as fires, volcanoes, hurricanes, and storms that cause tornados.
Geostationary Lightning Mapper (GLM)	The GLM provides early indication of storm intensification over land and ocean areas, severe weather events, and potentially improved tornado warning lead time of up to 21 minutes, as well as data for long-term climate variability studies. NOAA anticipates the GLM will have immediate applications to aviation weather services, climatological studies, and severe thunderstorm forecasts and warnings.
Space Environment In-Situ Suite (SEISS)	The SEISS sensors will monitor the proton, electron, and heavy ion fluxes at geosynchronous orbit; assess radiation hazard to astronauts and satellites; and provide warnings of high flux events which will mitigate damage to radio communication.
Solar Ultra Violet Imager (SUVI)	The SUVI allows users to observe the sun in the extreme ultraviolet (EUV) wavelength range, characterizing complex active regions of the sun, and solar flares and eruptions—space weather that could disrupt power utilities, communication and navigation systems, and potential damage to orbiting satellites and the International Space Station.
Extreme Ultra Violet/X-Ray Irradiance Sensor (EXIS)	The EXIS sensor will monitor solar flares that can disrupt communications and degrade navigational accuracy, affecting satellites, astronauts, high latitude airline passengers, and power grid performance.
Magnetometer (MAG)	The MAG will provide measurements of the space environment magnetic field that controls charged particle dynamics potentially dangerous to spacecraft and human spaceflight. In addition, it will provide alerts and warnings to many customers, including satellite operators and power utilities.

Source: OIG adapted from GOES-R program documentation

Appendix C: Potential Monetary Benefits

Description	Questioned Costs	Funds Put to Better Use
Unsupported ABI award-fee payments	\$ 8,857,750	\$ 0
Balance of ABI, GLM, and spacecraft contract award-fee pools	\$ 0	\$ 105,940,788

Source: OIG adaptation and analysis of NASA contract documentation

Appendix D: Award-Fee Structure Scoring for ABI, GLM, and Spacecraft Contracts

GRADING TABLE		
Range of Performance		
Adjectival Rating	Points	Description
Excellent	100–91	Of exceptional merit; exemplary performance in a timely, efficient and economical manner; very minor (if any) deficiencies with no adverse effect on overall performance
Very Good	90–81	Very effective performance, fully responsive to contract; contract requirements accomplished in a timely, efficient and economical manner for the most part; only minor deficiencies
Good	80–71	Effective performance; fully responsive to contract requirements; reportable deficiencies, but with little identifiable effect on overall performance
Satisfactory	70–61	Meets or slightly exceeds minimum acceptable standards; adequate results; reportable deficiencies with identifiable, but not substantial, effects on overall performance
Poor/Unsatisfactory	Less than 61	Does not meet minimum acceptable standards in one or more areas; remedial action required in one or more areas; deficiencies in one or more areas which adversely affect overall performance

Source: OIG, adapted from NASA contract documentation

Any factor receiving a grade of “Poor/Unsatisfactory” (less than 61) will be assigned zero performance points for purposes of calculating the award fee amount. The contractor will not be paid any award fee when the total award fee score is “Poor/Unsatisfactory.”

In order to earn a total overall rating of “Excellent,” the contractor must be under contract cost, on or ahead of schedule, and be rated “Excellent” under Technical Performance.

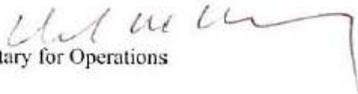
Appendix E: Agency Response



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

MAR 29 2012

MEMORANDUM FOR: Allen Crawley
Assistant Inspector General for Systems Acquisition
and IT Security

FROM: David M. Kennedy 
Deputy Under Secretary for Operations

SUBJECT: *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*
Draft OIG Audit Report

Thank you for the opportunity to comment on the Office of the Inspector General's draft audit report evaluating the evaluating the Geostationary Operational Environmental Satellite-R Series (GOES-R) acquisition and development effort. NOAA's specific comments on the report's findings and recommendations are attached.

Attachment



Department of Commerce
National Oceanic and Atmospheric Administration
Comments on the Draft OIG Report Entitled
“Audit of Geostationary Operational Environmental Satellite–R Series: Comprehensive
Mitigation Approaches, Strong Systems Engineering, and Cost Controls Are Needed to
Reduce Risks of Coverage”
(February 6, 2013)

The Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) appreciates the opportunity to review the Office of Inspector General's (OIG's) draft report regarding the Geostationary Operational Environmental Satellite–R Series. The following includes a response to each recommendation as well as comments to clarify facts and further enhance, explain, and improve the clarity of the report findings and recommendations

NOAA Response to OIG Recommendations

“To mitigate GOES two-imager coverage gap threats, we recommend that the NOAA Deputy Under Secretary for Operations ensure that NOAA”

Recommendation 1: “Develops a comprehensive set of trade-off approaches (with impacts and implementation timetable) to mitigate launch delays and communicates approaches to stakeholders and users.”

NOAA Response: NOAA concurs. The GOES-R Series program has actively developed and presented potential trade-offs to mitigate both schedule and cost risks in response to numerous budget questions and NOAA-NASA Program Management Council (PMC) actions and will continue to do so.

The NOAA-NASA PMC KDP II review and decision process decided that given the priority placed on minimizing gaps in geostationary coverage and the progress the program has made to date, the highest potential for maintaining constellation availability is to aggressively manage schedule towards the October 2015 planned Launch Readiness Date.

As a part of the schedule management activities, the program is working to improve the October 2015 schedule confidence. For example, in the spacecraft area, the program has increased the budget liens and threats to support additional Integration & Test (I&T) shifts, identified more efficient testing approaches to free up additional schedule margin, and established an increased management focus with the spacecraft contractor to status and oversee I&T activities. In the ground areas the program has identified a number of areas where capabilities can be deferred until after launch. The approach for implementation might involve deferring the installation and/or the test and/or testing and acceptance of the associated hardware and software. As the ground system hardware and software completes development, the program is working with the ground contractor and factory I&T to identify the capabilities posing the greatest schedule risk and how the current I&T plans need to be changed to mitigate those risks, including deferral actions. The program has also added liens and threats to support additional ground system contractor staffing and has worked with the ground segment contractor to increase the schedule reporting and management oversight.

Recommendation 2: “Keeps stakeholders and users informed of any trade-offs that have to be made to meet the launch date.”

NOAA Response: NOAA concurs. The GOES-R Series program has an active process for communicating program status to stakeholders and soliciting their input. The GOES-R Series program has a communications plan that describes how external stakeholders will be notified of GOES-R progress, status changes, and other relevant activities. This plan was developed in concert with, and as a part of, a more comprehensive “User Readiness Plan” which contains three primary components: a user systems readiness plan, a user training plan and the communications plan. Since the three components are closely tied together, the communications plan development took place in parallel with the user readiness plan.

GOES- R Series program interaction with users takes place at meetings such as the EUMETSAT Meteorological Satellite Users Conference, the NOAA Direct Readout Conference, the Algorithm Working Group (AWG) annual meeting, the GOES-R Risk Reduction Meeting, and the Algorithm Development Executive Board (ADEB) meeting. Additional interaction takes place at the GOES User’s Conference, the Annual American Meteorological Society (AMS) Meeting, sponsor meetings (including DoD and Canada) at the Cooperative Program for Meteorology Education and Training (COMET), and the annual GOES-R status briefing to the Office of the Federal Coordinator for Meteorology (OFCM).

As an example of GOES- R Series program interaction with users, information on the removal of the option 1 latencies and option 2 products was briefed to the NOAA-NASA PMC and to the GOES-R Ground Segment Steering Group. Information was also provided to the National Weather Service participants at the June 2011 GOES-R Algorithm Working Group (AWG) annual meeting in Fort Collins, CO and at the July 2011 GOES-R Proving Ground meeting in Juneau, AK. The topic was also covered in presentations at the EUMETSAT Meteorological Satellite Conference (Sept. 2011), the joint National Weather Association and GOES Users’ Conference Meetings (Oct. 2011), the Satellite Symposium at the upcoming annual American Meteorological Society Meeting (Jan. 2012), and will be addressed at future Direct Readout Conferences (April 2013), and on the GOES-R Series program website.

“To maintain robust systems engineering for the GOES-R Series program, we recommend that the NOAA Deputy Under Secretary for Operations”

Recommendation 3: “Directs NESDIS to report periodically to the NOAA Program Management Council on the adequacy of program systems engineering integration and NASA GSFC and headquarters system engineering support.”

NOAA Response: NOAA concurs. Current reporting to the GSFC Management Status Review (MSR) and the NOAA-NASA PMC includes reporting on the status of the program system engineering (PSE) activity. GSFC and NASA Headquarters leadership are part of the NOAA-NASA PMC and have a regular opportunity to provide their views of GOES-R PSE activities. An independent representative of NASA’s Chief Engineer participates in the GOES-R Series program’s status updates at monthly Flight Program Reviews (FPRs), which also include status of program system engineering activities.

PSE has been singled out as a program strength at the recent mission-level preliminary and critical design reviews. PSE successfully runs the key program processes such as risk and configuration management. PSE is actively managing the space-to-ground dependencies, has

instituted an inter-organizational system engineering forum that meets regularly to identify and address system engineering issues, and has actively worked to resolve issues like radio frequency (RF) compatibility testing and RF allocation for GOES-R. The GOES-R Series program will continue its reporting on the status of the PSE to the NOAA-NASA PMC.

“To limit cost overruns and improper award fees for GOES-R Flight Project contracts, we recommend that the NOAA Assistant Administrator for Satellite and Information Services ensure that NASA”

Recommendation 4: “Validates contractors’ proposals to verify that technical designs for components and subcomponents meet requirements.”

NOAA Response: NOAA concurs. NOAA agrees with the spirit of the recommendation that the government has the responsibility to limit cost overruns and to prevent improper award fees. In order to limit cost overruns and continue to make sure all award fees are proper, we will continue to effectively manage GOES-R activities in accordance with the GOES-R Memorandum of Understanding, Management Control Plan, and the applicable NOAA and NASA regulations, standards, and policies. For example, NASA’s approach, exemplified by the Geostationary Lightning Mapper (GLM) acquisition, includes a gated approach with extensive readiness reviews from initiation through concept and technology development to preliminary and final design and fabrication to integration and test, launch. This approach sets requirements for technological maturity, calls for rigorous system engineering and risk management practices, provides robust mission assurance support, and ensures sufficient schedule and budget are available. As demonstrated in the GLM acquisition, extensive use of engineering development units (EDUs) is encouraged to prove designs and identify and resolve issues prior to committing to flight model development.

Recommendation 5: “Modifies ABI and spacecraft contract award-fee structures to reduce award fee percentages in accordance with the Federal Acquisition Regulation, as well as clearly articulates how scores should be adjusted based on the magnitude of cost overruns.”

NOAA Response: NOAA non-concurs. GOES-R ABI and spacecraft award fee plans are compliant with the applicable Federal Acquisition Regulations and applicable Office of Procurement Policy directives. At the time the change was made to the FAR and NASA FAR Supplement, a Procurement Information Circular (09-13) was issued that “grandfathered” procurements awarded prior to the effective date of the FAR rule, October 14, 2009. The GOES-R award fee plan has been effective in incentivizing contractors to conduct additional focused technical reviews, make personnel adjustments that improved the contractor team, applying additional management focus to improve subcontractor and supplier performance, and change/improve processes. A specific example is the replacement of the GLM contract manager, a decision which was influenced by the GLM award fee evaluations and resulted in a much more responsive and effective performance by the GLM contractor.

Recommendation 6: “Adjusts future award fees for the ABI to be more commensurate with contractor performance, to incentivize the contractor to control costs.”

NOAA Response: NOAA non-concurs. The GOES-R ABI Award Fee method of assessing and scoring cost management and control is clear, effective, and has proven through use to incentivize the contractor. One example is the specific feedback provided to Exelis in an award fee letter criticizing their performance in building the ABI Optical Bench, which was overrun

and delivered late on the first build. In response, Exelis performed a lessons learned on the Optical Bench and put in place new tooling and build processes that made the assembly and alignment much more efficient and resulted in subsequent optical benches coming in under the allocated cost.

“To improve contract administration and management, we recommend that the NOAA Deputy Under Secretary for Operations”

Recommendation 7: “Directs the development of a policy for managing undefinitized contract actions and includes Federal Acquisition Regulation guidance on definitizing change orders in the shortest practicable time.”

NOAA Response: NOAA concurs. NOAA will develop a policy to manage the definitization of change orders in the shortest practicable time. NOAA’s Acquisition and Grants Office will collaborate with the GOES-R Series program and other entities involved in the definitization process to specifically outline procedures and set milestone time limits to further structure the time allotted for definitization. To effectively reduce the timeline for the definitization of a “change order,” NOAA shall develop the policy to incorporate the responsibilities of each entity involved. The guidance shall supplement the Federal Acquisition Regulation guidance related to Cost Liability Limits and time limits allotted for definitization. Contract action metrics have been added to monthly GSFC MSR reporting.

Recommended Changes for Factual and Technical Information

1. Page 2, third paragraph,:

Suggest replacing the existing paragraph with the following:

“The GOES-R Series program is a collaborative effort between NOAA and the National Aeronautics and Space Administration (NASA) to develop and acquire the GOES-R Series system. NOAA defines requirements, is responsible for overall program integration and management, provides funding, procures ground segment elements, and operates the deployed GOES satellites. NASA procures and launches the satellite, provides program mission assurance and system engineering resources and expertise, provides satellite system acquisition and development expertise and functional support, and assists NOAA with program integration and management. Program activities occur at the co-located Program and Project Offices at Goddard Space Flight Center (GSFC), Greenbelt, MD.”

The suggested wording is from the GOES-R Series program Management Control Plan description of the NOAA-NASA collaborative and integrated approach.

If not accepted, we suggest revisions 2, 3, and 4 below

2. Page 2, third paragraph, 2nd Sentence

“... and the remote backup unit for backup of these functions.”

Suggested revision: “... of mission-critical functions.”

The remote backup unit is not required to perform all functions referenced in the preceding text.

3. Page 2, fourth paragraph, 3^d sentence

To provide proper context for the ABI lifetime benefit, we recommend including a citation that

references the source used to support this sentence.

4. Page 2, footnote 5:

Suggested revision: "The independent review team was a NOAA-appointed team of senior satellite, ground, and operations acquisition experts that assessed ..."

Note that there is no longer a GOES-R-specific IRT.

5. Page 3, first paragraph, 1st sentence:

NOAA agrees with OIG suggested change, with slight modification, to:

"In May 2012, after the mission preliminary design review (MPDR), NOAA executives (in concurrence with NASA and the standing review board) gave the program approval to continue on course with its efforts to meet the October 2015 launch readiness date. *The Decision authority acknowledged that the confidence level in meeting this deadline is less than 50 percent. The NOAA/NASA Council, decision authority, and System Review Board agreed that this course of action had the highest potential for maintaining GOES constellation availability.*"

6. Page 3, first paragraph, line 6:

"However, the standing review board's August 2012 assessment of the initial mission critical design review (MCDR) expressed uncertainty about whether the program could meet the launch date because of schedule delays and the unavailability of a detailed integration and test schedule."

The Standing Review Board (SRB) stated they could not assess the programmatic status of the program given the uncertainty of the existing, detailed I&T schedule. The SRB did not characterize the launch date as uncertain; they characterized their ability to assess the schedule as uncertain. Actions were taken to update the schedule prior to completing the MCDR. Based on the MCDR II review, the SRB noted that the schedule was aggressive, but that the program was proactively managing schedule risk and optimally planning the program to maintain the earliest possible LRD.

Suggested rewrite: "The Standing Review Board (SRB) was unable to complete the August 2012 MCDR assessment due to a recent spacecraft subsystem technical issue. The issue required the detailed spacecraft integration and test schedule to be updated. Once these updates were incorporated, the MCDR was completed. The SRB noted that while the schedule was tight, the program was proactively managing schedule risk. The program had done a good job of planning the program so as to maintain the earliest possible LRD."

7. Page 4, paragraph 2, Sentence 2

"Program systems engineering has been strengthened; however, early in system development, it contributed to ground system schedule compression and increased costs."

The Program Systems Engineer neither influenced the ground system schedule nor the cost in the early development. As commented on later, the IRT suggested we assess how we use the PSE. That is, they perceived that we were using the PSE in a "coordination" role vice an "integrator" role, and they felt that decision needed reassessment.

Suggested rewrite: "Program Systems Engineering has been strengthened; however, to ensure continued strength, NOAA should periodically report on Program Systems Engineering adequacy."

8. *Page 4, second paragraph:*

Because this paragraph is a summary of the findings in the remainder of this section, recommend it be rewritten so that it is consistent with the resolution of the following detailed comments.

9. *Page 4, fourth paragraph, line 5:*

“NASA’s Joint Confidence Model, which is used to assess cost, schedule, and risk to predict the likelihood of a program’s success, has indicated that GOES-R is unlikely to be ready for launch by October 2015. The agency has given GOES-R only a 48 percent chance of an on-time launch”

The joint cost and schedule confidence level (JCL) is a programmatic assessment approach which NASA requires projects to use for baseline schedule assessment. The model is a GOES-R Series program JCL model. The assessment determined there was a 48 percent chance of meeting October 2015 LRD and a 52 percent chance of not meeting the planned launch date. Given the nearly identical confidence levels, unlikely is an inaccurate characterization of 48 percent positive confidence condition.

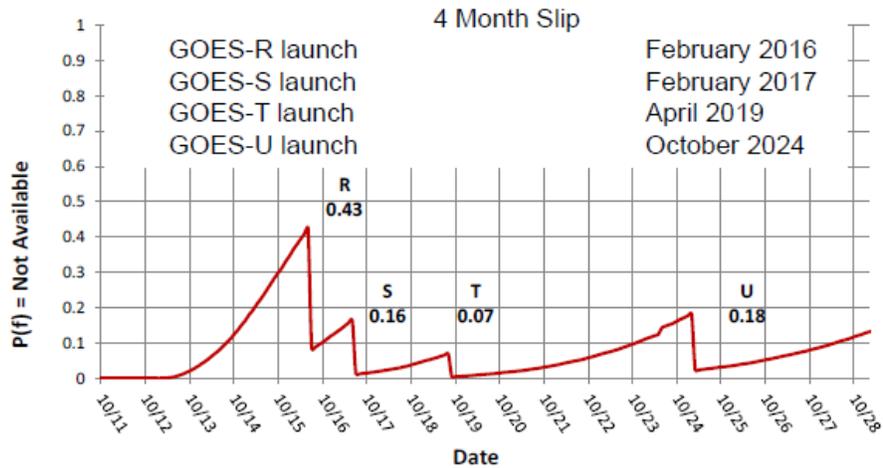
Suggested rewrite: “The GOES-R series program conducted a joint cost and schedule confidence level (JCL) assessment to determine cost and schedule confidence levels in establishing the GOES-R Series program’s baseline at Key Decision Point II (KDP-II). The JCL program assessment indicated that there is a 48 percent confidence of achieving the planned October 2015 launch readiness date for the GOES-R satellite.”

In subsequent discussions with the OIG, the OIG offered a proposed change that still uses the incorrect wording “NASA’s Joint Confidence Model”

10. *Page 4, last paragraph:*

“If GOES-R launches on time, the GOES constellation (GOES-13, -14, -15) will still be at an unacceptable level of risk—only 63 percent probability of having two imagers in operation, whereas NOAA’s minimum acceptance level is 80 percent. The NASA model projects that GOES-R is more likely to launch in February 2016, increasing the risk of a two-imager gap by 3 percent, leaving only a 60 percent chance of having two imagers in operation.”

It is the GOES-R Series program JCL model. The correct two imager probability for the baseline is 64 percent. If the GOES-R LRD is February 2016 the increase in risk of two imager gap is approximately 7 percent. See probability of Gap in two imagers curve below for GOES-R launch in February 2016. Also, the three GOES satellites referenced represent the three latest on-orbit satellites but may not be what is operational when GOES-R is launched. Therefore they should not be referred to as the future operational constellation.



Suggested rewrite: “The GOES constellation is projected to be at an unacceptable level of risk by October 2015 (projected GOES-R LRD)—only 64 percent probability of having two imagers in operation, whereas NOAA’s minimum acceptance level is 80 percent. If GOES-R launches in February 2016, the GOES-R Series program’s JCL 70 percent confidence date, the risk of a two-imager gap increases by about 7 percent more than the October 2015 date, leaving only a 57 percent chance of having two imagers in operation.”

11. Page 5, second paragraph, line 5:

“...reliability of hurricane forecasts was temporarily degraded because some GOES-14 data would not have been available for use until a 30-day test period was completed.”

It might be said that hurricane forecasts were potentially subject to degradation during that period; however, in the absence of Atlantic basin hurricanes during that period, it is an overreach to claim that they were degraded in terms of reliability or accuracy. GOES-14 data were fully available because GOES-14 had been taken out of storage for testing. There was no special testing required to use the imagery for forecasting purposes; however, GOES-14 was in storage location, west of the GOES East operational position. It initially would not have provided complete imagery coverage as far to the East as operationally required until the migration of GOES-14 to the GOES East longitude had been achieved, which takes about 30 days.

Suggested rewrite: “...reliability of hurricane forecasts was potentially subject to degradation because GOES-14 data would not have provided complete imagery coverage as far to the East as operationally required until the migration of GOES-14 to the GOES East longitude had been achieved, after about 30 days.”

12. Page 5, third paragraph, first line:

“Because there have been significant uncertainties with the GOES-R schedule, funding, and operational capability.”

Since 2007, the program’s capability, projected cost and schedule have been very stable and consistently managed. The only change in that history of stability was a slip in launch date due

to the spacecraft contract protest which slipped the projected GOES-R launch date from April 2015 to Oct 2015; this occurred in 2009. At KDP-II in 2012, the Program was lauded for maintaining its baseline capability, schedule and life cycle cost over the previous five years. The Program has documented this consistency in the annual satellite status report to Congress and in the Baseline report submitted to Congress after KDP-II.

Suggested revision: Delete the sentence.

In subsequent discussions with the OIG, the OIG offered a proposed change which states that “Because there have been significant uncertainties with the GOES-R schedule, funding, and operational capability recently.” This still describes an uncertainty that we believe is incorrect. Lifecycle cost projections have been stable since 2007 and launch readiness dates since 2009. We still have the same funding, LRD and capability that we had at the KDP in 2012.

13. Page 6, first finding:

“Schedule slips and Potential Reduction in Testing Activities Raise Concerns About GOES-R Readiness to Launch”

Because GOES-R is not yet ready to launch, we assume the purpose of this statement is to express concerns about the GOES-R Program meeting its Launch Readiness Date commitment. The cited phrase also seems to imply that hypothetical test reductions could affect on-orbit performance. While a lack of testing does not directly reduce on-orbit performance, perhaps what is meant is that the hypothetical test reductions might miss a problem that would degrade on-orbit performance. In conclusion, we are uncertain about the exact nature of this finding and we would appreciate clarification.

Suggested rewrite: “Schedule slips raise concern about GOES-R meeting Launch Readiness Date commitment.”

14. Page 6 first paragraph:

“In February 2012, at the MPDR, management identified the core ground system as the project to closely monitor for the next 3 years because it was most likely to threaten the launch date. By June 2012, the schedule reserve for the entire program had significantly decreased to below the recommended level for meeting the launch readiness date¹¹ and the Flight Project is now on the program’s critical path. In August 2012, at the initial MCDR, the program office reported significant delays with fabricating Flight Project components—a 6-month delay for the ABI, 4 months for the GLM, and 3 months for the spacecraft.”

Note that the “core ground” should be identified as a contract, rather than a project.

We have never identified the core ground contract as most likely to threaten the launch date. In our initial critical path analysis, activities within the core ground contract showed up as on the critical path to launch; however, we stated that we considered the spacecraft build as the biggest threat and believed this would become the critical path once detailed spacecraft hardware manufacturing schedules were developed. This is indeed what has happened.

The referenced abrupt drop in reserve was caused by a significant slip of the spacecraft core structure from a subcontractor to the spacecraft prime contractor. In response to that problem, we have accelerated work (the structure was then delivered a month early in December 2012) and as of Jan 2013, we have 51 days of schedule reserve above the guideline for the Program

Suggested rewrite: “Delays in numerous development activities and the drop in schedule reserve below guidelines in June 2012 raise concerns about the program’s ability to meet baseline launch date for GOES-R.”

15. Page 6, first paragraph, line 5:

“... and the Flight Project is now on the program’s critical path.”

The correct reference is to the spacecraft, rather than the Flight Project. The Flight Project includes spacecraft, instruments, and the launch vehicle.

Suggested rewrite: “...and the spacecraft is now on the program’s critical path.”

In subsequent discussions with the OIG, the OIG offered a proposed change which states “The spacecraft replaced the core ground system on the program’s critical path.”

16. Page 6, second paragraph:

“At the initial MCDR, program management had not presented its detailed plan for system integration and test and the standing review board was concerned about fitting the plan into a constrained schedule.”

Suggested rewrite: “At the initial MCDR the Standing Review Board (SRB) was unable to complete their programmatic assessment due to a recent spacecraft subsystem technical issue that required the detailed spacecraft integration and test schedule to be updated. Once these updates were incorporated, the MCDR was completed. The SRB noted that while the schedule was tight, the program was proactively managing schedule risk and that the program had done a good job of planning the program so as to maintain the earliest possible LRD.”

17. Page 6, second paragraph, line four:

NOAA agrees with the proposed change OIG offered in discussions, which states “NOAA needs to inform stakeholders of any cutbacks to test activities needed to meet the launch date that could result in changes to operational performance.”

18. Page 6, third paragraph, line 3:

“Available funds are scarce due to significant program cost increases of over \$1 billion¹⁴ and budget adjustments in previous years amounting to \$264 million;¹⁵ however, the program is not expected to exceed its lifecycle budget of \$10.9 billion.”

Life cycle cost projections have been consistent since 2007. The \$71 million Congressional reduction in FY11 have reduced available funding causing delays in a number of activities (e.g. slipping GOES-S work) and cancelling other activities (e.g. cancellation of ground options for some products and improved product latency.) The funding constraints that the program is working under in FY 2013 are the result of that budget reduction. The contract growth is within the planned budget requests and is not a significant factor in current low level of reserves. If the \$71 million Congressional Budget reduction had not occurred, there would be adequate levels of budget reserves.

Suggested rewrite: “Even with the full FY2013 budget request, the program is faced with funding constraints in FY 2013 that are the result of prior year budget reduction and rephasing actions amounting to \$264 million.”

19. Page 6, footnote 14:

“Cost increases...”

This statement is inaccurate.

Suggested rewrite: “Contract value increases...”

20. Page 7, section C, first paragraph, second sentence:

“NOAA expects the GLM to increase tornado warning lead time significantly, from 13 to 20 minutes”

The research cited is preliminary. It only pertains to one type of convective storm that predominates in Southwestern US, and the 13-20 minute figure is best case indicator (one indicator) and tornado warnings depend on many indicators. NOAA believes research is very promising and could eventually lead to a lead-time improvement.

Suggested rewrite: “Research and testing has demonstrated the GLM potential for improvement in tornado warning lead time and false alarm rate reduction.”

21. Page 7, second paragraph, line 5:

“Additionally, in 2011, GOES-R management decided to terminate two core ground system contract options it had initiated in 2010—the option to complete the full set of environmental data products planned for the GOES-R series (only half of the planned products will be developed¹⁸) and the option to improve the speed of processing of incoming instrument data. NOAA is deferring development of the full set of data products to a later date. The agency terminated these options, valued at \$51 million, due to budget constraints.”

The paragraph as written does not describe the full context and omits many of the implications of decisions.

Suggested rewrite: “In 2007, the GOES-R Series Program, working with the user community, prioritized the system end products and latency requirements to support the Program’s life cycle cost baseline. Lower-priority products were removed from the program baseline, but they were included as a contract option. The planned improvements to product latency were reduced, and a second contract option was structured to add back the improved latency. The intent was to exercise the options, despite not being in the program baseline, at a later date if the Program determined the ground contractor’s performance would be sufficient to free up reserve funds to pay for the options. Neither the key performance parameter products (Level 2+ Cloud and Moisture Imagery) nor any of the direct broadcast products were impacted by the removal of the options. Approximately one year after contract award, the program determined the ground contractor’s performance allowed the exercise of these options. However, due to the FY 11 Congressional reduction of \$71 million, and the resultant cash flow problem in FY 11 and 12, the options were terminated before any significant expenditure of funds occurred. These additional products and/or the enhanced latency could be implemented post-launch by the Core Ground Segment development contractor, in-house using a government team, or by a third party. The science for the products has been developed which makes implementation more feasible.”

22. Page 7, third paragraph, line 3:

“There are numerous factors—a pessimistic model projection, diminishing schedule reserve, and funding shortages—that threaten the October 2015 launch date.”

It is important to explain that an analytical JCL model cannot threaten the launch date. Schedule reserves are above the minimum guidelines. The only funding shortfalls threatening the schedule are the potential full year FY 2013 continuing resolution and/or sequester reduction.

Suggested rewrite: “The potential funding shortfall in FY 2013 due to a full year continuing resolution and/or sequester budget reduction threaten the October 2015 launch date.”

23. Page 8, second paragraph, line 2:

“However, program status information is not always kept up-to date or may not reveal issues with the program.¹⁹”

The program disagrees with this assessment. – see our comments on footnote 19. NOAA considers GOES R to be a model of an open and transparent program.

Suggested revision: Delete sentence.

24. Page 8, footnote 19:

¹⁹Examples of outdated status and other information that does not reveal the full breadth of program issues include (1) the GOES program did not update core ground system schedule variances for the Office of Management and Budget information technology dashboard; (2) the earned value management reports reflect only contractor cost overruns, not government-directed cost growth; and (3) the program’s life-cycle budget masks the impact of cost growth because substantial budget reserves are included to account for risk, as recommended by the NOAA independent review team in 2007.”

The program believes that as written, footnote 19 does not adequately take into account the following critical information:

- 1) All Dash board submissions have been made on time by the program. There was an occasion an OMB system error did not capture the GOES-R update. This error was noted by the DoC CIO and OMB updated the input. The CIO chain has confirmed GOES-R’s compliance and success in IT dashboard reporting.
- 2) The earned value reports reflect all authorized work including government directed changes. Government directed changes are included in the earned value baseline, they are not variances. This is consistent with the use of earned value throughout the industry.
- 3) The program maintains and shares data about contract costs including cost and scope increases. These contract data are briefed to NESDIS and NOAA CFOs on a monthly basis. In addition, we provide additional reports to the Joint NOAA and NASA PMC in order to keep management informed on contract growth. These reports include data about the overall allocated budget; the current estimate at completion; and growth thresholds (5% and 10%) for each contract and for overall government functions. As a point of clarification, the life cycle cost and associated budget profile are intended to address risks and issues including contract cost growth, and all contract cost growth is within the defined life cycle cost baseline.

In subsequent discussions with the OIG, the OIG offered a proposed change which states “Examples of outdated status and other information that does not reveal the full breadth of

program issues include (1) the GOES program did not update core ground system schedule variances for the Office of Management and Budget information technology dashboard; (2) and the earned value management reports reflect only contractor cost overruns, not government-directed cost growth. However, this is still inaccurate.

Suggested revision: Delete footnote.

25. *Page 8, fourth paragraph, line 2:*

“From contract award in May 2009 until January 2011, GOES-R Series program management and its systems engineering organization had difficulty coordinating delivery of flight information necessary for core ground system development. The delay compressed the core ground system development schedule, and the plan to resolve the problem substantially increased core ground system costs. This delay was exacerbated by a lack of program systems engineering leadership.”

Flight, Ground, and Program Systems Engineering (PSE) were working hard together to reach a common understanding of what was needed in terms of intersegment data deliveries. Lack of design maturity within both Flight and Ground, which is typical for that stage of development, made it difficult to define the data needs with sufficient specificity. The point at which it became clear that an issue existed was at the Guidance, Navigation, and Control (GN&C), Flight Software (FSW), and Command and Data Handling (C&DH) subsystem PDRs in December 2010. Ground engineers attended those reviews with expectations that were not met. The delay was not lack of PSE leadership, but rather how closely synched in time the spacecraft and ground core contracts were, caused primarily by the protest-induced start of the spacecraft contract.

Suggested rewrite: “As both the spacecraft and ground core contractors moved toward their respective Preliminary Design Reviews (PDRs), planned for early 2011, those teams, in conjunction with Program Systems Engineering (PSE), sought to ensure that a viable plan was in place to provide the spacecraft design data need by the ground core contractor to mature their design. As spacecraft subsystem PDRs were conducted in December 2010, it became apparent that ground needed data more mature than that appropriate for a spacecraft subsystem PDR. The parties immediately began working together to resolve the situation, which ultimately led to a replan of the ground core development, compressing the development schedule and increasing cost substantially.”

26. *Page 9, third paragraph:*

“However, due to NOAA’s plan to award the contracts only 2 months apart (and a subsequent protest that delayed the award of the spacecraft contract by 8 months), not enough time was left for the spacecraft contractor to plan or develop deliverables before the ground contractor needed them.”

NOAA was precluded from awarding the two major contracts by the Department of Commerce due to uncertainty on how to perform the Key Decision Point I. After much dialog and significant criticism by the Independent Review Team, the Department delegated the KDP-I decision to NOAA and the GOES-R Series program was allowed to release the request for proposals for the ground and spacecraft contracts. This complexity points to the difficulty of assigning fault to one specific agent.

Suggested rewrite: “However, the award of the ground and spacecraft contracts only 2 months apart (and a subsequent protest that delayed the award of the spacecraft contract by 8 months)...”

27. Page 9, box (“The Re-Plan”):

As written, the last line uses the term “idle time.” In actuality, the contractors’ activities during these periods would include work on necessary priorities. Otherwise, they would reduce staff. The real risk faced by the team would be performing work with less than mature information, resulting in inefficiencies.

Suggested rewrite: In subsequent discussions with the OIG, the OIG offered a proposed change which states that “This approach aims to utilize contractor time efficiently and reduce rework.” This rewrite is acceptable.

28. Page 9, footnote 23:

It is not accurate to say “simultaneous designing, developing, and testing large blocks of the system.”

The text is an adequate description of the situation but the supporting footnote is inaccurate.

Suggested revision: Delete footnote

In subsequent discussions with the OIG, the OIG offered a proposed change which states The fundamental problem with the contractor’s waterfall approach was that the ground system was divided in large development blocks, each requiring a substantial amount of flight information. However, this is still an inaccurate characterization of problem.

29. Page 10, item B:

“Prolonged Wait to Re-plan Core Ground System Increased Schedule Risks”

We do not agree that there was any “prolonged wait to re-plan” the core ground system. The re-plan actually allowed us to maintain existing schedule as opposed to keeping to the original plan which would have delayed completion of the ground system significantly

The text in this section of the draft report does not accurately reflect the sequence of events associated with the re-plan. It is impossible to definitively identify a priori all the implementation level information needs, their associated need dates, and their availability dates. What was recognized and reflected in Government-Furnished Property lists were the general items and categories of information and the best available planning dates based on Government experience and contractor proposals. As the ground contractor revealed the details needed for its development, we established the Giver Receiver Intersegment Database to status and manage this area.

The potential disconnects between the spacecraft and ground contracts in terms of dependencies and availabilities were recognized early in the execution of the spacecraft and ground contracts. They were caused by the protest delay of the spacecraft contract. However, it was not until the spacecraft and ground contracts had progressed to a level of maturity subsequent to their PDRs that the extent of the impacts was well understood. At that time, it was possible to begin consideration of alternative approaches to resolve the dependencies.

In addition, the recognition of the need to re-plan and the definition of the re-plan occurred prior to the development activities. Direction to proceed with the re-plan was accomplished in time to

keep the core ground development on schedule. Specifically, the re-plan did not affect the Ground Segment Preliminary Design Review schedule. It did shift the Critical Design Review to the right by three months to account for additional design maturation associated with system architecture and design changes rather than the shift to the incremental development approach.

Suggested revision: Delete finding.

In subsequent discussions with the OIG, the OIG offered a proposed change which states that: to finding title which states “Prolonged Wait to Re-plan Core Ground System **Created New Schedule Risk.**” However, this is inaccurate as described in explanation above. There was no prolonged wait.

30. *Page 10, item B, 2nd paragraph, 1st sentence:*
“... including the Systems Engineering Organization ...”

There is no such organization.

Suggested rewrite: “... including Program Systems Engineering ...”

31. *Page 10, item B, 3rd paragraph:*
References to NOAA are incorrect.

Suggested rewrite: Replace “NOAA” with “the Program” or “GOES-R”.

32. *Page 10, item B, 5th (last) paragraph, 1st two sentences:*
“Although the re-plan provided flexibility to adjust the ground system development schedule to variability in the Flight Project’s delivery schedule, it did not map all flight information delivery dates to ground need dates. As a means to better track interdependencies, program systems engineering developed the Giver–Receiver Inter-Segment Database to map out Flight and Ground Project dependencies and began a weekly update process to handle newly discovered dependencies and schedule changes.”

Flight, ground, and PSE all recognized, at that point in the program, it was not possible to define the information needs with sufficient specificity to eliminate any future disconnects. The GRID process was put in place before the re-plan was completed.

Suggested rewrite: “Given the relative immaturity of both spacecraft and ground core designs, the program recognized the need to develop, in conjunction with the re-plan, a process for identifying and obtaining agreement among the program elements for intersegment data needs as designs matured and needs became clearer. As a means to better track interdependencies, program systems engineering developed the Giver–Receiver Inter-Segment Database to map out Flight and Ground Project dependencies and began a weekly update process to handle newly discovered dependencies and schedule changes.”

33. *Page 10, item C:*
“Lack of Program System Engineering Leadership Prolonged the Coordination Problem”

The spacecraft-to-ground dialogue through technical interchange meetings began immediately after the contracts were awarded. These meetings, which included Program System Engineering (PSE), initiated discussions to define space-to-ground dependencies and their need and

availability dates. When it became clear that a more structured approach would be required to status and manage space-to-ground dependencies, the Giver Receiver Intersegment Database approach was put in place by PSE. The report seems to infer that there was, from day one, a definitive and complete solution to the space-to-ground dependencies that was not put in place because of prolonged inattention. The natural space system dependency process starts with categories and planning dates for needs and availabilities and then grows. Categories grow to tens and hundreds of discrete information items that individually mature starting with approaches, formats and ranges evolving to preliminary, final, and updated values, all with need and availability dates.

Suggested revision: We suggest that this be deleted and that any remaining relevant points be combined with the previous finding. This “combined finding” could address timing of major ground and spacecraft development efforts.

34. Page 11, second paragraph, second line:

“The NOAA Independent Review Team, at a key decision point review in July 2010, recognized that the program systems engineering organization lacked leadership and support for the Ground and Flight projects. It also noted that GOES-R did not receive adequate systems engineering support from NASA GSFC and its headquarters.”

The actual IRT recommendation reads: “The degree of PSE ‘coordination’ versus ‘integration’ should be reexamined and re-set by program management with the assistance of Goddard systems engineering leadership.” This finding had to do with how GOES-R management was using PSE (i.e., in a “coordination” vice “integration” role) and suggested we work with NASA Systems Engineering leadership to clarify responsibilities/activities in order to ensure successful end-to-end system integration. The IRT did not imply that the PSE lacked leadership or that GOES-R has not been getting adequate systems engineering support from NASA.

Suggested rewrite: “The NOAA IRT, at a key decision point in July 2010, emphasized that PSE is a critical function and is key to successful program outcome. The IRT recommended that GOES-R management clearly define and support the PSE integration role.”

35. Page 11, third paragraph:

As we were moving from formulation to design/development, GOES-R management worked with Goddard systems engineering management to find a new lead PSE with the skill set needed for this next phase of the program. In addition, the GOES-R systems engineering team developed the Giver-Receiver Inter-Segment Database, not NOAA.

Suggested rewrite for item C: “In January 2011, a new lead program systems engineer was put in place who exercised the required leadership in integrating Flight and Ground projects. Subsequently, The GOES-R system engineering team developed the Giver-Receiver Inter-Segment Database and instituted weekly database updates. With the re-plan’s aggressive ground system schedule and its dependency on maturing spacecraft design; NOAA needs to monitor program systems engineering integration and NASA support activities to reduce risks of performance degradation, cost overruns, and launch delays.”

36. Page 11, fourth paragraph:

This paragraph is a summary of the findings in the remainder of this section. Therefore, it should be rewritten so that it is consistent with our comments.

37. Page 11, fifth paragraph:

“GOES-R costs increased more than \$714 million for the Flight Project’s most beneficial instruments (ABI, GLM) and the spacecraft. Cost overruns—which occur when contractors’ incurred and planned costs exceed the expected costs of their contracts—represent the largest category (\$361 million) of these increased costs.²⁴ The ABI, GLM, and the spacecraft are currently overrunning their contracts by \$264 million, \$86 million and \$11 million respectively. See figure 3, below, for a depiction of cost for the spacecraft, ABI, and GLM to date.”

The paragraph should state that cost increases were contract value increases. Additionally, the dollar amounts should be corrected.

Suggested rewrite: “GOES-R contract costs increased more than \$689 million for the ABI, GLM and the spacecraft. Cost overruns, which occur when contractors’ incurred and planned costs exceed the negotiated costs of their contracts, represent the largest category (\$361 million) of these increased costs. The ABI, GLM, and the spacecraft have currently overrun their contract costs by \$264 million, \$86 million and \$11 million respectively. See figure 3, below, for a depiction of estimated contract costs for the spacecraft, ABI, and GLM to date.”

38. Page 12, Figure 3:

Please correct data in figure with data in table below:

<u>Contract</u>	<u>Contract Price</u>	<u>Contract Mods</u>	<u>Overrun</u>	<u>Total</u>
SC	\$ 779	\$ 107	\$ 11	\$ 897
ABI	\$ 329	\$ 153	\$ 264	\$ 746
GLM	\$ 97	\$ 64	\$ 86	\$ 246
Total	\$ 1,205	\$ 324	\$ 361	\$ 1,889

39. Page 13, item A:

“Contract Award Prices Were Significantly Less Than Program Estimates”

GOES-R development activities involve a degree of technical and programmatic uncertainty. The government includes margin in its budget and schedules, operates a comprehensive risk management process, and attempts to incorporate prototyping, engineering development units, and early testing to anticipate, identify, and mitigate the impacts of these realities. Given the upfront expense and schedule necessary to lessen this uncertainty in space systems, it is unrealistic, especially in a competitive situation, to attempt to accomplish this uncertainty reduction prior to awarding the development contract.

The GOES-R approach was to establish an 80 percent confidence life cycle cost estimate and to validate it with an independent cost assessment. The value of the awarded contracts was the result of the competitive contracting process. Minimizing the growth of the contracts to stay under the 80 percent life cycle cost estimate in the face of technical issues, the annual appropriation process, and interdependencies of multiple contracted activities is the challenge of large system acquisitions.

Suggested rewrite: We recommend corrections to reflect our explanation above.

40. Page 13, item A, last two sentences:

“Indeed, as the projects proceeded, significant cost increases and budget reductions eroded the reserves. The program reported, in November 2012, that program reserves for FYs 2012 and 2013 are below NASA recommended levels.”

These sentences imply GOES-R low reserve levels are attributable to the contract cost growths cited, which is not true. The GOES-R life cycle cost and the associated budget includes funds for the cost growths. The low reserve levels are due to the FY11 Congressional budget reduction.

Suggested revision: Delete sentences.

41. Page 14, item B:

“Technical Evaluation of GLM Design was Inadequate” and “Had NASA performed sufficient upfront validation of plans and designs including parts, other hardware, and supporting software as part of its evaluation of contractor proposals, these issues may have been identified sooner and the associated overruns reduced or eliminated.”

The process used to evaluate the design of GLM was the same process employed by NASA on other instrument developments. The budget for the instruments, as with the other elements of GOES-R, reflects a government 80 percent cost estimate to provide for the cost estimating uncertainties, issues, and risk inherent in these types of developments. The independent estimate of the GLM reflected its state of technical maturity. The process of requirements reviews followed by a series of design reviews with increasing fidelity supported by engineering development units is the normal process by which the initial mission, functional, and performance requirements and designs are matured, tradeoffs made, and engineering and environmental risks identified and retired. All these efforts are intended to ensure that the flight hardware cost, schedule, and performance development risks are minimized and that the fielded instrument performs on orbit as required.

Suggested revision: Eliminate this finding.

42. Page 14, item C:

“Award Fees Did Not Effectively Incentivize Exemplary Performance or Sufficient Cost Control”

Repeated references give an impression that what is being done regarding the GLM, ABI, and spacecraft award fees is being done by NASA exclusive of NOAA. This is incorrect. For the instruments, the Performance Evaluation Board (PEB) is chaired by the Flight Project manager or deputy project managers and the Fee Determining Official (FDO) is the Director of the Program and Projects Directorate (Code 400). NOAA program and project officials are voting members of the PEB and the PEB evaluation is reviewed by the GOES-R program as is the draft FDO award letter. For the spacecraft contract, the PEB is chaired by the GOES-R System Program Director (SPD) and is responsible for the draft FDO award letter.

An award fee is intended to be both subjective and objective in order to give the government the ability to adjust awards to accommodate evolving contract circumstances and priorities and more effectively motivate contractor performance. The inherent nature of aerospace instrument development does not lead to a formulaic, strictly objective evaluation process. Performance monitors by design are intended to be area experts who are closely following their assigned areas. The PEB members are more senior individuals who are expected to assimilate

performance monitor inputs and other applicable contractor performance information to make award recommendation to the FDO in accordance with the criteria in the award fee plan.

Without understanding the specifics of the OIG team evaluation, it is difficult to comment on the assessment that there are \$8.8 million questioned costs across four ABI award fee period awards. The GOES-R management team's review of the award letter narratives, scoring, and dollars awarded shows no inconsistencies with the ABI award fee plan. GOES-R experience based on many years of GOES-R instrument, spacecraft, and ground award fee determinations (~60 award fee evaluations) is that the current award fee structures and process are clear, effective, and have been proven through use to properly incentivize the contractors.

Suggested rewrite: Without a better understanding of the specifics of the issues or concerns underlying the finding descriptions, it is difficult to provide a constructive suggestion.

In subsequent discussions with the OIG, the OIG offered a proposed change which states "Because the documentation we reviewed did not demonstrate that these award fees were commensurate with actual contractor performance, we identified \$8.8 million paid across the four periods as questioned costs. Footnote - An undetermined portion of the \$8.8 million paid across these periods was provided to the contractor without adequate justification. Thus, rather than declaring a specific dollar amount as inappropriate spending, we instead question the appropriateness of the amount paid for the four periods in question."

We believe there is still some ambiguity in the report wording regarding the OIG concerns or issues with the GOES-R award fee. Based on our verbal interaction it is unclear if the concern is the fundamental process or the documentation of the process.

43. Page 15, second paragraph:

A critical point not included is that the ABI, GLM, and spacecraft award fee numerical rating systems are consistent with the NASA FAR Supplement (NFS) as it was written at the time when those contracts were awarded. The NFS rating system was updated in 2011, years after the GOES-R contract awards. Existing contracts were not required or expected to change their rating systems.

In subsequent discussions with the OIG, the OIG offered a proposed change that states "The numerical rating system should be adjusted such that contractors receive smaller percentages of award fee for non-exemplary performance." Footnote - Although the ABI, GLM, and spacecraft contract award fee ranges were in compliance with NASA guidance when the contracts were awarded (2009 and earlier), the guidance was altered in 2011 after Federal Acquisition Regulations specified ranges that were lower. It is in the program's best interest to use the new ranges because they are more likely to incentivize contractors towards excellent performance. According to the contracts' performance evaluation plans, the fee determining official has the option to alter the plans and methods for determining award fee."

GOES-R experience based on many years of instrument, spacecraft, and ground award fee determinations is that the current award fee structures and process are clear, effective, and have been proven through use to properly incentivize the contractors.

44. Page 16, first paragraph:

Changing the numerical rating system would NOT result in better contractor performance on existing contracts. In fact, the newer rating system allows the contractor to earn fee even if their performance falls in the 51-60% range. Under the older rating system, the contractor would earn nothing for this level of performance. GOES-R experience based on many years of instrument, spacecraft, and ground award fee determinations is that the current award fee structures and process are clear, effective, and have been proven through use to properly incentivize the contractors.

45. Page 16, fifth paragraph:

Without insight into the OIG's detailed analyses, it is impossible to assess why they conclude that the \$8.8M in fee is questionable. In making its determination, the PEB integrates many information sources (inputs from the CO, COTR, Project technical and business staff; contractor status reports and self-evaluation; and objective schedule and cost performance data) to make its determination. It seems likely that the OIG did not review the same information as the PEB did in reaching their conclusion.

46. Page 17, Finding IV

The NOAA/ Acquisition and Grants Office (AGO) used the Federal Acquisition Regulation (FAR) clause 52.243-2 "Changes – Cost Reimbursement" as the authority to execute all Engineering Change Proposal (ECP) change orders. The AGO is not governed by the Defense Federal Acquisition Regulation (DFAR) and did not use Undefined Contract Action authority to execute ECP's.

The timelines to definitization are a direct result of the lack of resources in the program office and AGO to support day-to-day operations, and manage the engineering change proposals. In accordance with FAR 43.204(b)(1) AGO worked and continues to work towards definitizing change orders in the shortest practicable time. Staffing resources balanced with managing mission requirements was the primary contributor in the timeline.

47. Page 17, first paragraph, last sentence:

The last sentence states, "Because of these delays, the government lost the opportunity to negotiate costs on an estimated \$79.6 million (see table 3, below)."

The program office and AGO worked together to review and accept Harris' certified cost proposal. Based on the certified proposal being accepted by the program office, and AGO justifying the proposal to be fair and reasonable, the \$79.6 million in question is cost directly associated to the revised scope. The definitization timeline did not affect the Government's ability to negotiate the costs.

48. Page 18, Section A

The size of an ECP is controlled by mission requirements and the immediate changes necessary to redirect the contractor's efforts. The size of the change order executed is a result of the magnitude of the necessary and immediate changes, other "no cost" and "low cost" changes are consolidated into an action for the purpose of efficiency and have no bearing on the timeline to definitization. The scope and urgency of the ECP is influenced by the significance of the change in scope. Reducing the size of an ECP would result in splitting required changes into multiple change orders resulting in more undefinitized actions. There is no correlation between the number of CCR's included in an ECP and the time it takes to definitize the action. The complexity of the specific CCR's and associated cost would have an effect on the definitization timeline.

Additionally, the last sentence states, "Thus, the significance of these delays is not communicated and their impact is not understood." The significance of delays was communicated to management through weekly meetings and reports, and the impact was understood.

49. Page 18, Section B

The last sentence states, "In contracts, NASA contracting officers minimized the need for UCAs by processing changes individually or in small groups on Flight Project contracts; when UCAs were necessary, NASA definitized them quickly." In response, this last sentence is of no relevance.

50. Page 18, Section C

AGO is governed by the FAR and Cost Liability Limits are not explicitly addressed. AGO established a Cost Liability Limit at 50% of a set not-to-exceed value. This practice is commonly used by Federal Acquisition Professionals and a required limitation for acquisition offices governed by the DFARS. AGO established Cost Liability Limits in-line with the DFARS to supplement the FAR's silence on the matter.