



U.S. DEPARTMENT OF COMMERCE
Office of Inspector General



OFFICE OF THE SECRETARY

***Successful Oversight of GOES-R
Requires Adherence to Accepted
Satellite Acquisition Practices***

Final Inspection Report No. OSE-18291/November 2007

Office of Systems Evaluation





UNITED STATES DEPARTMENT OF COMMERCE
The Inspector General
Washington, D.C. 20230

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MEMORANDUM FOR: John J. Sullivan
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Under Secretary of Commerce for Oceans and Atmosphere and
NOAA Administrator

FROM: Elizabeth T. Barlow

Acting Inspector General

SUBJECT: Final Inspection Report No. OSE-18291
*Successful Oversight of GOES-R Requires Adherence to Accepted
Satellite Acquisition Practices*

This memorandum transmits the final report on our review of the Geostationary Operational Environmental Satellite-Series R (GOES-R) Program. We assessed whether the Department and NOAA have established effective mechanisms for handling their expanded responsibilities to oversee and manage this complex acquisition. We found that the life-cycle process for GOES-R lacked key features of accepted satellite management practices, and this has contributed to additional cost and decreased development time. Our recommendations focus on aligning GOES-R oversight and management with accepted practices.

In responding to our draft report, the Department disagreed with certain of our findings and with our recommendation to implement procedures for GOES-R key decision point reviews based on NASA's satellite life-cycle procedure. It instead plans to use its existing procedures, suggesting the application of NASA's procedural guidance is more appropriately the role of NOAA. This being the Department's viewpoint, we believe it should delegate decision authority for key decision point C/D to NOAA, which is taking steps to improve oversight based on the NASA directive.

NOAA concurred with our findings and recommendations and is working with NASA to finalize the GOES-R Management Control Plan, which will document the approach for key decision point reviews and how NASA's satellite life-cycle procedures will be applied to all parts of the joint NOAA-NASA program.



The last chapter of the report discusses the Department and NOAA's responses to the draft report, which are included in their entirety in the appendices. We request that each organization provide us with an action plan describing the actions it has taken or plans to take in response to our recommendations within 60 calendar days of the date of this report. Please note that for certain recommendations, our discussion of the Department's response highlights topics we would like the action plan to address. Appropriate sections of the GOES-R Management Control Plan may serve as NOAA's action plan.

We appreciate the cooperation and courtesies extended to us during our review by the Department, NOAA and NASA. If you would like to discuss this report or action plan, please call me at (202) 482-4661 or Judith Gordon, assistant inspector general for systems evaluation, at (202) 482-5643.

Attachment

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SUMMARY

The National Oceanic and Atmospheric Administration and NASA are 7 years into the planning and development of the next series of Geostationary Operational Environmental Satellites (GOES)—dubbed GOES-R—which provide the United States with critical meteorological data for weather observation, research, and forecasting. For the first time, NOAA, rather than NASA, has the lead role in GOES-R’s program management and acquisition, thus giving the Department direct oversight authority for both the ground and space segments.

NOAA decided to use a new acquisition approach for GOES-R: award of a single prime contract for the space and ground segments. This was a significant departure from previous GOES acquisitions, which used separate contracts for the segments and NASA as the systems integrator. This change, coupled with the Department and NOAA’s expanded oversight and management roles, added risk to an already highly complex undertaking.

In an October 2005 action known as key decision point B, the Secretary approved the award of three contracts for program definition and risk reduction. At that time, the program cost estimate was approximately \$6.2 billion. Roughly 7 months into the program definition phase, data from the contractors and from an independent cost estimate prompted NOAA to revise projected GOES-R costs to \$11.4 billion.

An independent review team subsequently confirmed the accuracy of the new estimate and expressed concerns about the acquisition approach. At about the same time, problems with the National Polar-orbiting Operational Environmental Satellite System (NPOESS) were putting pressure on NOAA and Commerce to reassess the approach to GOES-R. In response, NOAA revised the acquisition strategy to more closely align with the traditional approach in which NOAA would acquire the ground segment and NASA would acquire the satellites and perform systems integration, but with NOAA retaining the lead role in program management and acquisition.

The changes in acquisition strategy should significantly bolster the chances of success on GOES-R. To reduce costs, NOAA has eliminated several planned satellites and instruments, bringing the cost estimate down to \$6.96 billion. However, in preparation for key decision point C/D, GOES-R scope and estimated costs are being reevaluated.

Department and NOAA’s Expanded Roles, Acquisition and Program Risks Prompt OIG Review

We assessed, among other things, whether the Department and NOAA have established effective oversight mechanisms for handling their expanded roles and are leveraging NASA’s oversight expertise. We found that the life-cycle process for developing GOES-R omitted key features of accepted satellite acquisition processes, leaving GOES-R at risk for additional problems. Our specific findings are as follows:

Lack of accepted life-cycle process left oversight officials without sufficient program information for first key decision point review. Viewed by the Department and NOAA solely as a procurement milestone, key decision point B was held at a much earlier stage in the program's life cycle than prescribed by standard satellite acquisition processes and without the benefit of a comprehensive program assessment and independent reviews that are key to the NASA model. Department and NOAA officials therefore did not have the information they needed to make sufficiently informed decisions about the path forward for GOES-R, namely, thorough and accurate evaluations of cost, schedule, technological readiness, acquisition strategy, and risks. An independent assessment of the program was commenced some 7 months after decision point B, ultimately confirming escalating cost estimates, unacceptable risks, and a flawed acquisition strategy. The changes that followed cost the agency time and money: \$17 million to redefine the overall system architecture and management structure, and a 9-month delay in the planned schedule for awarding the space and ground contracts.

GOES-R plan needs additional key decision points. In NASA and DOD space acquisition processes, decision point C occurs at the completion of preliminary design, and a separate decision point D is conducted before the system is built. Although GOES-R is roughly 2 years from completing preliminary design and even further from being ready to build the first satellite, its *final* planned decision point—decision point C/D—is expected to occur soon. The purpose is to obtain Department authorization for releasing solicitations for the multibillion-dollar space and ground segment contracts. Particularly in light of the significant program changes since key decision point B, we agree it is essential for the Department and NOAA to thoroughly review all aspects of the program in order to make well-informed decisions about how to proceed before releasing the solicitations—giving strong consideration to the findings and recommendations from the independent assessments. However, after decision point C/D, additional key decision points are needed at the end of subsequent life-cycle phases to determine GOES-R's readiness to proceed.

Procedures for decision point reviews are inadequate. Commerce lacks adequate capacity and experience for effective oversight of the highly technical and complex issues of space acquisitions and access to independent reviewers of its own. In their absence, Commerce should consult directly with NOAA and NASA independent reviewers as a key component of the decision making at each decision point. Adequate preparation and consultation with experts will help the Department identify any serious program weaknesses and determine the best path forward for GOES-R. In addition, both the Department and NOAA should use NASA Procedural Requirement (NPR) 7120.5D for satellite acquisition as guidance to better focus these reviews on the key objectives and products of each program phase.

NOAA has not adapted relevant NASA processes to GOES-R. The GOES-R memorandum of agreement between NOAA and NASA stipulates that the space segment will be managed according to NPR 7120.5D, but the agreement is silent on NOAA's use of the directive for the ground segment, nor has NOAA defined how these processes will apply to that segment or to the overall program.

The Department lacks procedures for reporting and approving major deviations from and changes to baseline. Commerce has not described its requirements and procedures for reporting and managing variances for GOES-R, or determined thresholds for holding special decision reviews when considering program enhancements.

What We Recommend

We recommend that Commerce strengthen GOES-R management and outcomes by

- Planning for additional GOES-R key decision point reviews in accordance with NPR 7120.5D guidance.
- Conducting key decision point reviews in a manner consistent with NPR 7120.5D guidance, to include identifying the decision criteria as well as the roles and responsibilities of those involved, what information will be presented for the decision, and how independent reviewers will be consulted and their assessment results used.
- If key decision point C/D or subsequent decision points are delegated to NOAA, ensuring that the Department and NOAA's authorities are clearly delineated.
- At all key decision points, ensuring any decisions made on the basis of assumptions or findings that differ from those of the independent assessments are documented and the rationale explained.
- Establishing thresholds and procedures for reporting and approving major deviations from GOES-R's capability, cost, and schedule baseline, as well as enhancements to the baseline.
- Completing and implementing the Department's major system acquisition policy.

We also recommend that NOAA strengthen GOES-R management and outcomes by

- Planning and documenting its approach for decision point C/D and subsequent decision points if the agency receives decision authority.
- Describing in the Management Control Plan or related documentation how NPR 7120.5D will be used for managing and overseeing the overall GOES-R program and ground segment, to include identifying planned deviations from NPR 7120.5D and describing the rationale for the deviations and compensating mechanisms that will be used.

Department and NOAA Response to Draft Report and OIG Comments

In responding to our draft report, the Department disagreed with certain of our findings and with our recommendation to implement procedures for GOES-R key decision point reviews based on NPR 7120.5D, suggesting that application of NASA's procedural guidance is more appropriately the role of NOAA. The Department's response does not, however, clearly define its own role in the process or explain precisely what actions it intends to take to execute that role, so we are requesting clarification in the action plan. In any event, based on the Department's position regarding NPR 7120.5D, we are persuaded that decision authority for KDP C/D should be delegated to NOAA.

NOAA responded that overall the draft report was fair and accurate and concurred with the recommendations directed to the Under Secretary for Oceans and Atmosphere.

We discuss the Department's and NOAA's responses in the last chapter of the report and include them in their entirety in appendixes I and II.

INTRODUCTION

NOAA's Geostationary Operational Environmental Satellites (GOES) have, since 1975, provided the United States with critical meteorological data for weather observation, research, and forecasting. These satellites look for "atmospheric triggers" for severe weather conditions such as tornadoes, flash floods, and hurricanes; monitor the development of storms; and track their movements. Two GOES satellites maintain a constant view of the Earth from a 22,300-mile orbit, focusing on the eastern and western United States and adjacent oceans. Three GOES satellites are currently in orbit—GOES-11 and GOES-12 are operational; GOES-13 is stored in orbit as a backup should one of the others fail.

Figure 1. GOES Satellite Constellation and Coverage



Source: NOAA

The GOES program is fully funded by NOAA, but development is shared with NASA. Traditionally, NOAA has established system requirements, acquired the ground segment (ground systems and algorithms), and operated the satellite, while NASA acquired the space segment (spacecraft, instruments, and launch vehicle and services). The instruments, satellite, and ground systems have been developed through separate contracts, with the government responsible for system-level integration.

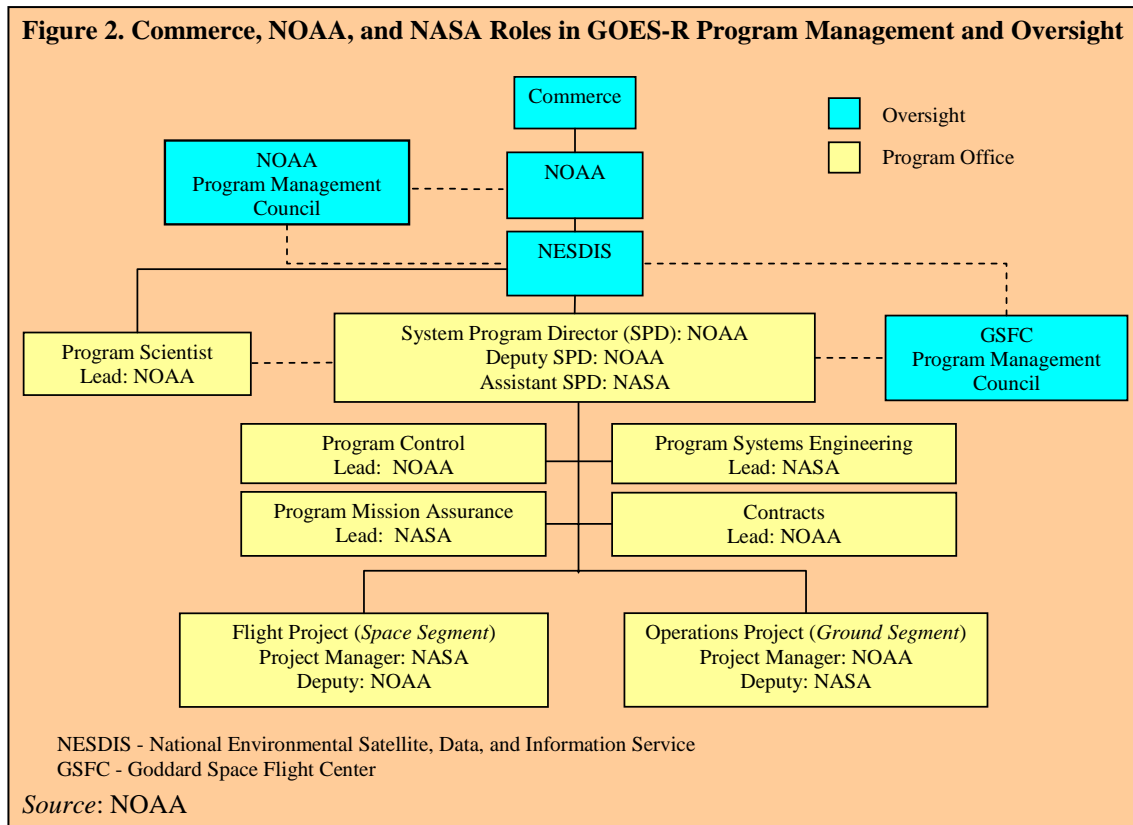
A New Direction for GOES-R

The next series of geostationary satellites—GOES-R¹—is the first technological advance in GOES instrumentation since launch of the GOES I-M series began in 1994, and is designed to be a major step forward in environmental monitoring. According to NOAA, the data transfer rate from satellite to ground station will increase from 2.1 Mbps to 120 Mbps,² and the number of environmental products will increase from 41 to 160. With original estimated costs exceeding \$6 billion, GOES-R is one of the largest and most expensive programs within the Department of Commerce.

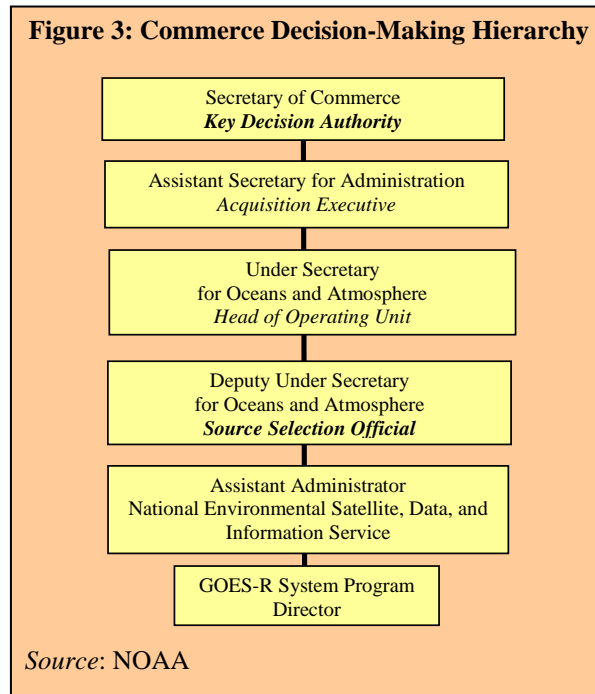
¹GOES satellites in production are given letter designations, which are changed to numbers after reaching orbit.

²Mbps is millions of bits per second.

NOAA and the Department pursue a new management and acquisition approach. Although the Department has overall responsibility for the GOES program, it has had limited decision-making authority over the space segment, the most complex and expensive part of GOES. To remedy this situation for GOES-R, NOAA and NASA signed an interim agreement in 2005 that gave NOAA the lead role in management and acquisition, thus giving the Department direct oversight authority for both the ground and space segments. As shown in figure 2, a consolidated NOAA-NASA program office for both segments was established under the direct control of a single system program director, who is a NOAA employee. Figure 3 shows the decision-making hierarchy at Commerce.



NOAA decided to use a new acquisition approach for GOES-R, similar to that used for the National Polar-orbiting Operational Environmental Satellite System (NPOESS): a single prime contract for the space and ground segments. NOAA expected the approach would improve management and end-to-end system integration, simplify the government’s interface with industry, and allow NOAA and the Department to focus on technical assessment and oversight. This significant departure from previous GOES acquisitions, coupled with the Department’s expanded management and oversight role, added risk to an already highly complex undertaking.



The NOAA program office devised a three-step management/acquisition strategy (figure 4). First would come a series of twelve industry-led contracts and internal government studies to identify potential concepts and architectures at the instrument and system levels, as well as potential risks and mitigation approaches. Next, three contracts for program definition and risk reduction would be awarded to (a) study the feasibility of meeting user requirements, (b) develop the architecture and system concept, (c) reduce risk, and

(d) establish cost, schedule, and performance baselines for the final acquisition and operation phase. Finally, one prime contractor would be selected for acquisition and operations. The contractor would finalize the system design, complete development of the instruments,³ complete the system-level integration and testing, and ultimately deploy the satellites. NOAA would award and manage this contract.

Figure 4. GOES-R Life-Cycle Phases, Key Decision Points, and Associated Contracts

Concept/ Architecture Development	Program Definition/ Risk Reduction	Acquisition and Operation
12 Contracts (\$12M)	3 Contracts (\$90M)	1 System Prime Contract (Original) (\$6 Billion)
▲		
KDP B		▲
		KDP C/D

Source: NOAA

Based on the completion of the first step's study contracts, the Department approved the acquisition plan for the next step on January 27, 2005. The program office subsequently sought and evaluated program definition/risk

³ Because the instruments have long lead times, NASA awarded and managed the contracts initially and then planned to transition them to the prime integration contractor, who would oversee completion of the instruments' development.

reduction proposals and recommended three to the Under Secretary of Commerce for Oceans and Atmosphere, who in turn conveyed these recommendations to the Secretary of Commerce. On October 4, 2005, the Secretary approved the award of three contracts. This action was known as key decision point B (KDP B). At that time, the program cost estimate was approximately \$6.2 billion, which was consistent with previously submitted Congressional budget requests for FY 2006 and FY 2007. The three contracts were awarded on October 21, 2005, for a total of \$90 million.

Escalating cost estimates prompt major program changes. In early May 2006, about 7 months after the award of the three contracts, cost estimates from the contractors and results of an independent cost estimate⁴ prompted the program office to revise GOES-R costs to approximately \$11.4 billion, nearly double the FY 2006 and 2007 budget requests. NOAA began working with the program office to find ways to cut costs. At about the same time, the agency convened an independent review team made up of former government and industry leaders in space acquisitions to assess the entire program, including the various cost estimates. The review team determined that the new estimate was more accurate than the original \$6.2 billion estimate. It recommended, among other things, that NOAA return to the traditional GOES management/acquisition approach of handling the ground segment while NASA handled the space segment because building internal capacity at NOAA for the space segment would be too difficult. The team also recommended that NOAA provide fully developed instruments to the space segment contractor, maintain a 25 percent management reserve to cover unanticipated costs, and adopt more realistic inflation indices and costing strategies.

At about the same time, problems with the NPOESS program were bringing pressure to bear on NOAA and Commerce to ensure the GOES-R strategy was sound. NPOESS—a joint project of NASA, NOAA, and Defense but wholly funded by the latter two agencies—was well behind schedule and showing staggering increases in life-cycle costs. The original estimate of \$6.5 billion had risen by more than 25 percent, triggering the Nunn-McCurdy provision of the FY 1982 National Defense Authorization Act, which required DOD to certify the program as essential to national security, redefine the program to meet acceptable cost estimates, and establish a management structure to keep costs in check.

GOES-R Instrumentation

Five instruments were originally planned for GOES-R, but NOAA scrapped the Hyperspectral Environmental Suite as cost estimates ballooned and technical issues arose:

Advance Baseline Imager. An advanced version of the current series of GOES imagers, which will have a greater number of channels, improved spatial resolution, and faster Earth coverage rates to provide more accurate measurements and improve forecasts of hurricanes, tornadoes, floods, and other severe weather.

Solar Imaging Suite. Designed to monitor solar activity, including an X-ray instrument for tracking and measuring solar flares.

Space Environment In-Situ Suite. Designed to provide continuous measurements of Earth's ambient magnetic field along with the proton, electron, and alpha-particle fluxes at geostationary orbit.

Geostationary Lightning Mapper. Designed to continuously track the intensity, frequency, and location of lightning discharges in order to help predict severe storms.

Hyperspectral Environmental Suite. Comprised of a sounder and multi-channel imager, and designed to provide high-resolution hemispheric sounding, mesoscale soundings of severe weather systems, and coastal waters imaging.

⁴ Independent cost estimates and assessments are prepared by an entity that is not under the supervision, direction, or control of the program so that they will be unbiased.

NOAA modifies acquisition strategy and scales back GOES-R. In response to the escalating cost estimates, findings of the review team, and lessons learned from NPOESS, the decision was made to change the acquisition strategy. On March 28, 2007, NOAA announced the change, which would more closely align the GOES-R acquisition with the traditional approach: NOAA would acquire the ground segment and NASA would award separate contracts for the space segment (spacecraft, instruments, and launch vehicle). As with previous GOES acquisitions, NASA would be in charge of system engineering and integration, but with the goal of eventually transitioning this responsibility to NOAA. The decision-making structure was retained: the GOES-R program office remained under NOAA, and the Department maintained direct oversight authority. On June 15, 2007, NOAA and NASA signed the final memorandum of agreement reflecting this management and acquisition approach. These changes should significantly bolster the chances of success on GOES-R.

In addition, the Department and NOAA scaled back GOES-R, agreeing to a \$6.96 billion budget for the total program. Two of four satellites originally planned for production were eliminated, as was one of the five instruments: the Hyperspectral Environmental Suite (HES) was proving to be too technically challenging to develop and far more expensive than expected. At this writing, three instruments are under contract for development—the Advance Baseline Imager (ABI), the Space Environmental In-Situ Suite, and the Solar Imaging Suite. The program office decided to divide development of the Solar Imaging Suite into two separate contracts, one of which was awarded in late August 2007 and the other in September 2007. The Geostationary Lightning Mapper contract is scheduled to be awarded in late November 2007. The three program definition contracts ended on April 20, 2007. The next key decision point—KDP C/D—was planned for September 2007, but has been postponed. It is intended to authorize release of requests for proposals for the ground and space segment contracts. In preparation for KDP C/D, the scope and estimated costs of GOES-R are being reevaluated.

OBJECTIVES, SCOPE, AND METHODOLOGY

We undertook this evaluation because of GOES-R's cost, complexity, and associated risks; its importance to the nation's weather forecasting capabilities and the public's safety; the substantial cost increases and schedule delays that historically plague satellite programs, as evidenced most recently by NPOESS; and the Department and NOAA's expanded oversight and management roles for a major satellite acquisition—roles for which they have little experience. We sought to determine whether the Department and NOAA have

1. Established effective oversight organizations, policies, and procedures for GOES-R that support informed decision making about budgets, acquisitions, and program progress;
2. Put mechanisms in place to successfully leverage NASA's oversight expertise;
3. Identified risks and mitigation strategies for furnishing instruments to the prime system integration contractor; and
4. Developed and implemented sound award fee plans that promote excellent contractor performance.

We began this evaluation as a joint project with NASA OIG, in which our counterpart focused on determining whether NASA program management councils effectively identify and review program issues and progress, and whether NASA has procedures and processes in place to adequately identify, mitigate, and report technical risks in accordance with agency policy. Our intention was to issue either one report, or separate reports under one cover letter, if crosscutting areas emerged. But because NASA OIG's work is ongoing and has not resulted in any findings to date, we are issuing this single report on our findings at Commerce.

After the acquisition approach was modified to include NASA providing fully developed instruments to the space segment contractor, we concluded that NASA was prepared to identify and mitigate potential risks since it would be following its standard practice. At the time of our fieldwork, an award fee plan had been established for the ABI only. Our analysis of data for the first four award fee periods indicated that the plan is being used properly—as the contractor began experiencing problems developing the instrument, NASA reduced fee payments for lagging performance. We therefore have no findings relating to these two objectives.

Our fieldwork entailed review of applicable federal legislation, Department of Defense (DOD) and NASA space acquisition policies and procedures, space acquisition reports issued by the Government Accountability Office (GAO), Department policies and procedures, and interviews with Department, NOAA, and NASA officials, and GOES-R program office managers and staff. We also reviewed a variety of GOES-R documents including the program plan; system engineering management plans; memorandums of agreement (MOA); key decision point B briefings and decision memorandum; cost estimation briefings; NOAA briefings to the independent review team and the independent review team's report; NOAA program management council briefings and minutes from January 2006 to April 2007; Goddard Space Flight Center program management council briefings starting from January 2004 to April 2007; GOES-R contractors' deliverables for system requirements and concepts and government furnished instruments; and award fee plans and their implementation.

We conducted the majority of our fieldwork from October 2006 to April 2007. We performed this evaluation in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency, dated January 2005, and under authority of the Inspector General Act of 1978, as amended, and Department Organization Order 10-13, dated August 31, 2006.

FINDINGS AND RECOMMENDATIONS

I. The Failure to Follow Accepted Space Acquisition Management Practices Contributed to Additional Cost and Decreased Development Time

The Department and NOAA, in assuming oversight and management responsibility for the entire GOES-R program, took on roles for which neither was adequately prepared. Neither had ever managed an acquisition project of this magnitude and complexity or had experience directly overseeing satellite acquisition. Neither had a workable oversight structure for major acquisitions. Ten years had passed since the Department had been involved in a key decision point review. And its policy for large system acquisitions was based on OMB guidance (Circular A-109) that designates approval authority for key decision points, in this case, the Secretary of Commerce, but does not specify procedures or assessment criteria for moving a program forward.⁵

Acquisitions of complex and costly satellites have a well-documented history of budget overruns and schedule delays, and earlier GOES series have been no exception. The GOES I-M budget increased from an initial estimate of \$640 million to \$2 billion and the program was 5 years late in delivering the first satellite. Agencies that engage in satellite development as a major part of their mission—such as NASA and DOD—have well-defined practices for minimizing these risks throughout a project’s life-cycle.⁶

NOAA—in developing its approach for GOES-R in 2005—did not follow accepted satellite acquisition practices. Figure 5 compares the GOES-R life-cycle and key decision points with those of NASA Procedural Requirement (NPR) 7120.5D. Adopted in March 2007, the directive prescribes how the agency will formulate and implement space flight programs and projects. Although issued after the GOES-R program began, the basic life-cycle steps and associated oversight—including thorough reviews and a requirement for independent assessments before key decision points—represent long-held practice in satellite acquisition.⁷

Viewing decision point B solely as a procurement milestone, the Department and NOAA did not possess sufficient cost, schedule, and technical information regarding the program to make a fully informed decision as to whether to proceed or how best to do so. By the time these organizations were confronted with the findings from an independent assessment—which showed program cost estimates soaring and a flawed acquisition approach—it was too late to recover from the impacts of its weak decision-making process at decision point B. Although key decision point reviews are held at Commerce for the purpose of making contracting decisions,

⁵ U.S. Department of Commerce, December 9, 1997. *Major Systems Acquisitions for the Department of Commerce*, Department Administrative Order 208-3.

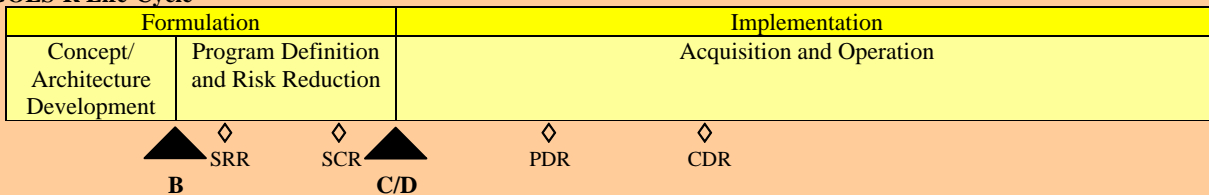
⁶ NASA currently uses NASA Procedural Requirement 7120.5D, *NASA Space Flight Program and Project Management Requirements*, March 6, 2007; DOD uses *National Security Space Acquisition Policy*, Number 03-01, December 27, 2004.

⁷ NASA’s previous policy (NPR 7120.5C) did not use the term “key decision point;” however, it required similar reviews. The term was introduced for the first time in NPR 7120.5D.

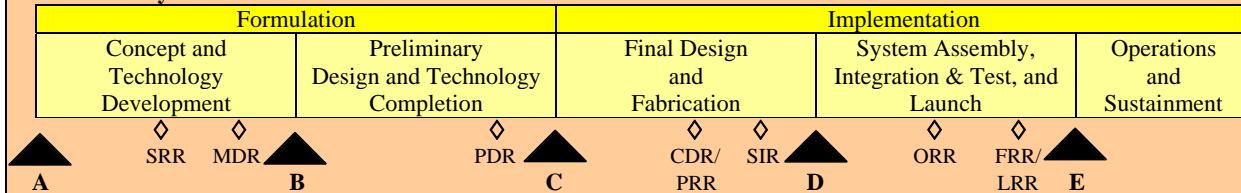
accepted satellite acquisition practice is to hold such reviews at the end of life-cycle phases to determine a program’s readiness to proceed to the next phase. As a result, the GOES-R plan calls for all of its key decision point reviews to be held relatively early in the program and omits decision points at critical downstream junctures.

Figure 5. Comparison of GOES-R and NASA Life-Cycle Phases, Major Milestones, and Key Decision Point Reviews

GOES-R Life-Cycle



NASA Life-Cycle



Legend

▲	Key Decision Point Review	SRR	System Requirements Review	PRR	Production Readiness Review
◇	Major Milestone Review	SCR	System Concepts Review	SIR	System Integration Review
		MDR	Mission Definition Review	ORR	Operational Readiness Review
		PDR	Preliminary Design Review	FRR	Flight Readiness Review
		CDR	Critical Design Review	LRR	Launch Readiness Review

Source: GOES-R Systems Engineering Management Plan, January 31, 2006; NOAA Program Management Council monthly briefings; NASA Procedural Requirement 7120.5D, *NASA Space Flight Program and Project Management Requirements*, March 6, 2007.

A. Lack of Accepted Life-Cycle Process Left Oversight Officials Without Sufficient Program Information for First Key Decision Point Review

At the first major review of the GOES-R program (key decision point B) in October 2005, senior Department and NOAA officials did not have the information they needed to make a sufficiently informed decision about the path forward for GOES-R, namely, thorough evaluations of cost, schedule, technological readiness, acquisition strategy, and risks that were as accurate as possible at that stage of the program. The objective of decision point B was to obtain approval to award three contracts to further define the system architecture and concepts. When key decision point B arrived, significant uncertainties remained regarding the system concept, achievable capabilities, and acquisition strategy;⁸ and NOAA planned to use the contracts to help address these

⁸ Commerce and NASA had not officially agreed to the acquisition strategy. Only an interim agreement had been signed by NASA’s Associate Administrator for Science Mission Directorate and NOAA’s Deputy Under Secretary of Commerce for Oceans and Atmosphere (Memorandum for the record, NASA, May 25, 2005).

uncertainties. We do not disagree with the decision to award contracts for this purpose. However, given the Department's and NOAA's inexperience in overseeing and managing satellite acquisitions, more comprehensive information was needed, which could be provided by way of independent assessments by satellite experts, to help identify any shortcomings, determine whether the appropriate work scope was being planned for the upcoming contracts, and evaluate the program's readiness to move forward. Lacking such information and assessments, the Department approved going forward at decision point B without sufficient reliable information to ensure the program was proceeding as effectively as possible.

The shortcomings of decision point B may be explained, in part, by the Department's general approach to key decision points. At Commerce, key decision points are treated solely as procurement milestones, held for the purpose of making contracting decisions, and are not based on comprehensive program reviews. In contrast, NASA's and DOD's policies for satellite acquisitions place key decision points at specific program maturity assessment junctures occurring at the end of life-cycle phases to determine whether a program is ready to proceed to the next phase. This determination is made on the basis of highly-structured reviews against established program management, technical, cost, and schedule criteria. While acquisition strategies and contract actions are frequently authorized at key decision points, they are but one of several critical areas examined. Key decision point B on GOES-R, conducted to authorize award of contracts to help address GOES-R program uncertainties, was held at a much earlier stage in the program's life-cycle than stipulated by NASA and DOD policies, and as noted, with no independent assessment and less comprehensive review.

Indeed, a critical feature of the life-cycle process—and one common to satellite acquisitions at both NASA and DOD—is the requirement for providing oversight officials with independent expert assessments at key program decision points. At these points, the decision authority reviews the program to determine its readiness to progress to the next phase of the system life-cycle. Independent assessments are designed to give decision makers objective information for making this determination. NASA policy requires the first independent review before beginning preliminary design (key decision point B); DOD requires such reviews prior to concept development (key decision point A). Regardless of whether NOAA's request to award the program definition/risk reduction contracts should be considered a key decision point, the associated review needed better preparation and oversight—incorporating detailed programmatic assessments and independent evaluations of cost, schedule and technical parameters—in order to ensure effective planning of the contracts' work scope, as well as more accurate decision-making information for the Department in support of the procurement request.

Independent assessment confirmed unrealistic cost estimates and management weaknesses.

NOAA recognized the need for independent review soon after the program definition effort began. In May 2006, roughly 7 months into the program definition phase, the independent review team began its assessment of GOES-R, ultimately confirming information coming from the contractors, an independent cost estimate, and the GOES-R program office: that the program as it was then defined would cost nearly double the original estimate; the HES was posing unacceptable cost and technological risks; and GOES-R would be better managed under the structure used for prior GOES acquisitions—that is, with NOAA handling the ground segment and NASA handling the space segment. Even before the team delivered its final report in

January 2007, NOAA had made major changes—among them, eliminating the HES and two satellites to bring program costs closer to original estimates, planning for a satellite platform that can fly both with and without a sounder, and revamping the management structure to give NASA control of the space segment. But these changes cost the agency time and money: \$17 million to redefine the overall system architecture and management structure, and a 9-month delay in the planned schedule for awarding the space and ground contracts, which has reduced development time and increased the risk of a gap in satellite coverage. They also delayed the planned availability of advanced sounding capabilities.

Without more extensive, reliable information at key decision point B, the Department and NOAA missed the opportunity to recognize earlier the need for at least some of these changes, potentially avoiding subsequent rework—and moving system development along more quickly and at a lower cost. For example, an independent cost evaluation would have revealed to all participants that the life-cycle cost estimate in support of key decision point B was unrealistically low as it was based on, among other things, outdated inflation indices (FY 2004 rather than FY 2005 indices), implausibly low software and algorithm development estimates, and abbreviated satellite lifetimes. In addition, in the summer of 2005, NOAA had developed a higher estimate based on more realistic assumptions, and had also contracted for an independent cost estimate, which though in its early stages at decision point B, was already suggesting significantly higher costs. Department officials chose to use the lower estimate for the decision—which was developed in 2004 and was consistent with previously submitted Congressional budget requests for FY 2006 and FY 2007—explaining that the program was still in a state of flux and that ample opportunities remained to make engineering trade-offs that would allow it to stay within budget.

Absence of policies and procedures for satellite acquisitions left the Department and NOAA without a guide for major systems oversight. Effective decision making at point B was further impeded by insufficient acquisition life-cycle procedures, including oversight mechanisms. Space acquisitions entail complex program management, technical, cost, schedule, contract, and budget issues that must be addressed in an integrated manner, but current Commerce policy for acquiring major systems⁹ lacks detail for establishing the kind of oversight procedures and evaluation criteria a complex project like GOES-R requires. This helps explain why the Department had no roadmap for establishing effective oversight mechanisms. In response to a recommendation from GAO,¹⁰ Commerce has worked to revise the policy but at this writing it has not been completed. This policy is not only needed for space acquisitions but for additional ongoing and future major system acquisitions including systems for the decennial census and other weather systems. Because the Department is uncertain when the policy will be finalized and implemented, it needs to define now how it will effectively monitor GOES-R throughout the duration of the program.

⁹ The Department defines major systems as those having a life-cycle cost of \$100 million or greater.

¹⁰ U.S. Government Accountability Office, June 2006. *NOAA: Next Steps to Strengthen Its Acquisition Function*, GAO-06-594, Washington, D.C.: GAO.

Also at decision point B, NOAA had not yet established a program management council to review monthly progress on GOES-R and had not implemented procedures for senior officials to make decisions about requirements trade-offs based on cost, schedule, technological risks, and user needs and about its readiness to award contracts.

Steps toward improvement. NOAA has improved oversight of the program since key decision point B. It established a program management council, which held its first meeting in January 2006. Chaired by the Deputy Under Secretary for Oceans and Atmosphere and staffed with senior officials from NOAA and NASA, the council meets monthly to assess GOES-R progress and the impact of proposed activities and changes. The council provides a forum for involving stakeholders in GOES-R requirements decisions, such as the development of ABI products to compensate for the lost HES sounder capabilities. It has been instrumental in NOAA's adopting recommendations from the independent review team and in planning for the key decision point C/D review. The council will also give senior NOAA and Commerce officials input and recommendations at this review and major milestone reviews.

NASA's Goddard program management council also convenes monthly and complements NOAA's programmatic, user-oriented reviews with detailed reviews of technical aspects of GOES-R instruments and the satellite platform. NASA conducts independent technical and engineering assessments at GOES-R major milestones reviews as well and will do so for key decision point C/D.

B. Decision Point C/D Provides Critical Review, But Does Not Obviate Need for Future Key Decision Points

In NASA and DOD space acquisition processes, decision point C occurs at the completion of preliminary design to assess a program's readiness to proceed to final design. A separate decision point D is conducted before the system is built. GOES-R, however, is roughly 2 years from completing preliminary design and even further from being ready to build the first satellite, but the planned *final* decision point—decision point C/D—is expected to occur soon. The purpose of this decision point is to obtain Department authorization for releasing solicitations for the multibillion-dollar space and ground segment contracts through which these activities will be implemented. Notwithstanding the lack of maturity of GOES-R, we agree it is important for the Department and NOAA to thoroughly review all aspects of the program in order to make well-informed decisions about how to proceed before releasing the solicitations for GOES-R. Given the significant program changes and magnitude of investment associated with these contracts, treating this procurement milestone as a key decision point has considerable merit, and decision making should give strong consideration to the findings and recommendations resulting from the independent assessments that have now been performed by space acquisition experts. However, after decision point C/D, additional key

Scope of KDP C/D Independent Reviews	
1.	Adequacy of management plans
2.	Technical requirements
3.	Risk identification and mitigation plans
4.	Program resources and processes
5.	Systems engineering and mission assurance
6.	Acquisition activities (e.g., request for proposals, source selection plans, incentive plans)
7.	Projects cost, schedule, and budget

Source: NOAA

decision points are needed at the end of subsequent life-cycle phases to determine GOES-R's readiness to proceed.

The current life-cycle process defined for GOES-R diverges from NPR 7120.5D by omitting key decision points and reviews prior to final design and fabrication (decision point C in NPR 7120.5D); system assembly, integration and test, and launch (decision point D); and operations and support (decision point E). One important reason for decision point C at NASA is to approve the formal cost, schedule, and technical baseline—called the “integrated baseline”—which is established after completion of preliminary design. This baseline becomes the reference point for tracking changes and assessing the impact of management and technical decisions. Program officials report significant deviations to senior management and a recovery plan is developed. (Figure 5 illustrates the difference between GOES-R decision points and NASA practices.)

NASA incorporated additional decision points after point C in response to a GAO review of its acquisition policies. GAO recommended these reviews to determine whether the detailed design will meet customer requirements and cost and schedule targets (decision point C) and to assess whether the product can be manufactured within cost, schedule, and quality targets (decision point D).¹¹ NASA's position at that time—and a viewpoint recently expressed to us by Department and NOAA officials—is that decision point D is not needed because of the small number of satellites produced. GAO disagreed, citing the high cost of building systems, as well as the high cost of system failure, and NASA ultimately incorporated this decision point into its new process.

However, neither NOAA nor the Department plans to incorporate these additional key decision points, which are integral to NASA's process. Given the lack of equivalent Department or NOAA processes, we believe it is imperative that these decision points be incorporated into the GOES-R program to align oversight with accepted practices.

C. Procedures for Decision Point Reviews Are Inadequate for Providing Decision Makers With Needed Information

As decision authority, the Department needs to be familiar with complex satellite programs and their review process, but Commerce lacks adequate capacity and experience for effective oversight of the highly technical and complex issues of space acquisitions and access to independent reviewers of its own. In the absence of these requisites, Commerce should consult directly with NOAA and NASA independent reviewers as a key component of the decision making at each decision point. Adequate preparation and consultation with experts will help the Department identify any serious program weaknesses and determine the best path forward for GOES-R. In addition, both the Department and NOAA should use NPR 7120.5D as guidance to better focus these reviews on the key objectives and products of each program phase.

¹¹ U.S. Government Accountability Office, December 2005. *NASA, Implementing a Knowledge-Based Acquisition Framework Could Lead to Better Investment Decisions and Project Outcomes*, GAO-06-218. Washington, D.C.: GAO.

In January 2007, the GOES-R independent review team issued a report recommending that the Department consider delegating decision authority for GOES-R at key decision point C/D to the Under Secretary for Oceans and Atmosphere. The report noted that doing so should not prevent certain Department organizations, such as the Acquisition Review Board, from carrying out their responsibilities.¹² NOAA subsequently requested the delegation; the Deputy Secretary responded that he would not forward the request to the Secretary until certain actions were taken, including clarifying the authorities NOAA is asking the Department to delegate. Given the Department's minimal major systems acquisition policy and the lack of clearly defined roles, responsibilities, and procedures for decision point reviews, we agree that the Department and NOAA's authorities for cost, schedule, programmatic, and contracting decisions must be clearly delineated if decision authority is to be delegated. And at all decision points, regardless of whether the decision authority is the Department or NOAA, the rationale for any decisions made on the basis of assumptions or findings different from those of the independent assessments (including cost) should be clearly documented and the rationale explained.

D. NOAA Has Not Adapted Relevant NASA Processes to GOES-R

In response to concerns raised by the independent review team, NOAA agreed in January 2007 to use the soon to be approved NPR 7120.5D as the template for defining GOES-R management roles, responsibilities, and processes. The MOA between NOAA and NASA states that guidance for GOES-R processes will be derived from NPR 7120.5D and documented in the Management Control Plan, and that the space segment will be managed in accordance with the directive as well. But the agreement is silent on NOAA's use of the directive for the ground segment, nor has NOAA defined how these processes will apply to that segment or to the overall program, although the directive itself makes adherence to its requirements mandatory for NASA's work on GOES-R.¹³

NOAA should ensure overall program management and ground segment activities follow the principles of NPR 7120.5D, and should clearly identify in the Management Control Plan or related documentation how these principles will be applied to that segment. In particular, NOAA should delineate for each project phase how the directive will be applied to project technical activities; planning, costing, and scheduling activities; cost and schedule control activities; and key decision point readiness activities.

¹² *Geostationary Operational Environmental Satellite, Series R (GOES-R) Independent Review Team (IRT) Report*, January 3, 2007, p. 22.

¹³ NPR 7120.5D, "NASA Space Flight Program and Project Management Requirements," Section 3.5, states that "[i]f the sponsoring agency does not want NPR 7120.5D requirements (or a subset of those requirements) to be followed, then the inter-agency MOU/MOA or the contract must explicitly identify those requirements that will not be followed, along with the substitute requirements for equivalent processes and any additional program/project management requirements the sponsoring agency wants. The Center must obtain a formal waiver by the NASA CE [chief engineer] for those NPR 7120.5D requirements that are not to be followed, or the Agency will direct the Center not to accept the work."

E. The Department Lacks Procedures For Reporting and Approving Major Deviations From and Changes To Baseline

As noted previously, the integrated baseline becomes the reference point for tracking changes and assessing the impact of management and technical decisions. Space acquisition legislation, policies, and procedures—including those of NASA and DOD—have provisions that stipulate what constitutes a significant cost overrun and schedule slippage, and associated procedures for reporting and managing such variances.¹⁴ These provisions are intended to ensure that senior officials are notified of significant variances and determine how best to handle them. For space acquisitions, a special review is typically conducted when actual costs exceed estimates by 15 percent or the program is 6 months or more behind schedule. Senior officials choose the review team participants, who typically include experts independent of the program. The goal of this review is to develop a recovery plan approved by senior officials and possibly the key decision point authority. Commerce has not described its requirements and procedures for reporting and managing variances for the GOES-R space and ground segments. The Department and NOAA also need to determine thresholds for holding special decision reviews when considering enhancements to sensing capabilities.

Recommendations

The Deputy Secretary should direct appropriate management officials to do the following:

1. Plan for additional GOES-R key decision point reviews in accordance with NPR 7120.5D guidance.
2. Conduct key decision point reviews in a manner consistent with NPR 7120.5D guidance, to include identifying the decision criteria as well as the roles and responsibilities of those involved, what information will be presented for the decision, and how independent reviewers will be consulted and their assessment results used.
3. If key decision point C/D or subsequent decision points are delegated to NOAA, ensure, in coordination with NOAA, that the Department and NOAA's authorities are clearly delineated.
4. At all key decision points, ensure any decisions made on the basis of assumptions or findings that differ from those of the independent assessments, including the independent cost estimate, are documented and the rationale explained.
5. Establish, in coordination with NOAA, thresholds and procedures for reporting and approving major deviations from GOES-R's capability, cost, and schedule baseline, as well as enhancements to the baseline.

¹⁴ The Office of Management and Budget is currently drafting a policy for space acquisitions requiring notification in the event of significant cost growth and schedule delays.

6. Complete and implement the Department's major system acquisition policy. For satellite programs, ensure the policy incorporates the key decision points in NPR 7120.5D and requires comprehensive independent reviews at all key decision points.

The Under Secretary for Oceans and Atmosphere should direct appropriate management officials to do the following:

1. If the agency receives decision authority for decision point C/D and subsequent decision points, plan and document NOAA's approach as described in recommendation 2 above to the Deputy Secretary.
2. Describe in the Management Control Plan or related documentation how NPR 7120.5D will be used for managing and overseeing the overall GOES-R program and ground segment, to include identifying planned deviations from NPR 7120.5D and describing the rationale for the deviations and compensating mechanisms that will be used.

DEPARTMENT AND NOAA RESPONSE AND OUR EVALUATION

The Office of the Secretary and the Under Secretary of Commerce for Oceans and Atmosphere provided written comments on a draft of this report (see appendixes I and II). These comments and our evaluation are discussed below.

Department Response

Department officials expressed support for our intent to encourage best practices in satellite acquisition. But they believe our report does not properly distinguish the Office of the Secretary's oversight and policy role from NOAA's program management and execution role and argued that the procedures we recommend are not used by NASA at the Secretarial level. The Department is incorrect on this point: The NASA Administrator's office—its Secretarial equivalent—is the decision authority for all projects that, like GOES-R, have life-cycle costs greater than \$1 billion, and in such cases, does in fact use the recommended procedures.

The Department asserted that NASA and DOD's life-cycle acquisition procedures (NPR 7120.5D and NSS 03-01, respectively) are not implementations of OMB Circular A-109 requirements, maintaining instead that they prescribe procedures that should be implemented at the program level. Again, this is incorrect. Both NASA and DOD acquisition life-cycle processes are implementations of OMB Circular A-109.¹⁵

Consistent with our report, the Department stated that the purpose of its key decision points is to review procurement decisions. Officials said they will use decision points along with established oversight procedures—quarterly reviews, annual budget reviews, and periodic acquisition board and information technology board reviews—for GOES-R. Our report points out that—unlike NASA and DOD practices—Commerce's various reviews do not provide the comprehensive, integrated appraisal of budget, cost, schedule, and technical risk at program maturity assessment junctures (key decision points). However, since the Department believes the key decision points in the satellite acquisition life cycle are more appropriately handled by NOAA, we believe it should delegate decision authority for KDP C/D to NOAA, which is implementing procedures to improve oversight based on the NASA directive.

The Department contended that it was sufficiently prepared for KDP B, arguing that the Secretary made a well-informed decision at this milestone to authorize the program definition and risk reduction (PDRR) contract awards and that the PDRR contractors would provide information needed to resolve program uncertainties and move the program forward. We have reworded the finding to avoid the implication that oversight officials failed to plan for decision point B. However, our report points out that information available at KDP B about program uncertainties—HES viability, satellite architecture, and acquisition approach—as well as projections of sizeable cost growth should have been reviewed and raised a red flag for both the Department and NOAA. For example, before KDP B, the program office was reporting major

¹⁵ See Department of Defense, *National Security Space Acquisition Policy No. 03-01*, December 27, 2004, page 5, and *NASA FAR Sup 1834*, November 2006, Section 1834.003.

technical risks and cost increases on HES to the NASA program management council, raising questions about whether HES could meet user requirements. It was also reporting that uncertainty about the spacecraft architecture was impacting instrument development and in turn pushing out the launch readiness date past 2012. Projections were indicating that costs could grow by more than a billion dollars over the amount stated in the FY 2007 budget—an estimate that proved to be conservative. A more structured, comprehensive, and integrated review including assessments by independent experts would have raised these issues. The decision to authorize the PDRR contract awards could then have addressed the need to modify the work scope to resolve these uncertainties before proceeding to concept development (option 1 of the PDRR contract). Initiating concept development prematurely contributed to \$17 million of rework and a 9-month delay in awarding the space and ground contracts.

The Department objected to our use of the term “cost growth,” contending that the higher estimates developed in the summer of 2005 do not represent cost growth because they were based on early concepts, which NOAA expected to change during the course of the PDRR contract. We used the term to describe the \$17 million of rework discussed previously, not to characterize the increased cost estimate, and have modified our report to clarify this point. However, the higher estimates were clear indicators that costs were growing, a consideration that should have been heeded at KDP B. While we do not disagree with the Department’s statement that the \$17 million in rework supported appropriate decisions about the acquisition strategy, this expenditure would not have been necessary if rework had been avoided in the first place.

The Department also contended that the change in the contract award date was not a delay but was instead to allow NOAA to obtain better information, and also reflected the postponement of the launch need date for the first satellite from 2012 to 2014. However, NOAA realized at KDP B that with a planned award date for the space and ground contracts of August 2007, it needed to push out the launch date to 2014 to allow for adequate satellite development time (80 months). The delay we are referring to is the subsequent change in the award date for these contracts to May 2008. As our final report notes, this 9-month delay reduces development time and increases the risk of a gap in satellite coverage. This increased schedule risk has been confirmed by the recent independent evaluation of GOES-R’s cost and schedule.

Commerce officials maintained that the Department supports the use of best practices regardless of their source, but pointed out that the practices we recommend have long been used without completely preventing serious schedule delays and cost overruns. They also suggest they are being criticized for failing to apply NASA procedures at KDP B that were not published until 2 years later. The NASA and DOD procedures we recommend embody best practices developed from these agencies’ 50 years of satellite acquisition experience. And in citing NASA’s current policy, which was released in March 2007, our report states that it represents long-held practice, and that the policy in effect at the time of KDP B—while not using the term “key decision point”—did require similar reviews.

The Department has no comparable experience to NASA’s and DOD’s and has offered no alternative best practices. The *2003 Final Report of the Defense Science Board (DSB) Task*

Force on Acquisition of National Security Space Programs identifies the basic causes of the significant cost growth and schedule delays in programs like GOES-R.¹⁶ NASA and DOD procedures are designed to mitigate these causes. While weaknesses in the application of these procedures are often a problem, the Department has offered no arguments suggesting that the principles embodied in the procedures are not sound.

Recommendations to the Department

The Deputy Secretary should direct appropriate management officials to do the following:

1. Plan for additional GOES-R key decision point reviews in accordance with NPR 7120.5D guidance.
2. Conduct key decision point reviews in a manner consistent with NPR 7120.5D guidance, to include identifying the decision criteria as well as the roles and responsibilities of those involved, what information will be presented for the decision, and how independent reviewers will be consulted and their assessment results used.

Commerce officials agreed that additional key decision point reviews should occur but believe that Department reviews should not be in accordance with NPR 7120.5D. Rather, NOAA should apply effective procedures in the Management Control Plan for the program, including NPR 7120.5D, as appropriate, while the Department will continue to follow its existing procedures and monitor the program via quarterly reviews, budget assessments, and evaluations conducted by the Information Technology Review Board and Acquisition Review Board.

The response suggests that NOAA, rather than the Department, should conduct additional decision point reviews. We ask Commerce officials to clarify their position on additional key decision points in their action plan. Since the Department believes its oversight procedures need not be changed, we encourage it to delegate decision authority for KDP C/D to NOAA, which is working to manage and oversee GOES-R in accordance with best practices.

3. If key decision point C/D or subsequent decision points are delegated to NOAA, ensure, in coordination with NOAA, that the Department and NOAA's authorities are clearly delineated.

The Department concurred with this recommendation and stated that it will continue to exercise its responsibilities to oversee the GOES-R program at key decision points.

¹⁶ These are (1) cost has replaced mission success as the primary driver in managing space development programs, (2) unrealistic estimates lead to unrealistic budgets and unexecutable programs; (3) undisciplined definition and uncontrolled growth in system requirements increase cost and schedule delays; (4) government capabilities to lead and manage the space acquisition process have seriously eroded; and (5) industry has failed to implement proven practices on some programs.

The Department's agreement to ensure that authorities are clearly delineated is responsive to our recommendation. We interpret the Department's statement that it will continue to exercise its GOES-R oversight responsibilities at key decision points as referring only to KDP C/D since there are no further decision points in its current process. We ask the Department clarify its response in the action plan.

4. At all key decision points, ensure any decisions made on the basis of assumptions or findings that differ from those of the independent assessments, including the independent cost estimate, are documented and the rationale explained.

Department officials stated that this recommendation is not appropriate for the Secretarial level but that NOAA's GOES-R program office should respond to independent assessments and those responses should inform subsequent NOAA and Department decisions. The Department asserted that multiple layers of independent review would be wasteful and duplicative.

This recommendation is intended for implementation by the decision authority, be it a Department official or NOAA official, and thus should be implemented at the Secretarial level if Commerce chooses to retain decision authority for KDP C/D. The recommendation goes beyond simply responding to independent assessments: For transparency and accountability, deviations in decision making from what is found by independent assessments should be clearly documented by the decision authority. The Department does not address this point, and we request that it do so in the action plan. We do not advocate multiple layers of independent review. Rather, our report states that the Department should consult with NOAA's and NASA's independent experts to assist in its deliberations at key decision points.

5. Establish, in coordination with NOAA, thresholds and procedures for reporting and approving major deviations from GOES-R's capability, cost, and schedule baseline, as well as enhancements to the baseline.

The Department stated that a new major systems acquisition policy is being drafted, which will direct operating units to put appropriate procedures in place. It explained that it currently monitors NOAA's execution of GOES-R through monthly reports, quarterly briefings, and budget reviews that track earned value, schedule, and performance.

It is unclear from this response whether the Department agrees that establishing thresholds and procedures for reporting and approving major baseline deviations and enhancements is appropriate. This is a best practice advocated by NASA, DOD, and OMB, among others. We urge the Department to include this requirement in its new policy.

6. Complete and implement the Department's major system acquisition policy. For satellite programs, ensure the policy incorporates the key decision points in NPR 7120.5D and requires comprehensive independent reviews at all key decision points.

Department officials partially concurred with this recommendation, stating that in developing the acquisition policy, they would consider a key decision point structure, along with other approaches.

Best practices for complex systems development designate key points at the end of major project phases to assess whether the project is on track and ready to proceed to the next phase, or whether remedial action is needed. Moving to subsequent phases without fixing significant problems results in costly rework and delays. The periodic or episodic reviews cited in the Department's response to our first recommendation have their place and can complement—but not substitute for—key decision point reviews.

NOAA Response

NOAA responded that overall the draft report was fair and provided an accurate description of the history of the GOES-R program.

Recommendations to NOAA

The Under Secretary for Oceans and Atmosphere should direct appropriate management officials to do the following:

1. If the agency receives decision authority for decision point C/D and subsequent decision points, plan and document NOAA's approach as described in recommendation 2 above to the Deputy Secretary.
2. Describe in the Management Control Plan or related documentation how NPR 7120.5D will be used for managing and overseeing the overall GOES-R program and ground segment, to include identifying planned deviations from NPR 7120.5D and describing the rationale for the deviations and compensating mechanisms that will be used.

NOAA concurred with these recommendations. It stated that it is working with NASA to finalize the Management Control Plan, which will document the approach for decision point C/D and subsequent decision points, and will document how NPR 7120.5D will be followed for all parts of the GOES-R program. NOAA also stated that it intends to meet all Commerce oversight requirements such as obtaining Acquisition Review Board approvals.

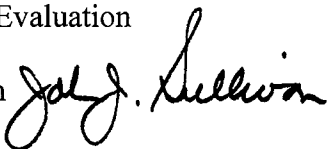
The actions described by NOAA are responsive to our recommendations.



OCT 18 2007

OCT 18 2007

MEMORANDUM FOR: Judith J. Gordon
Assistant Inspector General
for Systems Evaluation

FROM: John J. Sullivan 

SUBJECT: Office of the Secretary Response to the Office of Inspector
General's Draft Report, "*Successful Oversight of GOES-R
Requires Adherence to Accepted Satellite Acquisition
Practices*"

Thank you for the opportunity to review and comment on the Office of Inspector General's draft report, "*Successful Oversight of GOES-R Requires Adherence to Accepted Satellite Acquisition Practices*" (Draft Report No. OSE-18291). I enclose the Office of the Secretary's comments on this draft report.

Attachment

Department of Commerce
Office of the Secretary
Comments on the Draft OIG Report Entitled
“Successful Oversight of GOES-R Requires Adherence to Accepted Satellite
Acquisition Practices”
(Draft Inspection Report No. OSE-18291/August 2007)

General Comments

The Department of Commerce appreciates the opportunity to review this draft report on the Geostationary Operational Environmental Satellite Series-R (GOES-R) program. The Department acknowledges that the original GOES-R acquisition plan was problematic in certain respects, but the new, revised acquisition strategy has addressed those concerns and reduced program risk. We appreciate the effort expended by the Office of the Inspector General (OIG) in surveying this critically important acquisition. We are, moreover, very pleased that the OIG’s draft report supports the current program direction and faults only procedural deficits that NOAA—with the Department’s support and encouragement—is now addressing at the appropriate level.

Overview

The Department supports the intent of the draft report to encourage best practices in satellite acquisition, and is continuing to work with NOAA to substantively and procedurally strengthen programmatic oversight. The Department is concerned, however, that the recommendations in the draft report do not properly distinguish between the oversight and policy role of the Office of the Secretary (OS) and the program management and execution role of the National Oceanic and Atmospheric Administration (NOAA). It would not be appropriate to adopt the procedural recommendations within OS. The National Aeronautics and Space Administration (NASA) procedures recommended in the draft report are not used at the Secretarial level by NASA itself. Implementation of those procedures by OS, as opposed to NOAA, would diminish the flexibility that OS requires to oversee NOAA’s management of the GOES-R program and to provide policy guidance and direction.

The “key decision point” (KDP) process discussed in the draft report is an acquisition approval process set forth in OMB Circular A-109 and Department Administrative Order (DAO) 208-3. It was applied by OS at NOAA’s request, and is just one of the processes used by OS to oversee NOAA’s management of the GOES-R program. The A-109 KDP’s should not be confused with the key decision points or gateways identified in NASA or Department of Defense (DOD) program procedures. As implemented by those agencies, a key decision point/gateway may or may not be associated with a procurement decision point, but is always associated with the need to make a critical programmatic choice before the project is allowed to proceed to the next phase. Moreover, the A-109 KDP process does not stand alone: In addition to it, the Department’s established oversight processes include reviews connected with the annual budget, Acquisition

Review Board, and/or the Commerce Information Technology Review Board. All of these processes allow the various Secretarial offices to apply their expertise and keep senior policy officials well-informed.

Given NOAA's numerous reviews and periodic briefings that were made directly to senior policy officials, OS was aware of the issues facing the program and was fully prepared to make a procurement decision on NOAA's recommendation at the time of KDP B. Rather than insufficiently preparing the Department for KDP B, the process followed by the Office of the Secretary worked precisely as it should, and achieved its intended purpose of providing NOAA with the intelligence needed to make fully-informed, risk-reducing amendments to the GOES-R program. The process also identified weaknesses in NOAA's readiness for the KDP B decision and mandated that certain actions be completed prior to the Secretary making a determination. Those actions were completed and the Secretary made a fully informed decision to authorize the award of the preliminary design and risk reduction contracts.

Acquisition Model

The draft report assumes that NASA or DOD practices for satellite acquisition are the benchmark standards. Although these practices have long been used in meeting mission requirements, they have not completely prevented sometimes-serious schedule delays and cost overruns that have been well-documented in recent Government Accountability Office (GAO) reports¹. The Department supports the use of best practices for the GOES-R acquisition, regardless of the source.

The draft report appears to criticize the Department for not applying NASA procedures in the KDP B review conducted in 2005. However, the procedures that OIG recommends, *i.e.*, NPR 7120.5D, were not published by NASA until 2007. Indeed, these procedures were developed in response to GAO criticism that the *previous* procedures (NPR 7120.5C) lacked key criteria and a knowledge-based acquisition framework.² Had the Department employed the then-extant NPR 7120.5C procedures—since proven inadequate—flaws may well have resulted in the decision process.

Response to Major Findings of the Report

The Failure to Follow Accepted Space Acquisition Management Practices Contributed to GOES-R Cost Growth and Schedule Delays

¹ See GAO reports, *NASA: Lack of Disciplined Cost-Estimating Processes Hinders Effective Program Management*, May 2004, GAO-04-642. *Space Acquisitions Actions Need to Expand and Sustain Use of Best Practices*, April 19, 2007, GAO-07-730T. *DOD Needs to Take More Action to Address Unrealistic Initial Cost Estimates of Space Systems* [GAO-07-96](#), November 17, 2006

² See GAO report *NASA Implementing a Knowledge-Based Acquisition Framework Could Lead to Better Investment Decisions and Project Outcomes*, GAO-06-218, December 2005.

Cost Growth

The draft report finds that the Department or NOAA should have obtained “more extensive, reliable information at key decision point B.” But the purpose of KDP B was to award Program Definition and Risk Reduction (PDRR) contracts to develop the information that the draft report identifies as lacking. The PDRR contracts were intended to identify program risks and help develop life-cycle cost estimates, and they succeeded in achieving precisely this purpose. The PDRR contracts provided needed information on the basis of which appropriate actions were taken to reduce risks, such as the removal of the Hyperspectral Environmental Suite (HES) instrument. In addition, the \$17 million in rework on the PDRR contracts supported appropriate decisions affecting the acquisition strategy, based on both data coming from the PDRR contractors and an independent review of the program. There is no nexus between the decision process used in going forward with the PDRR contracts and NOAA’s subsequent conclusion—stemming largely from the PDRR contractor’s efforts—that cost and schedule estimates needed revision.

The draft report states that in the summer of 2005, NOAA developed a higher cost estimate and, in its early stages, an independent cost estimate was pointing toward higher costs. We do not agree that these estimates represent “cost growth.” The estimates were based on early concepts for the program’s structure, which NOAA expected to change (and did) during the course of the PDDR contracts.

Schedule Delay

The draft report appears to suggest that the change in the planned schedule for awarding the space and ground contracts and the lack of advanced sounding represents a schedule delay for the GOES-R program. In fact, the delay in the planned schedule for awarding the space and ground contracts was to allow NOAA to obtain better information on the program, and reflected a NOAA decision to change the planned launch need date for the first satellite from 2012 to 2014. The GOES-R schedule will continue to be updated to account for anticipated life-cycle of the current GOES series. Advanced sounding has been delayed based on the PDRR work and independent review, which determined that development of the HES instrument presented the program with significant cost and operational schedule risk.

Lack of Accepted Life-Cycle Process Left Oversight Officials Unprepared for First Key Decision Point Review

A-109 KDP B was a milestone held for the purpose of making a procurement decision. The draft report’s claim that oversight officials were “unprepared” is in error; OS was fully prepared to make an acquisition decision and did so based on NOAA’s assessment and presentation to the Department that the program was ready to proceed to that next phase.

The Department will work with NOAA to strengthen NOAA's processes; we understand that NOAA is adopting relevant procedures from NASA in the Management Control Plan for GOES-R. If the Department had followed DOD or NASA policies, as the draft report suggests, there still would not have been a comprehensive program review at the Secretarial level prior to the release of the PDRR contracts.

OS Responses to OIG Recommendations

The draft report states, "The Deputy Secretary should direct appropriate management officials to do the following:"

Recommendation 1: "Plan for additional GOES-R key decision point reviews in accordance with NPR 7120.5D guidance."

OS Response: While OS concurs that additional key decision point reviews should occur, the Department reviews (unlike NOAA reviews) should not be in accordance with NPR 7120.5D. Rather OS will continue to exercise oversight of the program in accordance with its procedures, and will continue to conduct GOES-R quarterly, Commerce Information Technology Review Board, Acquisition Review Board, and budget reviews.

Recommendation 2: "Conduct key decision point reviews in a manner consistent with NPR 7120.5D guidance, to include identifying the decision criteria as well as the roles and responsibilities of those involved, what information will be presented for the decision, and how independent reviewers will be consulted and their assessment results used."

OS Response: As stated in response to recommendation 1, OS concurs that NOAA should apply effective procedures in the Management Control Plan for the program, including NPR 7120.5D, as appropriate.

Recommendation 3: "If key decision point C/D or subsequent decision points are delegated to NOAA, ensure, in coordination with NOAA, that the Department and NOAA's authorities are clearly delineated."

OS Response: OS concurs that any delegation of authority to NOAA should be coordinated and that NOAA authorities should be clearly delineated. OS will continue to exercise its responsibility to oversee the GOES-R program key decision points.

Recommendation 4: "At all key decision points ensure any decisions made on the basis of assumptions or findings that differ from those of the independent assessments, including the independent cost estimate, are documented and the rationale explained."

OS Response: OS concurs that NOAA's GOES-R program office should respond to any independent assessments, and that those responses should inform subsequent decisions by NOAA and OS. This recommendation is not appropriate for the Secretarial level,

however. If OS considers NOAA's independent assessments to be sufficient, requiring multiple layers of independent review would be wasteful and duplicative.

Recommendation 5: "Establish, in coordination with NOAA, thresholds and procedures for reporting and approving major deviations from GOES-R's capability, cost, and schedule baseline, as well as enhancements to the baseline."

OS Response: OS is drafting a new major systems acquisition policy to replace DAO 208-3. That policy will direct the Department's operating units to have in place appropriate procedures for various acquisitions including satellites. Currently, the Department reviews NOAA execution of the program through monthly reports, quarterly briefings and budget reviews that track earned value, schedule and performance.

Recommendation 6: "Complete and implement the Department's major system acquisition policy. For satellite programs, ensure the policy incorporates the key decision points in NPR 7120.5D and requires comprehensive independent reviews at all key decision points."

OS Response: OS concurs in part. The Department's major systems acquisition policy will be completed by the third quarter of FY 2008. In creating that policy, a key decision point structure will be considered, along with other approaches.

In response to the draft report recommendations to the Under Secretary for Oceans and Atmosphere, OS defers to NOAA.


APPENDIX II: NOAA'S
RESPONSE



UNITED STATES DEPARTMENT OF COMMERCE
The Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

SEP 21 2007

MEMORANDUM FOR: Judith J. Gordon
Assistant Inspector General for Systems Evaluation

FROM: Conrad C. Lautenbacher, Jr.
Vice Admiral, U.S. Navy (Ret.)
Under Secretary of Commerce for
Oceans and Atmosphere 

SUBJECT: *Successful Oversight of GOES-R Requires Adherence to
Accepted Satellite Acquisition Practices*
Draft Report No. OSE-18291/August 2007

Attached is the National Oceanic and Atmospheric Administration's (NOAA) response to the Office of Inspector General's draft report on its review of the oversight of the Geostationary Operational Environmental Satellite-R series (GOES-R) program by the Department of Commerce, NOAA, and National Aeronautics and Space Administration. The response was prepared in accordance with Department Administrative Order 213-3, *Inspector General Auditing*. We appreciate the opportunity to respond to your draft report.

Attachment



**Department of Commerce
National Oceanic and Atmospheric Administration
Comments on the Draft OIG Report Entitled
“Successful Oversight of GOES-R Requires
Adherence to Accepted Satellite Acquisition Practices”
(OSE-18291/August 2007)**

General Comments

The Department of Commerce’s National Oceanic and Atmospheric Administration (NOAA) appreciates the opportunity to review this report on the oversight of the Geostationary Operational Environmental Satellite-R series (GOES-R) program. Overall the report is fair and provides an accurate description of the history of the GOES-R program. The primary concerns addressed in this report are the lack of adherence to standard satellite acquisition procedures as documented in National Aeronautics and Space Administration’s (NASA) Procedural Requirement 7120.5D (NPR 7120.5D) and the lack of independent reviews and assessments of the GOES-R program early on in program development. Many of the recommendations are specifically designed to strengthen the administration and oversight of the satellite acquisition program. NOAA is supportive of the Department of Commerce’s efforts to address these issues, and will continue to collaborate with Department officials in taking aggressive actions to finalize and implement the necessary improvements in policies and procedures in these areas.

NOAA Response to OIG Recommendations

The draft Office of Inspector General (OIG) report states, “The Deputy Secretary should direct appropriate management officials to do the following:”

Recommendation 1: “Plan for additional GOES-R key decision point reviews in accordance with NPR 7120.5D guidance.”

Recommendation 2: “Conduct key decision point reviews in a manner consistent with NPR 7120.5D guidance, to include identifying the decision criteria as well as the roles and responsibilities of those involved, what information will be presented for the decision, and how independent reviewers will be consulted and their assessment results used.”

Recommendation 3: “If key decision point C/D or subsequent decision points are delegated to NOAA, ensure, in coordination with NOAA, that the Department and NOAA’s authorities are clearly delineated.”

Recommendation 4: “At all key decision points ensure any decisions made on the basis of assumptions or findings that differ from those of the independent assessments, including the independent cost estimate, are documented and the rationale explained.”

Recommendation 5: “Establish, in coordination with NOAA, thresholds and procedures for reporting and approving major deviations from GOES-R’s capability, cost, and schedule baseline, as well as enhancements to the baseline.”

Recommendation 6: “Complete and implement the Department’s major system acquisition policy. For satellite programs, ensure the policy incorporates the key decision points in NPR 7120.5D and requires comprehensive independent reviews at all key decision points.”

NOAA Response: Since these recommendations are directed to the Deputy Secretary of Commerce, and the Department is planning a separate response to the Office of Inspector General on these issues, NOAA will defer response on these recommendations to the Department. As stated previously, NOAA remains committed to working with Department officials to make necessary improvements in NOAA and Department policies and procedures to strengthen our oversight and administration of the satellite acquisition program.

The report also states: “The Under Secretary for Oceans and Atmosphere should direct appropriate management officials to do the following:”

Recommendation 7: “If the agency receives decision authority for decision point C/D and subsequent decision points, plan and document NOAA’s approach as described in recommendation 2 above to the Deputy Secretary.”

NOAA Response: NOAA agrees with this recommendation. NOAA and NASA are in the process of finalizing the GOES-R Management Control Plan (MCP) which will document the approach for decision point C/D and subsequent decision points. The review plan will not change in content or structure if milestone decision authority is delegated. For example, NOAA intends to meet all DOC oversight requirement responsibilities such as required DOC Acquisition Review Board (ARB) approvals.

Recommendation 8: “Describe in the management control plan or related documentation how NPR 7120.5D will be used for managing and overseeing the overall GOES-R program and ground segment, to include identifying planned deviations from NPR 7120.5D and describing the rationale for the deviations and compensating mechanisms that will be used.”

NOAA Response: NOAA agrees with this recommendation. NOAA and NASA are in the process of finalizing the GOES-R Management Control Plan (MCP) which will document how NPR 7120.5D will be implemented for all components of the GOES-R program. NOAA has adopted NPR 7120.5D as its basis for GOES-R program management. NASA has agreed that the MCP is sufficient to satisfy NASA requirements for implementation of NPR 7120.5D.