

**WRITTEN TESTIMONY OF
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE**

**OVERSIGHT HEARING ON THE
GOVERNMENT ACCOUNTABILITY OFFICE REPORT ON
NOAA'S WEATHER SATELLITE PROGRAM**

**BEFORE THE
COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES**

SEPTEMBER 29, 2006

Introduction

Chairman Boehlert, Ranking Member Gordon, and Members of the Committee, I am Conrad C. Lautenbacher, Under Secretary for Oceans and Atmosphere at the Department of Commerce (DOC) and head of the National Oceanic and Atmospheric Administration (NOAA).

Before I talk about satellites, I would like to thank Chairman Boehlert for his thoughtful leadership and friendship over the past several years. I truly appreciate the bipartisan manner in which you conduct the Science Committee and your strong support for NOAA. You and your staff have been good to work with – always thorough and fair. We will miss your leadership and wish you the best in retirement. I also want to thank Chairman Ehlers who, although he is not retiring, will no longer be our subcommittee chairman in the next Congress. Chairman Ehlers has invested a considerable amount of time and effort into learning our issues and become quite an expert on our agency. I personally appreciate your leadership and efforts to pass a NOAA Organic Act. By passing the Organic Act on the House floor last week, you accomplished something many Members had tried and failed to do over the last 20 years. It was a testament to your dedication and your abilities, and I thank you.

What are geostationary satellites?

While the Committee is familiar with NOAA's next generation polar-orbiting environmental satellite program (NPOESS), I am here to discuss NOAA's next generation Geostationary Operational Environmental Satellite Program, known as GOES-R. NOAA has operated geostationary satellites since the 1970s. These satellites - located more than 22,000 miles above the equator - provide images and data on atmospheric, oceanic, and climatic conditions over the continental United States and Hawaii. These satellites are best known for creating the hurricane pictures you see on television, but they also provide data to help forecast the weather and provide warnings for severe weather such as thunderstorms. We operate two geostationary satellites, one over the east coast and the other over the west coast. To protect against a loss of satellite coverage, we maintain a spare satellite on-orbit that can be repositioned to take the place of a failed satellite.

What is GOES-R?

The final two GOES satellites in the current GOES-N series have been built. We are in the early stages of the acquisition process for the next generation of GOES satellites, called GOES-R. Given the long lead time needed for satellite development, acquisition work is required now to ensure continuity of satellite coverage.

At first, we envisioned GOES-R as a satellite series that would contain significant technological advancements. We looked at ways to expand the use of GOES data for other NOAA missions, such as ocean and coastal observations that support fisheries management and marine research. The 2003 preliminary system design concept was for a combination of the five sensors to be flown on as many as eight satellites. The preliminary cost estimate of \$6.2 billion identified in the GAO report was developed in 2004 and presented in the FY 2006 President's Budget. This figure has been revised over time as the program has moved forward.

The five sensors included an advanced imager, a hyperspectral suite, two solar weather sensors, and a lightning mapper. The Advanced Baseline Imager (or A-B-I) is the main sensor which fulfills NOAA's critical mission requirements. This sensor will provide significant advancements over current GOES imagers by taking pictures five times faster and have the ability to zoom in to view specific severe weather events, while at the same time continue to look at the rest of the United States. We currently do not have this capability and must constantly make decisions about what to focus on, which impacts our ability to forecast weather. The Hyperspectral Environmental Suite (HES) was conceived as an advanced sounder and coastal water imager that would provide a profile of atmospheric temperature and moisture content used in weather forecasting and take images of coastal areas for water quality monitoring and coastal hazard assessment. The Solar Imaging Suite (SIS) will provide pictures of the sun to detect solar flares, while the Space Environmental in-Situ Suite (SEISS) will measure the space radiation environment. The Geostationary Lightning Mapper (GLM) will help us better detect lightning and improve our capabilities to forecast and track severe weather.

The planned launch readiness date - based on the projected life expectancy of current satellites and the requirement to preserve continuity of the imaging mission - was projected to be in 2012. NOAA reevaluates the need date for GOES-R based on the performance of the operational satellites; this analysis has led to revisions of the GOES-R launch date. Continuing analyses of our current satellites indicates that the on-orbit GOES satellites are lasting longer than predicted and a 2014 launch readiness date is now warranted.

As noted earlier, GOES-R is still in the design phase and we have yet to award a prime contract for acquisition of this satellite series. Presently, three contractor teams are developing preliminary designs and identifying program risks, and when they are finished, NOAA and the Department of Commerce will decide on the system design and award a contract. The ABI instrument is under contract and being developed, and the contract for development of the SEISS instrument was just signed. NASA is managing all of our sensor contracts and is providing technical guidance and support for the whole program.

Lessons Learned from NPOESS and Other Reviews

NOAA is applying lessons learned from the NPOESS program and other recent reviews of space systems. We are implementing these lessons into our management and acquisition strategy. We

have made significant changes to our GOES-R program management and oversight based on direction from this Committee, reviews from the Government Accountability Office (GAO), the DOC Inspector General, the recent NPOESS Nunn-McCurdy certification process, and our own internal reviews.

I created a NOAA Program Management Council chaired by my Deputy, which is made up of senior NOAA and NASA personnel and meets monthly to review the program. This group assesses the technical, budget, and schedule performance of the program. It reviews proposed new activities and/or changes in scope of the program to ensure risk and budget impacts to existing programs are understood and realistic. This group provides recommendations on whether the program should move forward at all major milestones, such as contract award, critical design reviews, test readiness reviews and launch readiness. The PMC can also recommend alternative actions including terminations. During these monthly meetings members openly question the program director and can request further information or actions the program office must fulfill. Each meeting begins with a review of any open action item.

In addition, I have a group consisting of the NOAA users of the satellite data, which also reports to my Deputy. As we designed the original concept for GOES-R, the user group developed the initial requirements and meets regularly to assess the extent to which the preliminary designs meet the requirements. This group is critical as we move forward with finalizing sensors and the satellite system to ensure GOES-R will meet NOAA's requirements for data and products.

As both of the groups report to my Deputy, it is his job to arbitrate any differences of opinions between the two groups. My Deputy and I meet regularly to discuss the recommendations from the groups and I make decisions based on these recommendations. We provide the Department of Commerce with quarterly briefings on the program and I brief the Deputy Secretary and Secretary as needed.

We have co-located the GOES-R program office at NASA Goddard Space Flight Center and are using the full capabilities and processes at NASA for the development of the GOES-R system. This includes NASA's processes for independent technical and engineering reviews. The program reports on a monthly basis to a NASA Program Management Council which is chaired by the Goddard Deputy Director

We hired a team of independent satellite experts to provide periodic reviews and address specific concerns raised by NOAA senior leadership. We also hired two cost estimating teams to independently develop the program estimates. One will work for the GOES-R program office and develop the Program Office Estimate. The other cost estimating team works for the NOAA Chief Financial Officer, who reports to my Deputy, to provide an Independent Cost Estimate. Our goal is to ensure that the program will have a realistic and executable budget in place that provides sufficient reserves to handle development issues that arise. NOAA also hired a highly competent and respected former NASA program manager, Anthony Comberiate, for the GOES-R program. The GOES-R program has increased staff to support robust systems engineering and oversight of the contractors, including on-site representatives at the prime contractors and at major subcontractors.

What did we learn about GOES-R?

As we proceed through the preliminary design phase, our three contractor teams and our Independent Review Team have provided feedback on our design concepts:

1. To actually build our concept for GOES-R would be much more expensive and riskier than we first thought;
2. One of the proposed sensors, the Hyperspectral Environmental Suite (HES) is not technologically mature enough, would impact the spacecraft and the ground systems, and would not allow us to launch in 2014; and
3. Further improvements could be made in the way the acquisition will be managed.

Based on this information we are revising our plans to ensure we have a program that maintains data continuity, allows for technical advances, and is affordable. The good news is that this is the right time to make changes to the plans – before we let a contract to build the satellites.

Why have the cost estimates increased so much?

The preliminary cost estimates to build this new system went from \$6.2 billion to around \$11.4 billion. Most of the increase was because we revised the inflation assumptions in our cost models, which added about \$2.6 billion to the total. The estimates were also revised to provide for increased management reserves/margins based on expert recommendations and lessons learned from NPOESS. This added an additional \$800 million. The cost of spacecraft, ground system and sensors increased about \$1.5 billion. The remaining increase covers the launch, operation and support segments of GOES-R. This increase in the life-cycle cost estimate reflects new inputs from NASA and others.

In response to the increasing cost estimates for the program, the program office assembled a team of cost and technical experts and developed multiple program options to reduce cost and risk. The team provided information to the PMC and the user group, which examined the options and provided me with recommendations. These recommendations are being considered and decisions will be incorporated in the FY 2008 President's Budget.

Why not build HES?

One decision we have made is not to award a contract to build the HES sensor given its risks and technological challenges. HES is a large and complex instrument. The combination of instrument development challenges, magnitude of required spacecraft accommodations, and ground product implications, provided a high level of risk. Given input from the Program Management Council, input from the program office, the contractor and the independent review team, I determined HES created too much risk for the GOES-R program. While HES potentially could have provided a major improvement in our ability to characterize the atmosphere and the coastal environment, we did not think it was prudent to accept that much risk in an operational satellite for an acquisition program. We are examining alternate ways to maintain today's sounding capability for GOES-R. While not including the HES on GOES-R we are going to complete the HES preliminary design and risk reduction work that is currently under contract. This work will be of value to the user group which is actively working this issue with the program office as I have also asked the program office to look at alternatives to add a HES-like instrument on research satellites or future GOES satellites. Fulfilling the coastal waters component of the sounder capability remains a NOAA priority. NOAA has initiated a separate analysis of alternatives to examine possible future approaches for providing hyperspectral sounding and coastal waters imaging.

In addition to architectural changes, we have decided to provide the sensors to the prime contractor as Government Furnished Equipment. This will ensure more direct Government oversight of these critical developments allowing the prime contractor to focus on the spacecraft, ground system, and integration. We are also examining the division of labor between NOAA and NASA. In the past, NOAA has provided the funding and NASA managed the contract for NOAA. We are discussing with NASA whether this model is the most appropriate one for the GOES-R Program.

The GAO Report

We have also provided information to the GAO about GOES-R, which is why we are here today. I am pleased the GAO report recognizes we continue to incorporate the lessons learned from problems of other satellite programs into the GOES-R procurement. I realize more remains to be done and I am committed to doing it.

Specifically, the GAO provided three recommendations:

Recommendation number one: *Once the scope of the program has been finalized, establish a process for objectively evaluating and reconciling the government and independent life-cycle cost estimates.*

We will establish a process to reconcile the cost estimates, and I will ensure this process is reviewed by our Independent Review Team. We will examine how NASA and the Department of Defense reconcile cost estimates and tailor a process that is most appropriate for NOAA.

Recommendation number two: *Perform a comprehensive review of the Advanced Baseline Imager Sensor (called A-B-I) before it enters production.*

The report highlights the problems the contractor is experiencing with ABI, the one sensor in actual development. This sensor fulfills our mission critical imaging requirements. NOAA and NASA are working closely to ensure performance of the instrument meets these requirements. We believe we understand the current technical problems and the contractor has a realistic plan to develop the sensor. Given the importance of this instrument and lessons learned from the NPOESS Visible/Infrared Imager/Radiometer Suite (VIIRS) sensor, I agree with GAO that we need to ensure we are technologically ready to move forward through the critical milestones of development and production. NASA has several reviews of the sensor planned by government experts outside of the program, and NOAA will have independent experts regularly assess the progress of the sensor development at critical phases along with reviews by the NOAA PMC. GAO was also concerned about the potential for ABI cost overruns and schedule delays. We agree with GAO and we have budgeted for additional cost and schedule contingencies in line with GAO estimates to cover these challenges. We believe these actions will ensure the sensor will be ready to fly in 2014.

Recommendation number three: *Seek assistance from an independent review team to determine the appropriate level of people and resources needed to track and oversee the contractor's performance using specific metrics.*

We agree with GAO about the importance of monitoring critical metrics that help illuminate the cost and schedule performance of the contractors. NOAA is hiring at least three additional people to aid in the implementation of Earned Value Management program management. As the program

grows, we will adjust accordingly while seeking input and advice from NASA experts and our Independent Review Team.

What are NOAA's next steps?

Given the analysis that our preliminary concepts for GOES-R are significantly riskier and more expensive than previously thought and would likely not be ready for a 2014 launch, NOAA and DOC are reevaluating the GOES-R program. As we evaluate and attempt to balance cost, schedule, risk, and performance, our number one priority is to ensure continuity of existing imagery data.

We are providing the three contractor teams developing the preliminary designs for GOES-R three additional months. We want them to refine their designs by removing the HES sensor and providing at least existing sounding capability. We instructed them to develop a system that will have the remaining four sensor suites on each satellite, thus reducing the minimum number of satellites needed from three to two. We expect to have the preliminary design proposals at the end of this year. Then the program office, the PMC and the user group will provide me with recommendations on the final design for GOES-R, which will include the cost, schedule, performance and risk for the program. I will then provide my recommendations to the Secretary who will decide whether to move forward with a contract. It will then be about one year to develop and award a contract, which would occur in the summer of 2008.

Conclusion

As I have said before, satellites are very complicated and difficult machines to build. But, their capabilities are critical to NOAA's mission to predict the Earth's environment. I believe we are making significant strides in developing a better process for designing and acquiring our satellites. My goal is to have a process in place that will provide my successors with the best information to make the best decisions.

Once again, I appreciate the efforts of the Committee, in particular Chairman Boehlert, in working with us as we develop this process. I would be happy to answer any questions you may have.