

**GAO'S REPORT ON THE STATUS
OF NOAA'S GEOSTATIONARY
WEATHER SATELLITE PROGRAM**

HEARING
BEFORE THE
SUBCOMMITTEE ON ENERGY AND
ENVIRONMENT
COMMITTEE ON SCIENCE AND
TECHNOLOGY
HOUSE OF REPRESENTATIVES
ONE HUNDRED TENTH CONGRESS

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**GAO'S REPORT ON THE STATUS OF NOAA'S
GEOSTATIONARY WEATHER SATELLITE
PROGRAM**

TUESDAY, OCTOBER 23, 2007

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, DC.

The Subcommittee met, pursuant to call, at 2:08 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Nick Lampson [Chairman of the Subcommittee] presiding.

BART GORDON, TENNESSEE
CHAIRMAN

RALPH M. HALL, TEXAS
RANKING MEMBER

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The Subcommittee on Energy and Environment

Hearing on

**GAO's Report on the Status of
NOAA's Geostationary Weather Satellite Program**

2318 Rayburn House Office Building
Tuesday, October 23, 2007
2:00 - 4:00 P.M.

Witness List

Mr. David Powner

*Director, Information Technology Management Issues,
Government Accountability Office (GAO)*

Ms. Mary Ellen Kicza

*Assistant Administrator for Satellite and Information Services,
National Oceanic and Atmospheric Administration (NOAA)*

HEARING CHARTER

**SUBCOMMITTEE ON ENERGY AND ENVIRONMENT
COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES**

**GAO's Report on the Status
of NOAA's Geostationary
Weather Satellite Program**

TUESDAY, OCTOBER 23, 2007
2:00 P.M.—4:00 P.M.

2318 RAYBURN HOUSE OFFICE BUILDING

Purpose

The Subcommittee on Energy and Environment meets on October 23, 2007 to continue oversight on the next-generation Geostationary Operational Environmental Satellite (GOES) program. The Government Accountability Office has been continuing its evaluation of progress made by the National Oceanic and Atmospheric Administration at the request of the Subcommittee, and will release their new report.

Witnesses

**Mr. David Powner, Director, Information Technology Management Issues,
Government Accountability Office**

Mr. Powner is the head of the GAO team that has supported the Subcommittee's oversight of NOAA's major satellite programs for the past five years. GAO will discuss the findings and recommendations on NOAA's management of the GOES-R satellite program in the report it will release at the hearing.

**Ms. Mary Ellen Kicza, Assistant Administrator for Satellite and Information
Services, NOAA**

Ms. Kicza leads the National Environmental Satellite, Data and Information Systems (NESDIS) at NOAA, which operates both the geostationary and polar constellations of weather satellites. Formerly NASA's Associate Deputy Administrator for Systems Integration, she was hired by NOAA to bolster efforts to improve satellite program management in the wake of the severe problems suffered by the National Polar-Orbiting Operational Environmental Satellite (NPOESS) program. Ms. Kicza now has the responsibility for execution of the GOES program to be discussed today, and will provide NOAA's response to the GAO report.

Background*Watching the Western Hemisphere*

GOES satellites orbit 22,300 miles above the Earth's equator, an altitude where their orbital velocity matches the speed of Earth's rotation. As a result, these satellites maintain the same relative position over a particular point on the planet, and can look down to take pictures of weather patterns over the entire Western Hemisphere. A prototype satellite was launched in 1974; the first GOES satellite went into orbit in 1975. Today, normal practice has two GOES satellites in orbit simultaneously, with one focused on each of the U.S. coasts (GOES-11 and GOES-12). A third (GOES-13) is also kept in space as a spare to assure uninterrupted coverage.

These satellites are NOAA's primary sources for images and other data that support the National Weather Service units forecasting severe weather. The Severe Storm Center uses GOES to track tornadoes, hailstorms and other weather events threatening life and property over land. For the Hurricane Center, GOES can allow them to see developing storms in the areas of the oceans where there are no other observational sensors. Nightly weather reports at the Nation's local weather stations regularly bring GOES pictures into homes across America. GOES would probably be the one satellite NOAA's forecasters would vote to save if they were allowed to keep only one.

Keeping the Orbital Slots Full

The current GOES-R development program is the third major procurement for GOES satellites since NOAA assumed responsibility for funding its own geostationary operational satellites in 1982. In the previous instances, NOAA purchased five GOES-Next satellites in the period from 1985–2001, and then contracted for four GOES-N satellites for the years 1998–2001. The first GOES-N model launched in May 2006 to be the on-orbit spare¹ while GOES-O and GOES-P have been completed and are in storage for later launches. NOAA in 2002 decided not to complete the GOES-Q satellite because the existing satellites were exceeding their expected lifetimes by significant margins.

The GOES-R program was to represent the first major upgrade to the satellite sensors since GOES-8 went into orbit in 1994. As originally planned, NOAA would buy **four satellites** and intended to spend \$6.2 billion for the life cycle period 2007–2020. **Launch of the first satellite was expected in 2012.** As it had with the NPOESS program, NOAA issued instrument contracts with the intent to later transfer them to the contractor that would win the prime contract for the overall satellite system. NOAA also intended to take on the overall responsibility for procurement of the entire satellite system, including the spacecraft, instruments, ground systems and integration. NOAA told GAO that this management structure would “. . .streamline oversight and fiduciary responsibilities. . .”² in the program and overcome barriers that NOAA believed “. . .limited the agency’s insight and management involvement in the procurement of major elements of the system.”³

By the time the Committee met for GAO’s first report on the GOES-R program last September, some significant changes had been made. NOAA Administrator Lautenbacher informed Members that the cost estimate for the original program had risen to **\$11.4 billion**. As a result, the agency **reduced the number of satellites to be purchased by half, to two**. The **second major instrument, the Hyperspectral Environmental Suite, was removed** because the technical challenge was deemed too great. Finally, **first launch availability would now be December 2014**. With these changes, the program’s new life cycle (2003–2028) cost estimate reflected in the President’s FY 2008 budget request, was **\$6.96 billion**.

Responding to recommendations from an Independent Review Team (IRT) chaired by former Lockheed Martin President Tom Young, NOAA also determined in March that the GOES-R program should not follow the same acquisition strategy as NPOESS. Rather than a single prime contractor, there would be a contract for space systems managed for NOAA by NASA’s Goddard Space Flight Center and a separate contract for those system elements on the ground to be managed by NOAA. The IRT argued that this would allow NOAA to benefit from the expertise in both agencies. Instruments for the spacecraft would be acquired by NASA and supplied as government-furnished equipment to the satellite contractor. NASA should take on the responsibility for system integration. GOES-R was the first program to be taken on by a new Program Management Council at NOAA, where senior agency managers from NOAA would review progress on a monthly basis. Space elements will also undergo review by management councils at Goddard Space Flight Center.

GAO’s Progress Report

I. Does NOAA buy GOES-R?

GAO’s first finding is that the change in acquisition strategy has delayed NOAA’s decision to move forward on the acquisition of GOES-R, originally planned for last month. This would have the effect of stalling the competitions for both program segments (the space segment contract was expected to be releases in May 2008, followed by the ground system contract in August 2008). According to a briefing for Committee staff on September 21, the Independent Review Team reported to NOAA that they believed the ground system segment definition was some 6–12 months behind the point it needed to be to permit the agency to seek bidders. NOAA now has a tiger team at work to satisfy the IRT concerns. The agency hopes to be able to minimize the differences in schedule between the two system elements.

With the effort NOAA has devoted to the GOES-R program, it is highly unlikely that a decision would be made not to go forward at this point. However, it is a reasonable question to ask whether the increase in capability offered by the proposed

¹ While on the ground, GOES satellites have a letter designation based on the order in which they were built. After launch, checkout and acceptance testing in orbit, it is changed to a number. Therefore, GOES-N is now identified as GOES-13.

² Statement of David Powner before the Subcommittee on Energy and Environment, September 29, 2006; p. 9.

³ *Supra.*, p. 8.

program justifies the significant increase in cost per satellite. Originally the GOES-N series of satellites was to incorporate new capabilities beyond those provided by GOES I-M. Instead, they proved to be quite similar in capability to their predecessors. What would be the cost to NOAA of a decision not to pursue GOES-R in favor of continued purchases of the existing GOES design? How difficult would it be to carry out that decision?

II. What Will GOES-R Cost?

Cost estimating is the bane of large, complex programs at federal agencies, particularly when technical boundaries are being challenged. GAO reports that the cost estimates prepared by the program office and by an independent team differed by some \$2.4 billion—while the program office continued to cost the program at \$6.9 billion, the independent team concluded that the program as currently designed would cost \$9.3 billion. Both estimates are reported at the 80 percent confidence level (i.e., there is an 80 percent chance that if all of the assumptions in the cost models prove accurate, then the program will ultimately cost the amount calculated by the respective models).

GAO concluded, after reviewing the materials provided by NOAA, that the \$6.9 billion estimate is likely to rise. NOAA vigorously challenges GAO's conclusion. The agency questions GAO's evaluation of the inflation assumptions used in both estimates, and notes that as the agency has worked to reconcile the different estimates, the independent team's estimate in this area now uses DOD-standard inflation assumptions and is now \$600 million above the program office estimate. NOAA stated in its response to GAO that "[t]he most conservative estimates at the 80 percent confidence intervals bring the [program office estimate] within 12 percent of the ICE [independent cost estimate], or \$1.032 billion below the ICE [\$9.3 billion]." If NOAA's statement is accepted as accurate, this indicates that the **reconciled cost estimate to be submitted in the FY 2009 President's budget request it will be somewhere in the vicinity of \$8 billion—\$1 billion over the current estimate.**

GAO also reports that the independent cost estimating team is skeptical of the December 2014 launch availability for GOES-R. They believe there is an even chance that GOES-R would be ready for launch in October 2015, and an 80 percent chance that March 2017 will be the date. Again, NOAA responds that there is only an 11-month difference between the program's December 2014 date and the independent estimators accept this as reasonable. GAO believes that the date should be compared to the later March 2017 date, which represents the 80 percent confidence level.

III. Tracking Risk

GAO discussed the current types of risks being tracked by the GOES program office and the managers of the space and ground segment. There are no high-risk (where something that could seriously disrupt the program is judged to have a high probability of happening) issues currently identified, and NOAA has already addressed some, such as solidifying the program requirements document.

GAO noted that the risk analysis for the ground segment identified "...schedule interdependencies between the flight and operations projects offices as a medium criticality risk, but that neither the flight project office or the program identified this risk even though it is relevant to both." GAO recommended that NOAA maintain a program-level list of risk; NOAA has agreed and has made this a responsibility of the systems integration division. The Program Director will also provide monthly updates to the NOAA Program Management Council on the full risk list.

GAO also recommended adding three other risks to the new consolidated list. The first involved vacancies in key management positions. The System Program Director (SPD) is currently operating in an acting role (although she has extensive experience with GOES-R as a result of her position as Deputy Assistant Administrator for Systems in NESDIS). The Deputy System Program Director position is also filled in an acting role. The new Assistant SPD went on duty on September 4. NOAA is currently running a competition for the Program Director and will begin a new one for the Deputy position (no acceptable candidate was selected after the first competition). The need for stable, long-term expertise in leadership positions for programs like GOES-R is often cited as a lesson learned from previous program failures.

In its report, GAO notes that the Advanced Baseline Imager (ABI), the most critical sensor aboard GOES-R, is operating with only a one percent management reserve held by the contractor. This is, of course, far too low; reserves for instrument development normally are no lower than 20 percent. NOAA responds that the GOES-R program will maintain reserves in both of the project offices and at the program level. Instrument contractors will draw reserves from the overall reserve

maintained by the Flight Project and, if necessary, from the Program Office. The acting Program Director believes this plan requires extensive and continuing oversight by the Flight Project Manager in order to avoid depleting that reserve, and to allow NOAA to keep control of the reserve. GAO noted that the ABI has already suffered from technical and cost challenges that have led to one re-baselining and call on the Project Office reserve. The Project Office reserve dropped to 15 percent in July, although NOAA indicated in its comments that it has been increased to 20 percent. GAO estimates that the ABI program has some 40 percent of its work remaining and believes that the impact it has had on the existing reserve, even before GOES-R enters the development and production phase, indicates trouble in the future.

Finally, GAO and NOAA disagree about the level of insight NOAA has into NASA's management of the program's space segment. In July 1991, reviewing the development of the GOES-Next satellites (what became the I-M satellites currently in service), GAO reported to the Committee that the project was in serious trouble. Among the reasons was that NOAA did not require NASA to conduct appropriate engineering analyses before development of the satellites began (due to fiscal constraints and pressure to make the new satellites available for launch). Senior officials in the National Weather Service also said that NESDIS and NASA did not tell them that the solution to the instrument-pointing accuracy requirements would be very complex and difficult to accomplish. One of the reasons NOAA originally intended to serve as the program integrator was to overcome such communication problems.

GAO believes that the interagency agreement NOAA and NASA reached to govern the GOES-R program does not give NOAA—which is responsible for funding and executing the program—enough knowledge of contractor performance in the space segment managed by NASA. While NOAA receives contractor cost data from NASA, GAO questions if it is sufficient for NOAA to raise questions about its validity only with NASA. NOAA's response argues that with NOAA persons working in the Flight Project office at Goddard Space Flight Center, there will be extensive day-to-day oversight. The Program Office and Flight Project office will interact regularly. Further, NOAA personnel will participate in the NASA technical reviews during the program even before the monthly Program Management Council review at NOAA Headquarters. This is a risk that involves the differing cultures of the two agencies and will be reduced as NOAA assigns personnel with the appropriate technical expertise and experience to its positions in the GOES-R management structure.

The Sounder of Tomorrow

As noted earlier, one of the major changes to the GOES-R program was the decision to eliminate the Hyperspectral Environmental Suite (HES). This instrument was intended to enhance the ability to look down through the atmosphere to determine the temperature and moisture levels at various altitudes. Such data are critical inputs to forecasting models used by the National Weather Service. In the case of hurricane forecasting, the sensor is being designed to provide more refined measurements of winds surrounding the core of hurricanes to identify steering winds and better predict the storm's path. HES was also intended to improve our capability to monitor the waters of the continental shelf and coastal areas. NOAA states that it will be possible to use the Advanced Baseline Imager, combined with data from weather balloons and other sensors, to obtain results equivalent to that produced by the sounder now aboard the existing GOES satellites to meet the agency's needs when GOES-R becomes operational.

The recent National Research Council Earth Science Decadal Survey recommended that “. . . NOAA develop a strategy to restore the previously planned capability to make high temporal- and vertical-resolution measurements of temperature and water vapor from geosynchronous orbit.”⁴ At the time, NOAA had three contracts to identify ways to reduce risk in the HES instrument outstanding, and the Survey members suggested extending them to seek some option for providing improved sounding capability on GOES-R. While NOAA ultimately decided to allow the contracts to expire, the contractors involved have stated to Committee staff that sufficient insight has been gained to demonstrate an improved sounder aboard GOES-R. Although it would not be capable of meeting the original requirements for HES, it would represent a marked improvement over the existing sounder. However, in April, Administrator Lautenbacher announced there would be no new geo-

⁴ National Research Council. *Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond*. National Academies Press, 2007; p. 2–11.

stationary capability until at least GOES-T. Ms. Kicza stated at the time that alternatives for a future sounder would be explored.⁵

NOAA has now canceled a major instrument on each of its next-generation satellite systems after investing significant resources (the Conical Microwave Imaging Sounder on NPOESS being the other), thereby reducing the chance for improved performance over existing satellites. In both cases, the agency said that the instruments proved too challenging. It emerged later, however, that in both cases it was the pursuit of a particular measurement (ocean color for HES and soil moisture for CMIS) that proved to be the bottleneck. NOAA's process for developing requirements and managing the trade-offs invariably required when operating on technology's leading edge proves the perceptiveness of Voltaire's observation that "the best is the enemy of the good." One of the key issues for the Committee is to examine how we can improve the process for developing and acquiring advanced technologies for environmental monitoring and weather forecasting while maintaining cost control over the development and acquisition of satellite systems.

⁵ Iannotta, Ben. "Temperature and Humidity Sounder Will Not Fly on GOES-R." *Space News*, April 16, 2007; p. 10.

Chairman LAMPSON. This hearing will come to order. I wish you a good afternoon. The Subcommittee on Energy and Environment meets today for a report on the Geostationary Operational Environmental Satellite or GOES Program. Satellites which have been serving America since 1975, watch over the whole Western Hemisphere from their positions 22,300 miles about the Earth. They send back the pictures that your local weather reporter shows you every night. Those satellites provide the dramatic pictures of hurricanes that we all see when these storms are churning toward the coast. They enable forecasters to alert us that severe weather is on the way. It is the weather satellite no one wants to be without, especially those of us who represent the coastal areas.

Designing and flying satellites is a difficult business, and even with years of experience there are always frustrations in bringing new ones into service. In the early 1990s, the General Accounting Office told Congress that the generation of GOES satellites then in development was in serious trouble. The instruments were behind schedule, the program cost had more than doubled, and it still was not clear when the satellites would be launched. At least today we are not in the position of having the last GOES satellite in orbit with its fuel tanks almost empty.

Last year, NOAA Administrator Lautenbacher told us that the GOES Program cost estimates had almost doubled, and in order to bring them back within the agency's limited budget, he was cutting the number of satellites in half and eliminating one of the major instruments. An independent review team took issue with NOAA's intent to manage the GOES Program by itself, questioning whether there were enough people in the agency who know how to handle satellite design and development. The Earth Science Decadal Survey issued earlier this year by the National Research Council urged NOAA to find a way to recover the capability represented by the eliminated sensor. Our GAO team recommended a full-scale review of the Advanced Baseline Imager, the primary sensor, and bolstering the agency's management capability.

NOAA has been responding to all this advice, as Mr. Kicza will explain in her testimony. The agency decided that it did not or that it did have to ask NASA for help and has given its sister agency the responsibility to manage those elements of the GOES Program that will fly in space. It will apply its own special expertise to the grand side of the program. It has brought over NASA staff to supplement its own program and project managers. It completed the review of the Advanced Baseline Imager. Today it is at the point where the decision has to be made to buy GOES-R. That makes it a good time to see where we are.

Mr. Powner from GAO has some important messages to bring out in his statement. It appears that the program cost estimate will be around \$8 billion by the time we receive the President's budget request this year. This is some \$1 billion more than the estimate Admiral Lautenbacher gave us last year. That is not a good trend. It concerns me to find out that we are operating with both an acting program director and an acting deputy program director, and that NOAA's first attempt to fill the deputy's slot couldn't find someone for the job. There appears to be strong disagreement between our witnesses about the relationship between NOAA and NASA in

terms of managing the space segment of the GOES Program. I trust Ms. Kicza will discuss that with us.

The Chair of NOAA's Independent Review Team, Tom Young, knows from his own experience and many reviews of what went wrong in other satellite programs, where to look to figure out how well a project like GOES is progressing. He has told us that the opportunity to get GOES right is there.

So I hope today's hearing will keep GOES moving in the right direction. I thank you for being here, and I recognize the Ranking Member, Mr. Inglis, for his opening remarks.

[The prepared statement of Chairman Lampson follows:]

PREPARED STATEMENT OF CHAIRMAN NICK LAMPSON

Good afternoon. The Subcommittee on Energy and Environment meets today for a report on the Geostationary Operational Environmental Satellite, or GOES, program. These satellites, which have been serving America since 1975, watch over the whole Western Hemisphere from their positions 22,300 miles above Earth. They send back the pictures that your local weather reporter shows you every night. GOES satellites provide the dramatic pictures of hurricanes that we all see when these storms are churning toward the coast. They enable forecasters to alert us that severe weather is on the way. It's the weather satellite no one wants to be without, especially those of us who represent coastal areas.

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Thank you, and I recognize the Ranking Member, Mr. Inglis, for his opening remarks.

Mr. INGLIS. Thank you, Mr. Chairman. Thank you for holding this hearing on the Geostationary Operational Environmental Satellites-R Series. This hearing continues close oversight of this vital weather satellite program, oversight that started in the last Congress.

Last September the Government Accountability Office came before the Science Committee to report on the status of GOES-R series procurement. GAO also made recommendations on how to proceed so as to avoid any further cost overruns while ensuring that technological development stays on schedule.

More than a year later we are meeting again with witnesses from GAO and NOAA to discuss the status of the GOES-R Program. However, there are disagreements this time around about GAO's assessment of where program development stands.

I look forward to hearing if and why NOAA disagrees with GAO's assessment that the project costs will be nearly two billion more than last year's outlook, and why the satellites may not be ready for launch until as late as 2017.

I am particularly concerned that possible launch delays will result in discontinuity of valuable forecasting data, the kind of data that the Chairman was just referencing. If GOES-R fails to launch until 2017, and doesn't come online until 2019, will NASA, NOAA, and weather forecasters lose access to the information they need to accurately predict and observe storms?

Those of us responsible for this program, Congress, NOAA, and NASA, cannot lightly allow delays and cost overruns. GOES-R today is a \$6.9 billion program for two satellites. That is a lot of taxpayer money. We expect that investment to provide a series of weather satellites that are launched on time and provide data to ensure the most accurate possible weather forecasting and modeling.

I look forward to hearing from our witnesses today and yield back the balance of my time, Mr. Chairman.

[The prepared statement of Mr. Inglis follows:]

PREPARED STATEMENT OF REPRESENTATIVE BOB INGLIS

Good afternoon. Thank you, Chairman Lampson, for holding this hearing about the Geostationary Operational Environmental Satellites-R series (GOES-R). This hearing continues close oversight of this vital weather satellite program, oversight that started under Republican leadership of this committee.

Last September, the Government Accountability Office came before the Science Committee to report on the status of the GOES-R series procurement. GAO also made recommendations on how to proceed so as to avoid any further cost overruns while ensuring that technological development stays on schedule.

More than one year later, we are meeting again with witnesses from GAO and the National Oceanic and Atmospheric Administration to discuss the status of the GOES-R program. However, there are disagreements this time around about GAO's assessment of where program development stands. I look forward to hearing if and why NOAA disagrees with GAO's assessment that the project costs will be nearly \$2 billion more than last year's outlook, and why the satellites may not be ready for launch until as late as 2017.

I'm particularly concerned that possible launch delays will result in discontinuity of valuable forecasting data. If GOES-R fails to launch until 2017, and doesn't come online until 2019, will NASA, NOAA, and weather forecasters lose access to the information they need to accurately predict and observe storms?

Those of us responsible for this program, Congress, NOAA, and NASA, cannot lightly risk delays and cost overruns. GOES-R today is a \$6.9 billion program for two satellites. That is a lot of taxpayer money. We expect that investment to provide a series of weather satellites that are launched on time and provide data to ensure the most accurate possible weather forecasting and modeling.

I look forward to hearing from our witnesses today and yield back the balance of my time.

Chairman LAMPSON. Thank you, Mr. Inglis. I ask unanimous consent that all additional opening statements submitted by Subcommittee Members may be included in the record. Without objection, so ordered.

[The prepared statement of Mr. Costello follows:]

PREPARED STATEMENT OF REPRESENTATIVE JERRY F. COSTELLO

Mr. Chairman, I appreciate the Subcommittee revisiting the issue of how the development of the GOES-R satellite system is progressing. This is an important subject given the dependence we have on geostationary weather satellites for weather forecasting. The American public has grown very accustomed to up-to-the-minute weather information, particularly regarding hurricanes and other severe storms. Given the loss of life and property that are at stake in these situations, maintaining a robust program is essential. As we know, satellite development is extremely complex, but is critical to the ongoing performance of the GOES series.

The new GAO report to be released today expresses some continued concerns about the GOES-R program, particularly surrounding the cost estimate and the interaction between NOAA and NASA. It also indicates that some progress has been made, and I look forward to hearing more details from Ms. Kicza about how NOAA is working to improve the overall performance of its satellite delivery.

Mr. Chairman, oversight of federal spending is one of our most basic responsibilities. As I have said before, it becomes even more important in an era of reduced budgets. I again commend you for holding today's hearing and appreciate the time and expertise of our witnesses.

Chairman LAMPSON. It is my pleasure today to introduce our witnesses. Mr. David Powner, who is the Director of Information Technology Management Issues at the Government Accountability Office. He is the head of the GAO team that has supported the Subcommittee's oversight of NOAA's major satellite programs for the last five years.

And Ms. Mary Ellen Kicza is the Assistant Administrator for our Satellite and Information Services and leads the National Environmental Satellite Data and Information Systems, NESDIS, at NOAA, which operates both the geostationary and polar constellations of weather satellites.

We welcome both of you.

You will each have five minutes for your spoken testimony. Your written testimony will be included in the record for the hearing, and when you both have completed your testimony, we will begin with questions. Each Member will have five minutes to question the panel, and we will get to that in a few minutes.

Mr. Powner, we will begin with you, please.

STATEMENT OF MR. DAVID A. POWNER, DIRECTOR, INFORMATION TECHNOLOGY MANAGEMENT ISSUES, GOVERNMENT ACCOUNTABILITY OFFICE

Mr. POWNER. Chairman Lampson, Ranking Member Inglis, and Members of the Subcommittee. We appreciate the opportunity to testify this afternoon on our GOES-R report completed at your request. Your early oversight, Mr. Chairman, has been essential to

ensure that NOAA is effectively planning for this critical satellite acquisition.

Today, as requested, I will provide an update on the GOES-R current cost and schedule estimate, our assessment of whether NOAA is adequately addressing key technical and programmatic risks, and recommendations going forward.

Last September when we testified before you, Mr. Chairman, we discussed GOES as a fourth satellite program costing over \$6 billion in the cost and scope uncertainties. Specifically, the cost was approaching \$12 billion double the original estimate.

Since that time the program dropped a complex sensor, decreased the number of satellites from four to two, and revised its lifecycle cost estimate to \$7 billion with the launch of the first satellite in 2014. As the program approaches critical contract award dates next year, the program cost estimates are growing, and schedules are being extended. Independent studies estimate that the two satellite program will cost about \$2 billion more than the current \$7 billion program, and the first satellite is to be delayed two years.

The reasons for the differences between the independent estimate and NOAA's estimate include differences in government costs, the space and ground segments, and different assumptions regarding inflation. No one commenting on our draft report told us that the revised estimate is likely to go up \$1 billion and have about a year delay.

However, this revised estimate is not expected to be released until February of next year with the President's 2009 budget. Two points regarding the cost estimate. First, most satellite programs overrun even the most conservative independent cost estimate, and second, we remain concerned that an estimate is being developed more based on how acceptable it is in the next budget cycle rather than whether it is a true reflection of what the program will cost.

Turning to risks, NOAA has established a solid risk management program. Specifically, it has identified key risks and put in place mitigation plans. For example, key risks include the lack of an integrated master schedule and technical risks associated with Advanced Baseline Imagery (ABI) sensor.

However, we found several areas for improvement. We found inconsistencies among GOES-R's different risk lists. For example, the ground segment identified interdependencies among the space and ground segments as a key risk but the space nor the overall program identified this.

We, therefore, recommended that NOAA use a program-wide list that is reconciled with other risk activities. NOAA acknowledged that this is needed and now has an updated program-wide risk list.

We also found that several important key risks were not being acknowledged and made recommendations that NOAA acknowledge these risks, develop mitigation plans, and report the status of these key risks to senior executives. These risks include key leadership positions that need to be filled, NOAA's limited insight into NASA's deliverables, and the early depletion of management reserves, expanding on each of these. Two senior GOES-R Program positions, the system program director and the deputy director, are currently

filled by personnel in acting capacities. NOAA's working aggressively to fill these positions.

In prior GOES acquisitions an issue with NOAA's limit was NOAA's limited insight into the portions of the procurement managed by NASA. During our review we heard that this continues to be an issue. In particular, when it comes to NOAA's ability to review key costs and schedule information for the space segment that NASA is responsible for.

NOAA disagreed with our assessment recommendation in this area and has reported an unparalleled level of transparency between the two agencies. Given the past problems NOAA has experienced obtaining insights into NASA's contracts, we believe that NOAA should acknowledge this risk and manage it appropriately.

We also remain concerned about the early depletion of management reserves at the early stage of this acquisition. NOAA has downplayed the risk, stating that their overall program reserve is consistent with best practices. We, however, believe that this should be managed aggressively since it is likely to result in increased program costs.

In summary, Mr. Chairman, NOAA is positioning itself to more effectively manage the GOES-R acquisitions. However, moving forward a realistic cost and schedule estimate is needed, as is even more aggressive risk management.

This concludes my statement. Thank you for your oversight of this important satellite acquisition.

[The prepared statement of Mr. Powner follows:]

PREPARED STATEMENT OF DAVID A. POWNER

Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to participate in today's hearing on the planned Geostationary Operational Environmental Satellites-R series (GOES-R) program. The GOES-R series is to replace the current series of satellites, which will likely begin to reach the end of their useful lives in approximately 2014. This new series is expected to mark the first major technological advance in GOES instrumentation since 1994. It is also considered critical to the United States' ability to maintain the continuity of data required for weather forecasting through the year 2028.

As requested, our testimony summarizes the report we issued today on the GOES-R program. Specifically, we (1) assessed the status and revised plans for the GOES-R procurement and (2) evaluated whether the National Oceanic and Atmospheric Administration (NOAA) is adequately mitigating key technical and programmatic risks facing the GOES-R program.¹ In preparing for this testimony, we relied on our work supporting the accompanying report. That report contains a detailed overview of our scope and methodology. All of the work on which this testimony is based was performed in accordance with generally accepted government auditing standards.

Results in Brief

NOAA has made progress on its GOES-R procurement—which is estimated to cost \$7 billion and scheduled to have the first satellite ready for launch in 2014—but costs and schedules are likely to grow.

Specifically, NOAA completed preliminary design studies of its GOES-R acquisition and planned to make a decision to proceed to development and production in September 2007. In addition, the agency recently decided to separate the space and ground elements of the program into two separate contracts to be managed by the National Aeronautics and Space Administration (NASA) and NOAA, respectively. However, this change in the GOES-R acquisition strategy has delayed the decision

¹ GAO, *Geostationary Operational Environmental Satellites: Progress Has Been Made, But Improvements Are Needed to Effectively Manage Risks*, GAO-08-18 (Washington, D.C.: Oct. 23, 2007).

to proceed with the acquisition. Further, independent estimates are higher than the program's current cost estimate and convey a low level of confidence in the program's schedule. Independent studies show that the estimated program could cost about \$2 billion more, and the first satellite launch could be delayed by two years. As NOAA works to reconcile the independent estimate with its own program office estimate, costs are likely to grow and schedules are likely to be delayed. However, NOAA officials stated that while their reconciliation process is still ongoing, the revised cost estimate will likely be \$1 billion more than the current \$7 billion and the first satellite launch will likely be delayed one year from 2014, rather than two years.

To address cost, schedule, and technical risks, the GOES-R program has established a risk management program and has taken steps to identify and mitigate selected risks. For example, as of July 2007, the program office identified the lack of an integrated master schedule as its highest priority risk. It also identified other risks including technical challenges affecting the development of a critical instrument and the development of requirements between the space and ground segments. The program has also established plans for bringing these risks to closure. However, more remains to be done to fully address risks. Specifically, the program has multiple risk watch lists that are not always consistent. Further, key risks are missing from the risks lists, including risks associated with unfilled executive positions, limitations in NOAA's insight into NASA's deliverables, and insufficient funds for unexpected costs (called management reserve). As a result, the program is at risk that problems will not be identified or mitigated in a timely manner and could lead to program cost overruns and schedule delays.

To improve NOAA's ability to effectively manage the GOES-R procurement, in our report being released today, we are making recommendations to ensure that the GOES-R program office manages, mitigates, and reports on risks using a more comprehensive program-level risk list. In written comments, the Secretary of Commerce agreed with our recommendations to use a program level risk list and to add selected risks to its list, but disagreed that NOAA has insufficient insight into NASA's contracts. The Secretary cited an unparalleled transparency between the two agencies. However, NOAA has not demonstrated that it has validated NASA's contractor performance and we remain concerned that NOAA lacks the capability to oversee this important aspect of the program. Given the past problems NOAA had in obtaining insight into NASA's contracts and the importance of this interagency relationship to the success of the GOES-R program, we believe that this issue should be managed and monitored as a risk.

Background

Since the 1960s, geostationary and polar-orbiting environmental satellites have been used by the United States to provide meteorological data for weather observation, research, and forecasting. NOAA's National Environmental Satellite Data and Information Service (NESDIS) is responsible for managing the civilian geostationary and polar-orbiting satellite systems as two separate programs, called GOES and the Polar Operational Environmental Satellites, respectively.

Unlike polar-orbiting satellites, which constantly circle the Earth in a relatively low polar orbit, geostationary satellites can maintain a constant view of the Earth from a high orbit of about 22,300 miles in space. NOAA operates GOES as a two-satellite system that is primarily focused on the United States. These satellites are uniquely positioned to provide timely environmental data to meteorologists and their audiences on the Earth's atmosphere, its surface, cloud cover, and the space environment. They also observe the development of hazardous weather, such as hurricanes and severe thunderstorms, and track their movement and intensity to reduce or avoid major losses of property and life. Furthermore, the satellites' ability to provide broad, continuously updated coverage of atmospheric conditions over land and oceans is important to NOAA's weather forecasting operations.

To provide continuous satellite coverage, NOAA acquires several geostationary satellites at a time as part of a series and launches new satellites every few years (see Table 1).

Table 1: Summary of the Procurement History of GOES

| Series name | Procurement duration ^a | Satellites ^b |
|----------------------------|-----------------------------------|--------------------------|
| Original GOES ^c | 1970–1987 | 1, 2, 3, 4, 5, 6, 7 |
| GOES I-M | 1985–2001 | 8, 9, 10, 11, 12 |
| GOES-N | 1998–2011 | 13, O, P, Q ^d |
| GOES-R | 2007–2016 | R, S |

Source: GAO analysis of NOAA data.

^aDuration includes time from contract award to final satellite launch.

^bSatellites in a series are identified by letters of the alphabet when they are on the ground and by numbers once they are in orbit.

^cThe procurement of these satellites consisted of four separate contracts for (1) two early prototype satellites and GOES-1, (2) GOES-2 and -3, (3) GOES-4 through -6, and (4) GOES-G (failed on launch) and GOES-7.

^dNOAA decided not to exercise the option for this satellite.

Three satellites—GOES-11, GOES-12, and GOES-13—are currently in orbit. Both GOES-11 and GOES-12 are operational satellites, while GOES-13 is in an on-orbit storage mode. It is a backup for the other two satellites should they experience any degradation in service. The others in the series, GOES-O and GOES-P, are planned for launch over the next few years. NOAA is also planning the next generation of satellites, known as the GOES-R series, which are planned for launch beginning in 2014.

GOES-R Program—An Overview

NOAA plans for the GOES-R program to improve on the technology of prior series, in terms of both system and instrument improvements, to fulfill more demanding user requirements and to provide more rapid information updates. Table 2 highlights key system-related improvements GOES-R is expected to make to the geostationary satellite program.

Table 2: Summary of Key GOES-R System Improvements

| Key feature | GOES-N (current) | GOES-R |
|--|------------------|---------|
| Total number of products | 41 | ~68-120 |
| Downlink rate of raw data collected by instruments (from satellite to ground stations) | 2.6 Mbps | 70 Mbps |
| Broadcast rate of processed GOES data (from satellite to users) | 2.1 Mbps | 40 Mbps |
| Raw data storage (the length of time that raw data will be stored at ground stations) | 0 days | 3 days |

Source: GAO analysis of NOAA data.

In addition to the system improvements, the instruments on the GOES-R series are expected to significantly increase the clarity and precision of the observed environmental data. NOAA originally planned to acquire six different types of instruments. Furthermore, two of these instruments—the Advanced Baseline Imager and the Hyperspectral Environmental Suite—were considered to be the most critical because they would provide data for key weather products. Table 3 summarizes the originally planned instruments and their expected capabilities.

Table 3: Originally Planned GOES-R Series Instruments, as of August 2006

| Planned Instrument | Description |
|--|---|
| Advanced Baseline Imager (ABI) | Expected to provide variable area imagery and radiometric information of the earth's surface, atmosphere, and cloud cover. Key features include <ul style="list-style-type: none"> • monitoring and tracking severe weather, • providing images of clouds to support forecasts, and • providing higher resolution, faster coverage, and broader coverage simultaneously. |
| Hyperspectral Environmental Suite (HES) ^a | Expected to provide information about the earth's surface to aid in the prediction of weather and climate monitoring. Key features include <ul style="list-style-type: none"> • providing atmospheric moisture and temperature profiles to support forecasts and climate monitoring, • monitoring coastal regions for ecosystem health, water quality, coastal erosion, and harmful algal blooms, and • providing higher resolution and faster coverage. |
| Geostationary Lightning Mapper (GLM) | Expected to continuously monitor lightning activity over the United States and provide a more complete dataset than previously possible. Key features include <ul style="list-style-type: none"> • detecting lightning strikes as an indicator of severe storms and • providing a new capability to GOES that only previously existed on polar satellites. |
| Magnetometer | Expected to provide information on the general level of geomagnetic activity, monitor current systems in space, and permit detection of magnetopause crossings, sudden storm commencements, and substorms. |
| Space Environmental In-Situ Suite (SEISS) | Expected to provide information on space weather to aid in the prediction of particle precipitation, which causes disturbance and disruption of radio communications and navigation systems. Key features include <ul style="list-style-type: none"> • measuring magnetic fields and charged particles, • providing improved heavy ion detection, adding low energy electrons and protons, and • enabling early warnings for satellite and power grid operation, telecom services, astronauts, and airlines. |
| Solar Imaging Suite (SIS) ^b | Expected to provide coverage of the entire dynamic range of solar X-ray features, from coronal holes to X-class flares, as well as estimate the measure of temperature and emissions. Key features include <ul style="list-style-type: none"> • providing images of the sun and measuring solar output to monitor solar storms and • providing improved imager capability. |

Source: GAO analysis of NOAA data.

^aHES was cancelled in September 2006.^bSIS development work was divided into two separate acquisitions, the Solar Ultra Violet Imager and the Extreme Ultraviolet and X-Ray Irradiance Suite.

More recently, however, NOAA reduced the scope of the GOES-R program because of expectations of higher costs. In May 2006, the program office projected that total costs, which were originally estimated to be \$6.2

More recently, however, NOAA reduced the scope of the GOES-R program because of expectations of higher costs. In May 2006, the program office projected that total costs, which were originally estimated to be \$6.2 billion, could reach \$11.4 billion. We reported that this led NOAA to reduce the scope and technical complexity of the baseline program.² Specifically, in September 2006, NOAA reduced the minimum number of satellites from four to two, canceled plans for developing the Hyperspectral Environmental Suite, and estimated the revised program would cost \$7 billion. Table 4 provides a summary of the timeline and scope of these key changes.

² GAO, *Geostationary Operational Environmental Satellites: Additional Action Needed to Incorporate Lessons Learned from Other Satellite Programs*, GAO-06-1129T (Washington, D.C.: Sept. 29, 2006) and *Geostationary Operational Environmental Satellites: Steps Remain in Incorporating Lessons Learned from Other Satellite Programs*, GAO-06-993 (Washington, D.C.: Sept. 6, 2006).

Table 4: Key Changes to the GOES-R Program

| | Baseline program, as of August 2006 | Program with reduced scope, as of September 2006 |
|---|--|---|
| Number of satellites | 4 | 2 |
| Planned instruments | 2 critical instruments and 4 noncritical instruments or instrument suites Critical instruments: • Advanced Baseline Imager • Hyperspectral Environmental Suite Noncritical instruments/suites: • Geostationary Lightning Mapper • Magnetometer • Space Environmental In-Situ Suite • Solar Imaging Suite | 1 critical instrument and 4 noncritical instruments or instrument suites Critical instrument: Advanced Baseline Imager Noncritical instruments/suites: • Geostationary Lightning Mapper • Magnetometer • Space Environmental In-Situ Suite • Two components of the former Solar Imaging Suite (the Solar Ultra Violet Imager and Extreme Ultraviolet and X-Ray Irradiance Suite) |
| Life-cycle cost estimate (in then year dollars) | \$6.2–11.4 billion | \$7 billion |
| End of operations and maintenance | 2028 | 2028* |

Source: GAO analysis of NOAA data.

*All satellites are expected to have a 15-year lifespan (5 years in on-orbit storage plus 10 years in operation).

GOES-R Program Office Structure

NOAA is solely responsible for GOES-R program funding and overall mission success. However, since it relies on NASA's acquisition experience and technical expertise to help ensure the success of its programs, NOAA implemented an integrated program management structure with NASA for the GOES-R program. Within the program office, there are two project offices that manage key components of the GOES-R system. These are called the flight and operations project offices. The flight project office oversees the spacecraft, instruments, and launch services. The operations project office oversees the ground elements and on-orbit operations of the satellites. The project manager for the flight project office and the deputy project manager for operations project office are designated to be filled with NASA personnel. Additionally, NOAA has located the program office at NASA's Goddard Space Flight Center.

Planned GOES-R Acquisition Strategy

NOAA's acquisition strategy was to award contracts for the preliminary design of the GOES-R system to several vendors who would subsequently compete for the contract to be the single prime contractor responsible for overall system development and production. As such, in October 2005, NOAA awarded contracts for the preliminary design of the overall GOES-R system to three vendors.³

In addition, to reduce the risks associated with developing technically advanced instruments, NASA awarded contracts for the preliminary designs for five of the originally planned instruments. NASA expected to subsequently award development contracts for these instruments and to eventually turn them over to the prime contractor responsible for the overall GOES-R program.

GOES-R Preliminary Design Studies Are Completed, But Key Program Changes Have Been Made and Cost and Schedule Estimates Are Likely to Grow

NOAA has completed preliminary design studies of its GOES-R procurement. In addition, the agency recently decided to separate the space and ground elements of the program into two separate contracts to be managed by NASA and NOAA, respectively. However, this change has delayed a key decision to proceed with the acquisition, which was planned for September 2007. Further, independent estimates are higher than the program's current \$7 billion cost estimate and convey a low level of confidence in the program's schedule for launching the first satellite by 2014. As NOAA works to reconcile the independent estimate with its own program office estimate, costs are likely to grow and schedules are likely to be delayed.

³These were called Program Definition and Risk Reduction contracts.

Progress Has Been Made on GOES-R Procurement Activities

NOAA and NASA have made progress on GOES-R. The program office has completed preliminary design studies of the overall GOES-R system and has initiated development work on most of the planned instruments. Specifically, the NOAA-issued contracts for the preliminary design of the overall GOES-R system to three vendors have ended, and the designs have been completed.

In addition, after completing preliminary designs on five of the originally planned instruments, NASA awarded development contracts for three of them.⁴ Further, the most critical of these instruments—the Advanced Baseline Imager—has completed a major development milestone. In February 2007, it passed a critical design review gate and NASA approved the contractor to begin production of a prototype model.

NOAA Revised Its Acquisition Strategy

NOAA recently made a number of key changes in how it plans to acquire the GOES-R system. Originally, NOAA planned to award and manage a single prime contract for the acquisition and operation of the integrated system. However, an independent review team assessed the program and found that this approach was risky.⁵ It recommended that NOAA split the acquisition effort into two separate contracts for the space and ground segments and have NASA manage the space segment. The independent review team concluded that there was less risk in continuing with this approach than there would be if NOAA took on a new and expanded role.

In March 2007, Commerce approved NOAA's decision to implement these recommendations. The agency revised its acquisition strategy to include two separate contracts—the space segment and the ground segment. The two contracts are expected to be awarded in May 2008 and August 2008, respectively. The space segment is to be managed by a NASA-led flight project office. As such, NASA is to be responsible for awarding and managing the space segment contract, delivering the flight-ready instruments to the space segment contractor for integration onto the satellites, and overseeing the systems engineering and integration. NOAA is to be responsible for the ground segment contract, which is to be managed by the NOAA-led operations project office.

The revised acquisition strategy has delayed NOAA's plans to complete a key decision milestone on whether to proceed with GOES-R development and production in September 2007. Once this decision is made, the final requests for proposals on the system segments are to be released. The agency could not provide a timeframe for when this key decision milestone would take place.

GOES-R Cost Estimates Are Likely to Grow and Schedule Estimates Are Likely to Slip

NOAA's current estimate that the life cycle cost of the GOES-R program would be \$7 billion is likely to grow, and its estimate that the first satellite would be launched in December 2014 is likely to slip. Consistent with best practices in cost estimating, in May 2007, NOAA had two different cost estimates completed for the current GOES-R program—one by its program office and one by an independent cost estimating firm. The program office estimated with 80 percent confidence that the program would cost \$6.9 billion. The independent estimating firm estimated with 80 percent confidence that the program would cost \$9.3 billion.

A comparison of the two cost models shows that the independent estimator has about a 20 percent level of confidence that the program can be completed for \$6.9 billion. Further, the independent estimator concluded that the program office estimate significantly understated the risk of cost overruns. Other major differences between the two estimates are contained in government costs and in the space and ground segments. In commenting on a draft of the accompanying report, NOAA officials noted that one of the differences between the estimates is the inflation rate. The independent estimator assumed a higher inflation rate than the rate that NOAA and NASA typically use. NOAA officials noted that if the independent estimate was adjusted to NOAA's inflation rate, the program's cost estimate—with 80 percent confidence—would be \$8.7 billion. However, we believe that the value of an independent estimate is that it does not necessarily use the same assumptions as the program office. By offering alternative assumptions, the independent estimate provides valuable information for government officials to consider when revising program cost estimates.

⁴NASA has not yet issued a development contract for the Geostationary Lightning Mapper. This contract is expected to be awarded at the end of October 2007.

⁵This independent review team, comprised of former senior industry and government space acquisition experts, was hired by NOAA to assess the adequacy of the GOES-R program's management approach, acquisition strategy, and resource availability, among other things.

Program officials are reconciling the two different cost estimates and plan to establish a new program cost estimate to be released in conjunction with the President's fiscal year 2009 budget in February 2008. Program officials were unable to provide us information on the reconciled estimate until it is released. Nonetheless, the revised cost estimate will likely be \$1 billion more than the current \$7 billion.

Regarding schedule, NOAA's current plan to launch the first GOES-R series satellite in December 2014 could be delayed. This schedule was driven by a requirement that the satellites be available to back up the last remaining GOES satellites (GOES-O and GOES-P) should anything go wrong during the planned launches of these satellites (see Table 5). However, as part of its cost estimate, the independent estimator performed a schedule risk analysis. The independent estimator determined that there was less than a 50 percent chance that the first satellite would be ready for launch by December 2014 and that a later date would be more realistic. The estimator determined that it had 50 percent confidence that the first satellite would launch by October 2015 and 80 percent confidence that the satellite would launch by March 2017. A delay of this magnitude could affect the continuity of GOES data should the agency experience problems with the predecessor satellites.

Table 5: GOES-R Program Launch Schedule, as of July 2007

| Milestone | Planned date |
|---------------------------------------|--------------|
| GOES-O launch ^a | April 2008 |
| GOES-P launch ^a | April 2009 |
| GOES-R satellite available for launch | Dec. 2014 |
| GOES-S satellite available for launch | April 2016 |

Source: NOAA.

^aGOES-O and GOES-P are not part of the GOES-R series program. Their launch dates are provided because of their relevance to the GOES-R series satellite schedules.

NOAA Is Taking Steps to Address Key Risks, But More Remains to Be Done

To address cost, schedule, and technical risks, the GOES-R program established a risk management program and has taken steps to identify and mitigate selected risks. However, more remains to be done to fully address a comprehensive set of risks. Specifically, the program has multiple risk watch lists and they are not always consistent. Further, key risks are missing from the risks lists, including risks associated with unfilled executive positions, limitations in NOAA's insight into NASA's deliverables, and insufficient funding for unexpected costs (called management reserve) on a critical sensor. As a result, the GOES-R program is at increased risk that problems will not be identified or mitigated in a timely manner and that they could lead to program cost overruns and schedule delays.

GOES-R Has a Risk Management Program and Is Taking Measures to Address Selected Risks

The GOES-R program office established a risk management program and is tracking and mitigating selected risks. Risk management is a leading management practice that is widely recognized as a key component of a sound system development approach. An effective risk management approach typically includes identifying, prioritizing, and mitigating risks, and escalating key risks to the attention of senior management.

In accordance with leading management practices, the GOES-R program identifies risks, assigns a severity rating to risks, tracks these risks in a database, plans response strategies for each risk in the database, and reviews and evaluates these risks during monthly program risk management board meetings. Program-wide and project-specific risks are managed by different offices. The program office identifies and tracks program-wide risks—those that affect the overall GOES-R program. NASA's flight project office and NOAA's operations project office manage risks af-

fecting their respective aspects of the program.⁶ Further, the program office briefs senior executives on top program and project risks on a monthly basis.

GOES-R Program Office Identified and Is Working to Mitigate Program-wide Risks

As of July 2007, the program office identified three program risks affecting the overall GOES-R program. These risks include the development of the integrated master schedule, the ability to secure authorization to use a key frequency band to meet the space-to-ground communication data link requirements for the GOES-R system, and the final approval of the GOES-R mission requirements from the NOAA Deputy Under Secretary.

NOAA is working to mitigate and close program risks that it is tracking. For example, the program office recently closed the risk associated with GOES-R requirements because it had sufficiently defined and obtained approval of these requirements. As another example, the program office considers the lack of an integrated master schedule to be its highest priority risk. Program officials reported that completion of the integrated master schedule is driven by the completion of the intermediate schedules for the ground segment and the space-to-ground inter-dependencies. Key program staff members, including a resident scheduler, meet on a weekly basis to resolve outstanding design issues and hone these schedules. Program officials reported that the intermediate schedules are near completion and that they plan to have the integrated master schedule completed in Fall 2007. They expect to remove this issue from the risk watch list at that time.

NASA Identified Flight Segment Risks and Is Working to Mitigate Them

As of July 2007, the NASA flight project office identified four risks affecting instrument development, all of which are classified as medium risk. The top three risks pertain to the advanced imaging instrument, ABI—including issues on timely and quality subcontractor delivery of a critical part, stray light negatively impacting the performance of the optical system, and meeting specified performance requirements on image navigation and registration. The fourth priority risk pertains to the improvement of subcontractor quality assurance on a key sensor for the Space Environmental In-Situ Suite.

NASA is working to mitigate the flight segment risks that it is tracking. For example, the ABI contractor, among other things, plans to complete a key simulation review before the end of the year (called the structural thermal optical performance analysis) to evaluate whether the instrument can meet its expected performance parameters for image navigation and registration. NASA also recently conducted a vendor facility assessment of the Space Environmental In-Situ Suite subcontractor to determine whether adequate quality assurance improvements had been made to be compliant with contract requirements. These actions are expected to help mitigate the risk.

NOAA Identified Risks in its Operations Segment and Is Working to Mitigate Them

As of July 2007, the NOAA operations project office identified five risks impacting the management and development of the ground system and operations, including one that is identified as a medium risk. These risks include, among other things, inadequate definition of flight and operations project inter-dependencies, algorithm development responsibilities, and the adequate definition of coordination requirements between the space and ground segments to ensure that the two requests for proposals are consistent.

NOAA is working to mitigate the ground system and operations risks that it is tracking. For example, for the highest priority risk regarding schedule inter-dependencies, key staff from both the flight and operations projects meet weekly in order to identify and synchronize project schedules. The project office expects to close this risk in Fall 2007.

Multiple Watch Lists Are Not Consistent, Making It Difficult to Prioritize and Manage Risks

While GOES-R has implemented a risk management process, its multiple risk watch lists are not consistent in areas where there are inter-dependencies between the lists, which makes it difficult to effectively prioritize and manage risks at the appropriate organizational levels. Sound risk management practices call for having a consistent prioritization approach and for significant problems to be elevated from

⁶NASA's GOES-R flight project office is responsible for the spacecraft, instruments, and launch services. NOAA's GOES-R operations project office is responsible for the ground elements and on-orbit operations of the satellites.

the component level to the program level. This is because an issue affecting a critical component could have severe programmatic implications and should be identified, tracked, and overseen at the program level. In addition, program executives should be briefed regularly on the status of key risks.




However, on the GOES-R program, the risks identified on the multiple risk lists are inconsistent in areas where there are inter-dependencies between the lists. These inter-dependencies include situations where a risk is raised by one project office and affects the other project office, but is not identified by the other project office or elevated to the program level risk list. They also include situations where a risk identified by a project office has program-wide implications, but is not elevated to the program level risk list. For example, the operations project office identified schedule inter-dependencies between the flight and operations project offices as a medium criticality risk, but neither the flight project office nor the program identified this risk even though it is relevant to both. As another example, the operations project office identified the ground procurement schedule as a major issue in its briefing to senior management, but this risk was not identified on its own or on the program-wide risk lists.

In addition, while the three offices brief senior management about their key risks on a monthly basis, selected risks may not be accurately depicted in these briefings because of the inconsistencies among the risk watch lists. For example, both the flight and operations project offices identified technical development issues as minor to moderate risk areas, but the program office did not identify this item as a risk and, when it briefed senior management, it noted that technical development was in good shape. Figure 1 depicts examples of inconsistencies among risk lists and briefings to senior management.

The lack of consistency in managing risks in areas where there are inter-dependencies makes it difficult to ensure that all identified risks are appropriately prioritized and managed. This situation hampers the program office's ability to identify and mitigate risks early on and to anticipate and manage the impact of risks on other areas of the program.

Figure 1: Examples of Inconsistencies among GOES-R Risk Watchlists, as of July 2007

| | Risk: Schedule interdependencies between the flight and operations segments | Risk: Ground procurement schedule | Risk: Technical development issues |
|---------------------------------------|---|--|---|
| Program Office's risk list | not identified as a risk | not identified as a risk | not identified as a risk |
| Flight Project Office's risk list | not identified as a risk | not applicable—is an operations project office issue | 3 technical risks listed as medium criticality |
| Operations Project Office's risk list | listed as medium criticality | not identified as a risk | 1 technical risk listed as low criticality |
| Briefing to senior executive council | not identified as a risk | identified as having major issues | Program Office identified risk area as in good shape <ul style="list-style-type: none"> Flight Project identified risk area as having moderate issues Operations Project identified risk area as having minor issues |

 High risk
 Medium risk
 Low risk

Source: GAO analysis of NASA and NOAA data.

Important GOES-R Management Risks Are Missing From the Program Watch List

To be effective, a risk management program should have a comprehensive list of risks. However, several key risks that impact the GOES-R procurement and merit agency attention are not identified in the program's risk lists. These risks include (1) key leadership positions that need to be filled, (2) NOAA's limited insight into NASA's deliverables, and (3) insufficient management reserves (held by the program and a key instrument contractor). At the conclusion of our review for the accompanying report, program officials stated that they are aware of these issues and are working to monitor them or address them, as warranted. Nevertheless, until these and other program-wide risks are identified and addressed as part of a comprehen-

sive risk management program, there is increased likelihood that issues will be overlooked that could affect the acquisition of the GOES-R system.

Key GOES-R Leadership Positions Need to Be Filled

The two senior GOES-R program positions—the system program director and deputy system program director—are currently filled by NASA and NOAA personnel in an acting capacity until they can be permanently filled by NOAA. In addition, the acting system program director is not able to work full time in this role because she is also on a special assignment as the NESDIS Deputy Assistant Administrator for Systems. NOAA reported that it plans to fill the deputy system program director role in the near future, but noted that it could take more than six months to fill the system program director role. Given the approach of the development phase of the GOES-R acquisition and the competing priorities of the acting system program director, it is especially important that these key leadership positions be filled quickly. At the conclusion of our review, agency officials stated that they are aware of this issue and are working to fill the positions, but they did not believe the issue warranted inclusion on the program level risk watch list. However, without the senior level attention inherent in a sound risk management program, it is not clear that NOAA is sufficiently focused on the importance of establishing knowledgeable and committed program executives, or in moving quickly to fill these critical positions.

NOAA's Insight into NASA's Program Elements Is Limited

NOAA's March 2007 decision to adopt an acquisition management approach similar to prior GOES procurements could make the agency vulnerable to repeating some of the problems experienced in the past. In particular, our work on the GOES I-M series found that NOAA did not have the ability to make quick decisions on problems because portions of the procurement were managed by NASA.⁷ In fact, NOAA officials originally intended to depart from this approach as a lesson they learned from the GOES I-M acquisition, because it limited the agency's insight and management involvement in the procurement of major elements of the system.

The established NOAA/NASA interagency agreements require NASA to submit monthly contractor cost performance reports to NOAA and to alert NOAA should cost and schedule performance drop below certain thresholds. NASA is currently submitting the required reports and has alerted NOAA on major cost and schedule changes. However, these interagency agreements do not contain provisions that enable NOAA to ensure that the data and reports are reliable and that they accurately depict contractor performance. To do so would entail NOAA having the ability and means to question and validate data, such as by having direct access to the contractor.

NASA and NOAA officials reported that the two agencies are working together with an unparalleled level of transparency and noted that NOAA program staff have access to contractor data and can bring any questions with the data to the relevant NASA staff. However, they acknowledged that this process is not documented and were not able to demonstrate that NOAA staff had questioned contract data and that NASA had facilitated obtaining answers to the questions. By not identifying and mitigating this risk on its program risk list, NOAA increases the likelihood that the GOES- program will repeat the management and contractor shortfalls that plagued past GOES procurements.

Recent Changes on a Key Instrument Have Reduced Program Management Reserve Funds and Limited Contractor Reserve Funds Leave GOES-R Vulnerable to Future Cost Increases

A recent modification to the critical ABI instrument contract increased its cost, thereby reducing the amount of management reserve funds held by the program office for unexpected expenses. In September 2006, we reported that ABI was experiencing technical challenges, that were resulting in cost and schedule overruns. Since then, the contractor continued missing cost and schedule targets—a trend that continued until February 2007. At that time, NASA modified the contract to implement a revised baseline cost and schedule. The added cost of this modification was funded using management reserve funds held by the GOES-R program office.⁸ As a result, the amount of reserve held by the program office dropped below 25 percent—a level that NOAA reported it intended to establish as a lesson learned from other satellite

⁷GAO-06-993.

⁸This reserve is intended to cover expected costs above those projected by the contractor and unexpected costs in solving problems during a system development program.

acquisitions. As of July 2007, the program's reserve level was at about 15 percent. Program officials stated that their revised goal is to maintain between 10 and 15 percent in reserve at the program level. While maintaining a 10 to 15 percent management reserve is on par with other major satellite acquisitions, the depletion of management reserves this early in the GOES-R acquisition raises concerns that there will be insufficient reserves during the challenging development, integration, and testing phases to come.

In addition, the contractor for the ABI instrument has a very low level of reserve funding for unexpected costs, which means that any unexpected problems will likely lead to cost growth on the overall GOES-R program. As of May 2007, the contractor was holding less than one percent of funding in reserve to cover unexpected costs associated with the 40 percent of work left to be completed. As such, there is a risk that the new baseline could fail due to inadequate reserves to finish the program. This would likely have a diminishing effect on the reserve held by the GOES-R flight project and the program office to cover the costs of a second revised baseline plan. Our prior work on system acquisitions has shown inadequate reserves to be an indicator of poor management performance that could lead to cost overruns.⁹ Considering that GOES-R has not yet entered the development and production phases, it will be critical for NOAA's senior executive management to aggressively manage this risk. By not identifying, mitigating, and tracking this risk in a program-wide risk list, the GOES-R program runs an increased risk that unanticipated issues on the ABI instrument will lead to program-wide cost overruns and schedule delays.

Implementation of GAO Recommendations Should Improve NOAA's Ability to Effectively Manage the GOES-R Procurement

To improve NOAA's ability to effectively manage the procurement of the GOES-R system, we recommended in our accompanying report¹⁰ that the Secretary of Commerce direct the Undersecretary of Commerce for Oceans and Atmosphere to take the following two actions:

- Ensure that the GOES-R program office manages, mitigates, and reports on risks using a program-level risk list that is reconciled with and includes risks from its flight and operations project offices that could impact the overall program.
- Include the following risks on the program-wide risk list, develop plans to mitigate them, and report to senior executives on progress in mitigating them:
 - unfilled or temporary GOES-R program leadership positions,
 - insufficient program insight on NASA contract performance, and
 - insufficient management reserve on the critical Advanced Baseline Imager instrument and at the GOES-R program level.

In written comments, Commerce agreed with our recommendations to use a program level risk list and to add selected risks to its list. The department reported that NOAA has established a consolidated program-wide risk list that is to be used to evaluate risks during monthly internal and external reviews. Further, NOAA acknowledges the risks associated with having unfilled leadership positions and insufficient management reserves and is working to mitigate these risks. However, the department disagreed with our recommendation to manage and mitigate the risk that NOAA has insufficient insight into NASA's contracts. The department cited an unparalleled level of transparency between the two agencies and listed multiple regular meetings that the two agencies hold to ensure close coordination. While an improved working relationship between the two agencies is critical, NOAA has not provided any evidence that it has been able to effectively question and validate data on NASA's contractor performance. Given the past problems that NOAA has experienced in obtaining insight into NASA's contracts and the importance of this inter-agency relationship to the success of the GOES-R program, we believe that this issue should be managed and monitored as a risk.

NOAA also requested that we acknowledge its effort to reconcile its program estimate with the independent estimate and reflect a 20 percent possibility that the program could cost \$1 billion more than the current estimate of \$7 billion, rather than \$2 billion more. We acknowledge this in our report; however, the reconciliation effort is not complete and NOAA did not provide us with a reconciled estimate.

⁹ GAO-06-993.

¹⁰ G110-08-18.

In summary, although NOAA has made progress in the GOES-R procurement, changes in the GOES-R acquisition strategy could lead to cost overruns and schedule delays if not managed effectively. Over the last year, NOAA has completed preliminary design studies of its GOES-R system and decided to separate the space and ground elements of the program into two contracts and have NASA oversee the system integration effort. Current program plans call for a two-satellite program—estimated to cost about \$7 billion—with launch of the first satellite in December 2014. However, independent studies show that the program's cost could increase by about \$2 billion and that the first launch could be delayed by at least two years.

NOAA has taken steps to identify and address key risks but more could be done to effectively manage risks from a program-wide perspective. In particular, the program has multiple risk watch lists that are not consistent in areas where there are inter-dependencies and key risks have not been elevated for program-wide attention. Also, several risks that warrant NOAA's attention have not been placed on any watch list. Specifically, the top two leadership positions are only temporarily filled; NOAA does not have the ability and means to obtain insight into NASA contracts in order to validate contractor performance data; and insufficient management reserves to handle unexpected problems on a critical instrument and at the program level are likely to affect overall program costs when any unexpected problems arise. Until NOAA manages and addresses a comprehensive set of program risks, the agency's ability to effectively manage the GOES-R acquisition will be significantly weakened and could lead to substantial program overruns and delays.

Mr. Chairman, this concludes my statement. I would be happy to answer any questions that you or Members of the Subcommittee may have at this time.

BIOGRAPHY FOR DAVID A. POWNER

Experience

Twenty years' experience in information technology issues in both public and private sectors.

Education

Business Administration, University of Denver

Senior Executive Fellows Program, Harvard University, John F. Kennedy School of Government

Dave is currently responsible for a large segment of GAO's information technology (IT) work, including systems development, IT investment management, health IT, and cyber critical infrastructure protection reviews.

In the private sector, Dave has held several executive-level positions in the telecommunications industry, including overseeing IT and financial internal audits, and software development associated with digital subscriber lines (DSL).

At GAO, Dave has led teams reviewing major IT modernization efforts at Cheyenne Mountain Air Force Station, the National Weather Service, the Federal Aviation Administration, and the Internal Revenue Service. These reviews covered many information technology areas including software development maturity, information security, and enterprise architecture.

Chairman LAMPSON. Thank you, Mr. Powner.

Ms. Kicza.

STATEMENT OF MS. MARY ELLEN KICZA, ASSISTANT ADMINISTRATOR FOR SATELLITE AND INFORMATION SERVICES, NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), U.S. DEPARTMENT OF COMMERCE

Ms. KICZA. Mr. Chairman and Members of the Subcommittee, I am Mary Kicza, Assistant Administrator for the National Environmental Satellite, Data, and Information Service within the National Oceanic and Atmospheric Administration. Today we are here to talk about NOAA's next generation geostationary satellite program, GOES-R.

As you said, GOES spacecraft are critical to hurricane and other severe weather forecasting because they are constantly taking im-

ages and collecting data above the United States. We have two geostationary satellites operating in space; one over the east coast and one over the west coast. We do maintain a spare satellite in orbit in case of any problems with the operational satellites. We just launched GOES-N, our current on-orbit spare, and we are finishing building two satellites, O and P, which will launch, provide data until GOES-R is launched in 2014.

We are in the final design phase of GOES-R. We plan to release requests for proposals in early 2008, and to award contracts for building the new satellites and ground systems by the end of 2008. GOES-R remains on track for a 2014 launch to maintain continuity for the GOES-N series.

My written testimony details significant changes we have made to strengthen our management of the GOES-R Program. We maintain overall program management responsibility with NOAA for GOES-R. NASA manages the flight project, which includes building and integrating the instruments and the spacecraft and procuring the launch vehicle. NOAA manages the ground system project, which includes all ground stations and algorithm development.

These changes place the government in a direct oversight role for each of the key elements of the GOES-R Program; the spacecraft, the instruments, and the supporting ground systems. We have instituted specific matrix and milestones to ensure problems are quickly identified and fixed. We continue to have outside independent experts look at our program, and we will make changes as necessary.

NOAA continues to value the insight and reviews by GAO, and I would like to respond to the recommendations in the recent GAO report. As David said, recommendation number one relates to assuring that risks highlighted in one area are examined for their potential program-wide implications. NOAA agreed with this recommendation, and it has already begun to implement a consolidated risk list that the GOES-R system program director regularly reviews. The NOAA Program Management Council is briefed monthly on the top risks and the strategies for resolving and closing these risks.

Recommendation number two directs that NOAA add the following risks to the program-wide risk list. These include unfilled or temporary GOES-R Program leadership positions, insufficient program insight on NASA contract performance, and insufficient management reserve on the critical advanced baseline imagery instrument, and at the GOES-R Program level.

NOAA agrees with highlighting the risks associated with filling the leadership positions. The GAO in their draft report had highlighted three vacancies as being of concern. One has been filled. The remaining two are in the final decision stages. The status of filling key vacancies is tracked on a weekly basis at the staff level and formally reviewed on a monthly basis at NOAA's Program Management Council meeting.

The GOES-R Program is currently being led full-time by Ms. Abigail Harper. She is my Deputy Assistant Administrator for Systems Acquisitions. Ms. Harper is highly qualified with multiple

years experience in satellite systems acquisitions and in satellite systems safety and mission assurance.

Meanwhile, NOAA has expedited its search for the GOES-R Systems Program Director. I have completed all of the interviews of the highly-qualified candidates and will be forwarding my selection to Vice Admiral Lautenbacher within the week.

We do not fully understand GAO's concern with respect to NOAA's insight into NASA's performance. We do have unprecedented insight into NASA contract performance. Our GOES-R Program is co-located at NASA Goddard with the flight project and the ground project. Our program interacts with the projects on a daily basis.

Additionally, we have a comprehensive management control plan which clearly outlines roles, responsibilities, authorities, and reporting requirements.

Regarding the recommendation highlighting the reserve posture as a risk, NOAA believes there are sufficient reserves on the Advanced Baseline Imagery instrument and at the program level. When the GAO had reviewed the program earlier this year, the program had not yet allocated the management reserves to the project level. We were holding it at the program level. This may have led to an incorrect interpretation by the GAO as to the reserve posture. The program does maintain a budget that reflects at least a 25 percent management reserve. Today, the GOES-R Program maintains reserve at both the program level and the project level, and we believe that these reserves are sufficient to manage risks.

We also have concerns about GAO cost and schedule assertions. We have worked hard to reconcile the independent estimate with the program estimate. Early in the cost estimation efforts the two estimates did diverge in several areas due to differing assumptions. As a part of the reconciliation process, the program estimate has, in fact, increased, and the independent estimate has decreased. The estimates are now within 12 percent of each other.

The independent estimator has indicated that the program estimate represents a reasonable cost estimate at this stage of the development. The updated cost estimate is, in fact, informing our 2009 budget process.

Additionally, the independent estimator has also indicated that the two schedules are essentially in agreement with each other within the capability of current modeling, schedule estimating models to predict.

In concluding, I want to take the opportunity to thank Mr. Powner for the recommendations offered. We are taking appropriate action to respond to the concerns, and I do appreciate the Committee's continued interest in NOAA's satellite programs. We are strengthening our management of these programs. We do have a fully-functioning, operational satellite with backup systems in place, and we are pleased to be working on the next generation GOES-R.

At this point I will be happy to answer any questions you have. [The prepared statement of Ms. Kicza follows:]

Introduction

Mr. Chairman and Members of the Subcommittee, I am Mary E. Kicza, Assistant Administrator of the National Environmental Satellite, Data, and Information Service (NESDIS). NESDIS is part of the National Oceanic and Atmospheric Administration (NOAA), within the Department of Commerce (DOC). I appreciate the opportunity to discuss with you today NOAA's environmental satellite programs and to highlight their importance to our hurricane and other severe weather forecasting and warning capabilities. NOAA has made significant progress in the development of the next generation Geostationary Operational Environmental Satellites-R Series (GOES-R) program since the September 29, 2006 hearing.

NOAA's satellite acquisitions are complex and difficult development efforts. I will be the first to acknowledge that NOAA does not have a strong track record with regard to recent satellite acquisition development efforts. We appreciate the Government Accountability Office's (GAO's) recognition that, in the GOES-R acquisition, "progress has been made." NOAA is working hard to prevent schedule and budget problems from occurring in our satellite programs. We have implemented several changes to strengthen the review, cost estimating and program control processes within our satellite development programs in response to lessons learned from programs including the National Polar-orbiting Operational Environmental Satellite Systems (NPOESS) and from the recommendations of outside reviewers, such as the GAO.

We value the GAO's reviews of GOES-R. In fact, GAO's recommendations place emphasis on some areas where NOAA is already proactively engaged: obtaining an independent cost estimate and reconciling differences with the program cost estimates; assuring that we are paying proper attention to managing risk; and putting in place protocols similar to those used by the National Aeronautics and Space Administration (NASA) for milestone decision points for satellite acquisition programs. We thank the GAO for its recommendations and look forward to its continued review of the program.

What are Geostationary Satellites?

NOAA has operated geostationary operational environmental satellites (GOES) since the 1970s. These satellites are located more than 22,000 miles above the equator and provide near continuous 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 the data to help forecast the weather and are critical to detecting and tracking severe weather. Advances in hurricane prediction depend not only on improved observations such as those from satellites, but also on improved data assimilation, computer models, and continued research to better understand the inner workings of hurricanes.

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 in space that can be repositioned and brought out of storage in a matter of hours to take the place of a failed satellite. Given the importance of these satellites, continuity of operations remains our highest priority.

What is GOES-R?

Individual GOES satellites have a letter designation through their development until they are launched, placed in orbit, and have completed a rigorous checkout procedure. They are then given numeric designations for their operational lifetimes. The operational satellites in space now, GOES-11 and GOES-12, are the last two satellites of the GOES I-M series. The next series of geostationary satellites is called GOES-N, and this series consists of the same instruments as the GOES I-M series. The first of the GOES-N series satellites was launched in May 2006 and is currently serving as the on-orbit spare. The final two satellites from this series—GOES-O and GOES-P—are already built and will be launched over the next several years. We are still in the preliminary design phase of development for the next generation of GOES satellites, called GOES-R, which will ensure uninterrupted satellite data continuity when the GOES-N series ends. Current assessments indicate that GOES-R must be launched at the end of 2014 to provide continuous geostationary data. The GOES-R series will include advancement beyond the GOES-N series, particularly in instrument capability. GOES-R will provide forecasters and scientists with a new suite of greatly improved instruments. These new instruments will enhance our current capability to track and monitor severe weather on Earth

with greatly improved imagery and scan rates. Solar environmental monitoring instruments will provide a significant advance for space weather forecasting.

We have committed, during the preliminary design phase of GOES-R, to thoroughly examine the program to confirm its readiness to proceed into the acquisition phase. This has involved changing the management and acquisition strategy, implementing regular senior NOAA and NASA reviews of the program, and subjecting the program to independent review and cost estimates. These efforts are yielding valuable results by identifying areas that require additional attention and providing the appropriate resources to address those areas. We believe we are on a sound track going forward.

Status of GOES-R

During 2006 and 2007, NOAA and NASA conducted a top-to-bottom review of the program with input from an Independent Review Team of senior satellite acquisition experts, the user community, and reports from the three preliminary design contractors. These efforts led to a revision of our plans to ensure we have a program that maintains data continuity, allows for technical advances, and is affordable. Specifically, we had to acknowledge that to actually build our concept for GOES-R would be much more expensive than we first thought. As a result, we made the decision not to award a contract to build the Hyperspectral Environmental Suite given its risk and technological challenges. In addition we made a decision in March 2007 to change the program management structure to take advantage of the unique organizational expertise of NOAA and NASA. NASA has a long history of managing successful satellite acquisitions, while NOAA has a long history of developing successful ground systems for operational weather satellites. This change incorporated important lessons learned from other major systems acquisitions projects. Key elements of the new management strategy are:

- NOAA has overall program responsibility and total program funding.
- NASA manages development of spacecraft and instruments, and provides launch services.
- NOAA manages development of ground systems and operates the system on orbit.
- NASA leads government systems engineering, integration activity and mission assurance.
- For each of the GOES-R program projects (ground, flight, and integration) NOAA and NASA partner closely, with NOAA staff providing direct support (i.e., as deputy program managers) to NASA-led elements, and vice versa.

We also changed our acquisition strategy to align with the new management strategy by replacing the single, prime contract approach with two primary contracts, one for the space segment and one for the ground segment. The combination of the new management and acquisition strategy will reduce program risk and maximize our potential for fielding a high performing satellite system on schedule and within budget. To document this management change and other major aspects of the program, NOAA and NASA signed a Memorandum of Understanding in June 2007 and will shortly implement detailed operating procedures documented in the GOES-R Management Control Plan (MCP). The MCP, patterned after a NASA Program Plan, will implement the current NOAA/NASA program management practices and guide responsibilities of NOAA and NASA for the GOES-R Program.

NOAA has benefited from the 2005 decision to create a jointly staffed NOAA/NASA program office at the Goddard Space Flight Center. Prior to 2005, NASA conducted all of GOES acquisition activities for NOAA, and NOAA maintained a small liaison staff at the Goddard Space Flight Center. Collocation of NOAA and NASA program personnel at the Center facilitates communication between the flight and ground projects, permits effective joint program systems engineering and integration, and encourages a collaborative NOAA/NASA team environment. NOAA and NASA personnel work side-by-side. The overall GOES-R program management team has access to the satellite acquisition expertise and experience in place at Goddard Space Flight Center, including engineering and program management reviews of GOES-R.

Status of Spacecraft and Ground System Acquisition

To prepare for the 2008 spacecraft source selection, a joint NOAA/NASA team is reviewing industry responses to a draft Request for Proposals (RFP) received in mid-September. The spacecraft project has successfully concluded the review which allows the Request for Proposals to go forward. We are now in the process of finalizing the RFP. At present, four instruments are currently in the implementation

phase, one (the geostationary lightning mapper) is nearing implementation and the sixth (the magnetometer) will be procured as part of the spacecraft acquisition. Instruments will be delivered to the spacecraft contractor as government-furnished equipment for integration on the spacecraft. Appendix 1 provides a list of the instruments and their status.

The ground project is nearing completion of the reviews necessary to allow the project to go out for proposal. We anticipate a draft RFP for the ground segment will be released in January 2008. NOAA and NASA are working towards releasing the final spacecraft and ground RFPs in early 2008. NASA and NOAA will release the final spacecraft and ground RFPs following appropriate NASA and NOAA/DOC reviews and approvals.

Since the GAO issued its report in September 2006, the Independent Review Team has met twice to provide recommendations to NOAA concerning program readiness for the acquisition phase. The GAO's most recent report indicates that, while NOAA and NASA are taking the right steps to put together a sound GOES-R Program, there is still work to be done before proceeding into the acquisition phase, especially in the ground system. Identifying and addressing issues before the acquisition phase begins is a key lesson learned from the NPOESS program. Once we begin the acquisition phase and the contracts are in place, the workforce engaged in implementing the program ramps up sharply. Fixing problems during the acquisition phase is more costly given the larger workforce involved. That is why it is so important to take the time to identify and address the problems during the program definition phase. We want to enter the acquisition phase with a program that will succeed with all risks appropriately identified and tracked.

Status of the Cost Estimate

NOAA has hired outside experts to develop the program cost estimates. This cost estimating team works for the GOES-R program office and is developing the Program Office Estimate. In addition, we have hired an independent team to examine the Program Office Estimate. This independent team works for the NOAA Chief Financial Officer and has provided an Independent Cost Estimate. The Independent Cost Estimate group and the GOES-R Program are actively working to clarify assumptions and understand the differences in the cost estimates developed through their review.

The GAO Report

GAO has provided regular reviews of our GOES-R Series acquisition for many years and we appreciate the perspective that the GAO professionals provide. We have met with GAO and provided information and feedback on its most recent report. I will summarize this information for you today.

I am pleased that the GAO report recognizes we have taken steps to apply the lessons learned from other satellite programs to the procurement of GOES-R. I understand we have more work to do to improve the overall management of these complex and high risk programs, and the joint NOAA/NASA team is fully committed to making further improvements.

Specifically, the GAO provided two recommendations related to program-wide risk:

21Recommendation number one: *Ensure that the GOES-R Program Office manages, mitigates and reports on risks using a program-level risk list that is reconciled with and includes risks from both flight and operations project offices that could impact the overall program.*

NOAA agrees with the recommendation and has directed the GOES-R Program Office to maintain a consolidated program-wide risk list and use this list in internal and external reviews of the program. The GOES-R risk management process includes regular review of project risks by the program and selective elevation of project risks at the program level for mitigation and management. The System Engineering and Integration Division of the GOES-R Program is responsible for maintaining the program risk list which is reviewed at least monthly by the GOES-R System Program Director. The GOES-R System Program Director briefs the NOAA Program Management Council monthly on the top risks and the strategies for resolving and closing them.

Recommendation number two: *Include the following risks on the program-wide risk list, develop plans to mitigate them and report to senior executives on progress in mitigating them:*

- Unfilled or temporary GOES-R program leadership positions,
- Insufficient program insight on NASA contract performance, and

- *Insufficient management reserve on the critical Advanced Baseline Imager instrument and at the GOES-R program level.*

NOAA agrees with the need to track the leadership positions and has a structured process in place to do so. The status of the filling these vacancies is reviewed at the monthly Program Management Council meetings. On an acting basis, the GOES-R program is being led by two highly qualified individuals with multiple years experience in satellite and major systems acquisitions. NOAA has requested that the NOAA Workforce Management Office expedite a nationwide advertisement and search for a permanent GOES-R System Program Director.

NOAA realizes that to have the necessary insight into NASA contract performance it is not simply sufficient to have co-located and intermingled staff. That is why NOAA and NASA are drafting a comprehensive Management Control Plan that will establish the framework for Program and Project performance. NOAA will assure that the finalized Plan provides NOAA a sufficient degree of insight and guidance to meet NOAA's responsibility for mission success.

Finally, NOAA does not agree with the assertion that there are insufficient reserves on the Advanced Baseline Imager instrument and at the GOES-R program level. It is important to note that the funding level used by GAO as the baseline for this evaluation is not the same amount that NOAA actually budgeted for this instrument. NOAA budgeted more funding than the contract amount, and withheld the difference as a management reserve at the GOES-R program level, rather than in the specific instrument budgets. While at the time of the GAO review in March through August, the GOES-R Program had not allocated this management reserve to the projects, the reserve funding has now been allocated and is sufficient to manage the anticipated program risk. The GOES-R Program currently maintains reserves at the Program level and at the Flight and Ground Project levels. The System Program Director holds the project managers responsible for managing their projects and reserves. The current level of management reserve for the Advanced Baseline Imager at the program and project levels are sufficient.

While not a recommendation, GAO has asserted the following in the body of the report: “. . . independent estimates are higher than the program's current cost estimate and convey a low level of confidence in the program's schedule. Independent studies show that the estimated program could cost about \$2 billion more, and the first satellite launch could be delayed by two years.”

NOAA strongly disagrees with this statement and is currently working with the program and independent cost estimators to resolve the differences. It is critical that this assertion be put into its proper context. Early in the cost estimation effort, the program office and independent estimates were divergent in several areas due to differing assumptions, which is not uncommon for programs of the magnitude of GOES-R. Accurate comparison of the two cost estimates requires an assessment of each estimate's ground rules and assumptions. Resolution of issues related to instrument design complexity, software scope, and inflation factors can have huge effects on revised estimates. As work with the independent estimator has progressed, we have resolved numerous differences in ground rules and assumptions and have seen the two cost estimates begin to converge. We expect to achieve even closer convergence as we continue to resolve the remaining differences in assumptions.

As with the two cost estimates, the reconciliation efforts associated with the schedule estimates have identified some key assumption differences that should result in some convergence in the schedule estimates. However, it should be noted that the two schedules essentially agree with each other (within the capability of current schedule estimating models to predict).

Conclusion

I appreciate the Committee's continued interest in NOAA's satellite programs. It is widely acknowledged that satellites are very complicated and difficult systems to design, build, and operate. However, their capabilities play a role in NOAA's mission to observe and predict the Earth's environment and to provide critical information used in protecting life and property.

We are making significant strides in developing a better process for designing and acquiring our satellites. We have fully functioning operational satellites with backup systems in place, and we are working on the next generation that will provide significant improvements in our ability to forecast the weather. I would be happy to answer any questions you may have.

Appendix 1

GOES-R Instrument Status

- **Advanced Baseline Imager (ABI)**
 - Implementation phase
 - Contractor: ITT Corporation, Fort Wayne, IN
- **Space Environmental In-Situ Suite (SEISS)**
 - Implementation phase
 - Contractor: Assurance Technology Corporation, Carlisle, MA
- **Extreme Ultra Violet/X-Ray Irradiance Sensor (EXIS)**
 - Implementation phase
 - Contractor: Laboratory for Atmospheric and Space Physics, Boulder, CO
- **Solar Ultra Violet Imager (SUVI)**
 - Implementation phase
 - Contractor: Lockheed-Martin Advanced Technology Corp, Palo Alto, CA
- **Magnetometer**
 - To be procured as part of spacecraft contract
- **Geostationary Lightning Mapper (GLM)**
 - Contract to be awarded Fall 2007

BIOGRAPHY FOR MARY ELLEN KICZA

Mary Ellen Kicza is the Assistant Administrator for Satellite and Information Services. Before coming to NOAA, Ms. Kicza served as the Associate Deputy Administrator for Systems Integration at NASA. As a senior leader within NASA, she was responsible for assuring that mission and mission support elements were effectively aligned and integrated to execute NASA's vision and mission.

Over the course of her career, Ms. Kicza has served with distinction in a variety of technical, managerial and leadership posts in which she has been involved in the development, launch and support of satellite systems as well as multi-faceted research and development programs. In these roles, she has acquired extensive experience, not only in executing scientific and engineering programs but also in strategic planning, budget formulation, and workforce and facilities planning. In addition, she has significant experience in building and maintaining effective relationships with the Office of Management and Budget, the Office of Science and Technology Policy, the Defense Department, Congress, the aerospace industry and a diverse research community.

Ms. Kicza's accomplishments have won her two SES Meritorious Service Awards, NASA's Distinguished Service and Scientific Achievement Medals, and numerous other awards. Ms. Kicza began her career as an engineer at McClellan Air Force Base in California, developing and testing software for Air Force satellite communications systems. In 1982, Ms. Kicza joined NASA's Kennedy Space Center where she served as a lead engineer, participating in the preparation of Atlas Centaur and Shuttle Centaur launch vehicles in support of NASA, DOD and NOAA satellites.

Since that time, Ms. Kicza has served as a program manager, as Deputy Director of the Solar System Exploration Division, Assistant Associate Administrator for Space Science, Associate Center Director for Goddard Space Flight Center, and Associate Administrator for Biological/Physical Research. In these roles, Ms. Kicza led and managed large, complex ground-based and space flight programs, many of which are international in scope, in support of U.S. space and earth science programs. As the Associate Center Director at Goddard, she managed a diverse scientific and engineering community of approximately 3,100 civil servants and 6,000 contractors. Ms. Kicza received her Bachelor's Degree in Electrical and Electronics Engineering from California State University, and a Master's Degree in Business Administration from the Florida Institute of Technology.

DISCUSSION

Chairman LAMPSON. Thank you very much, Ms. Kicza. We have a vote. I don't know why we have that goofy alarm. Somebody made the decision they liked it, I guess.

We are going to continue to go forward and see how far we can get through this. So let me begin with Mr. Powner.

GOES PROGRAM COSTS

NOAA uses an 80 percent confidence level in its cost estimating. My understanding is that leaves a 20 percent chance that the quoted cost will be exceeded. So the cost numbers reported for GOES represents floors, not ceilings. Right?

Mr. POWNER. Correct. Well, there is a chance that, at an 80 percent confidence level, there is a 20 percent chance it actually could go up or down is really what it says. So it is always going up, so correct.

Chairman LAMPSON. Does the estimate give a limit to the possible program costs?

Mr. POWNER. It does not give a limit. No.

Chairman LAMPSON. Ms. Kicza, according to the comments NOAA submitted to GAO, the most conservative estimates at the 80 percent confidence intervals bring the program office estimate within 12 percent of the Independent Cost Estimate (ICE) or \$1.032 billion below the ICE. The ICE is \$9.3 billion. This implies that the program office estimate is now \$8.3 billion. This is a billion dollars above NOAA's estimate at last year's hearing.

Can I assume that this will be the cost estimate reported in the President's budget estimate in February?

Ms. KICZA. No, sir. I am not sure how you are working your math, but right now our current program office estimate is between \$7–\$8 billion, and that is within the 12 percent of the current independent estimate. I believe the independent cost estimate numbers came down from what you may have earlier quoted.

Chairman LAMPSON. Where will we find that additional—last year it was seven, and it is going to be—

Ms. KICZA. We are at \$6.9 billion with President's FY 2008, budget, and as we had indicated last year we still had to go through the Independent Cost Estimate and reconcile. And that is, in fact, the process we are going through.

Chairman LAMPSON. Okay. So that number is going to be a higher number. Will that—

Ms. KICZA. The number that we are dealing with now is the current program office estimate, is higher than the \$6.9 billion. It is between \$7–\$8 billion, and it is part of our FY 2009 discussions.

Chairman LAMPSON. And that will be in the President's budget in February?

Ms. KICZA. Yes, sir.

Chairman LAMPSON. Will NOAA be getting the additional money to cover that?

Ms. KICZA. As I have indicated, we are in dialogue with the Administration on what we believe is an appropriate budget for the GOES-R Program. I think we have good rationale for indicating the need for the additional budget. We are budgeting at the 80 per-

cent cost confidence level, and we think that is a reasonable approach to take at this stage of the program.

Chairman LAMPSON. Mr. Powner, in your experience, which of the cost estimates is the most believable and why?

Mr. POWNER. Well, if you look at it from a historical perspective and just to clarify this, there is, right now at \$6.9 billion and the independent cost estimate was at \$9.3 billion. And that is in our report, and you can see allegations that NOAA disagrees with that statement. All we were reporting was what the independent cost estimators came up with.

Now, clearly, there is this reconciliation that is going on right now. No one has seen that. Okay. So we hear it is between \$7-\$8 billion. We haven't seen that. Historically if you look at NPOESS and these other satellite acquisitions, the independent cost estimate becomes a reality or typically it is exceeded. So hopefully, we are hopeful that NOAA is right, and we are at a lower cost, but if you look historically, we are in the ballpark of the \$9.3 billion with the independent cost estimator.

Chairman LAMPSON. Do you want to comment?

Ms. KICZA. Yeah. As I had said earlier, I think we all agree that we should be budgeting at the 80 percent cost confidence level. That is the right thing to do at this space in the game, and we particularly want to get a sound cost estimate before we get the major contractors on board. We have an 80 percent cost estimate at the program office level. The independent cost estimator had an 80 percent cost estimate. The reconciliation process is an approach of understanding the differences between the two cost estimates, seeing where they converge, and then coming forward with what we believe is a rational cost estimate to be presenting in the President's fiscal year 2009 budget.

We won't exactly reconcile, but for every area that we don't specifically reconcile on, we will have a good reason for why we believe our number is the better number.

Chairman LAMPSON. Mr. Powner, how should Congress react when it receives these differing cost estimates? How do we assure that the cost estimating process give us an accurate estimate of a likely program cost and not an estimate trying to stay within a figure likely to be approved by the OMB?

Mr. POWNER. Well, I think the key is to look at where the differences lie and whether the assumptions and rationale on those differences makes sense from an oversight perspective. Clearly, we don't know exactly where those are at the moment, but if you look at like independent cost estimators, whether it is GOES or NPOESS, they typically look at historical data. It is more heavily influenced by historical data. There is a lot of other information internal to the program that only Ms. Kicza and her staff has right now that are driving these decisions, and I think from an oversight perspective, whether it is yourself or GAO helping you with that, we really need to look at those assumptions and whether they are reasonable.

Chairman LAMPSON. Thanks. Mr. Inglis.

Mr. INGLIS. Ms. Kicza, I guess it is, if I am understanding this right, you think that the independent estimate is \$7-\$8 billion. Right?

Ms. KICZA. A program office estimate is between \$7–8 billion, and it represents what the program believes is a sound 80 percent cost confidence estimate.

Mr. INGLIS. And the independent estimate is?

Ms. KICZA. The independent estimate will be a little bit higher than that, and those areas where there are differences we will explain the differences and the rationale for why we believe the estimate that we are coming forward with is a correct estimate.

I would like to take the opportunity to also say that we are not trying to bring in an estimate that the Administration will accept. We are bringing in an estimate that we believe is a sound estimate to execute the program successfully.

Mr. INGLIS. And when will, what is the process by which you are going to explain those differences? When will that be and or can you tell us now what the differences are?

Ms. KICZA. I can tell you where the key areas of difference are. Yes. It is in the amount of maturity of the software, so you will see some deltas in the software development area. You will see some deltas in the area of instrument development and some deltas in the area of systems engineering. In all cases the program estimate increased its estimate, and I believe we have a sound basis for the numbers that we have identified in our estimate.

Mr. INGLIS. And when is that, when do you intend to make those explanations available with specificity?

Ms. KICZA. We can make them available as part of the '09, budget process, and we are also having that independently looked at by our independent review team.

Mr. INGLIS. Which, I guess, is driving some of the Chairman's questions about, it sounds like it is connected to the budget process.

Ms. KICZA. Yes, it is. Absolutely.

Mr. INGLIS. But then that you, I guess that brings up the possibility of being fit into the budget process I think is the, is at least the theory that the Chairman is pursuing.

And it is not really reflecting what is happening in the program. It reflects rather that the budget exigencies rather than the program's natural expenses.

Ms. KICZA. At this point what we have delivered as a budget that we believe is a rational budget at the 80 percent cost confidence level, and I have no indication that it would be anything other than that.

GOES COMPLETION DATES

Mr. INGLIS. How about the time estimate differences? The time to completion. What is, the delivery dates. When, what is with the discrepancy there? You are thinking that it is going to be operational when?

Ms. KICZA. We plan to have it available for launch for the December 2014 timeframe. We have had that looked at both internal and external of the program. I think it is a rational launch date to proceed to with sufficient schedule reserve.

What the independent estimator has indicated is that within the ability of the current models to predict, the two estimates are essentially the same.

Mr. INGLIS. So the independent analysis agrees——

Ms. KICZA. Right.

Mr. INGLIS.—with your analysis, 2014?

Ms. KICZA. Within the ability of models to predict. So they are saying it could be as much as a year later than what we are, but the models are not, they don't have a high enough fidelity to be able to discern between those two dates.

Mr. INGLIS. So you are saying 2014. They may be saying 2015.

Ms. KICZA. Yes, sir.

Mr. INGLIS. I wonder where I get the 2017 number. Do you have any idea?

Ms. KICZA. It was an earlier point in the independent process. So through the reconciliation process we have reduced that delta.

Mr. POWNER. Can I clarify that?

Mr. INGLIS. Yeah.

Mr. POWNER. 2014, \$6.9 billion, 2014, was the current estimate. The independent assessors came up with the \$9.3 billion cost and then about a two-year delay into the 2017 timeframe. So when we heard back from NOAA on our report, what they told us that they anticipated instead of a \$2 billion overrun and a two-year delay, a \$1 billion overrun and a one-year delay. Now, today we are hearing a 2014, delivery. So we are a little confused because the one time we were \$2 billion more and two out, and then they replied back one billion more and only one out instead of two. And today I am hearing 2014. So we probably need to get that cleared up.

But what we have was an original estimate of 2014, in the independent assessment and the rest of this is just kind of in the fog, Ranking Member Inglis, because we don't see any data on that.

Ms. KICZA. What I will clarify is what we provided back is where the independent estimate is coming in versus what I have been talking about as the program estimate. The independent estimate went from \$9.2 billion and two years down within, to a one-year beyond where we are estimating. Similarly, both in cost and schedule, the independent estimate through the reconciliation process has come down, and from our perspective the program office estimate in terms of cost has increased in part of the reconciliation process.

Mr. INGLIS. Thank you, Mr. Chairman.

Chairman LAMPSON. Okay. We have only a couple minutes left before our vote. We will have to be in recess until we make those votes. There are three, one 15-minute, which is almost over, and two fives, so we will be coming back, and we are in recess.

[Recess.]

Ms. GIFFORDS. [Presiding] Good afternoon. I don't look like Nick Lampson, but I am Gabrielle Giffords, and this meeting is officially resumed.

GOES-R PROCUREMENT

Just following up on the Congressman's questions, this question is for Ms. Kicza. Has NOAA yet made a final decision to purchase the GOES-R?

Ms. KICZA. I think it is very important to remember that we are still in the formulation phase for GOES-R. This is the time when we are trying to settle on the cost, the scope, and the schedule. We

have not yet made the decision to go out and procure those major contracts for ground and space segments. We are approaching that decision now.

INVESTING IN NEW SATELLITES TECHNOLOGIES VS. REOPENING EXISTING SATELLITES

Ms. GIFFORDS. Okay. And a pretty basic question. With what we know now is it better to invest the limited resources for geostationary weather satellites by reopening the line of existing satellites, expensive though it may be, or to continue with the developing of the new technologies with GOES-R with the threat of the constantly rising costs that could possibly leave us without those improved capabilities?

Ms. KICZA. That is a really good question, and in fact, when we were going through our series of options that we were examining last summer as a part of this effort, we looked at whether or not it would be cost effective to look at simply duplicating the GOES-N series, which is the current line. And what we found is that because of the mission design life for that series, you would have to buy three spacecraft, where with GOES-R you have to buy two. You would not have the capability, but it would be a comparable cost. And it would still require the same approach. You would still have to go out with a new procurement.

So we didn't see any schedule benefit, no cost benefit, and we would lose the cost we had already sunk into the development for GOES-R.

MANAGING GOES AND NPOESS COSTS

Ms. GIFFORDS. There is also reality that NOAA is already struggling with a second highly-complex satellite program, the NPOESS, and the level of resources does not appear to be able to meet the real needs of both programs simultaneously. What, therefore, is the best course of action to pursue, assuming that there is no sudden influx of or increase of funds for NOAA?

Ms. KICZA. Well, right now the NPOESS Program, the Polar Orbiting Satellite Series, is a joint program with NOAA and DOD. We each share half of the costs of that development, and it is fully funded at this point in time. The only area where we are working for an updated cost estimate is on GOES-R.

Both satellite series are needed to support our operational weather forecasting capability.

Ms. GIFFORDS. Let me just get the clarification. So you believe that you can accomplish both with the funds that you currently have available to you?

Ms. KICZA. We are increasing the cost estimate for GOES-R, and the NPOESS Program is currently fully funded.

Ms. GIFFORDS. And how much is that increase going to be for?

Ms. KICZA. We have indicated that it is, right now we are at \$6.9 billion. The increase is between, to bring it up between \$7-\$8 billion.

GAO RECOMMENDATIONS

Ms. GIFFORDS. Mr. Powner, with all the work that you have been asked to do in your area, what would you offer some recommendations to deal with this conundrum?

Mr. POWNER. A couple key areas that I would like to highlight in terms of perhaps where we have had some disagreements is on the management reserve. It is early stage of this program. I think if you look at the independent review team recommendations on GOES, the recommendation is that we have a 25 percent management reserve. That was the target.

When we completed our report, the management reserve had decreased for the program now, overall, down to 15 percent. We heard today it is now back up to 15 with the renegotiating of numbers. It is important that we maintain an adequate management reserve, because there is a lot of technical complexity involved here, and that really needs to be looked at.

The other thing that we feel strongly about, and we have had some disagreements, Ms. Kicza and I have discussed this, is the insights into NASA's activities. Historically, that has been a problem on these prior GOES satellite acquisitions. We have heard this morning, this afternoon that there is unparalleled transparency in the two agencies that are working together.

Well, but also when I read Ms. Kicza's statement, I see comments in here that there are frameworks being established so that we can have the appropriate insight and guidance. We still need to work on that and make, keep that on our radar screen to make sure we have adequate insights into NASA's activities.

Ms. GIFFORDS. Mr. Powner, would you recommend more Q GOES satellites or go forward with the GOES-R?

Mr. POWNER. That is a very good question. Two things. We would need to see two things in order to answer that question. One, we would want to know exactly what the cost of GOES-R is to be. We hear it is between \$7-\$8 billion. We hear that an independent cost estimator says it could be as high as \$9.3 billion. Historically those independent estimates have come true. Resurrecting the prior Q satellite, you know, we hear that you have to, we understand you have to start assembly lines and the whole bit, but exactly what that would cost, we don't have any firm numbers. So you would need that cost, the actual cost of GOES-R, and have a true cost benefit analysis to determine what is best going forward.

Ms. GIFFORDS. And when do you think we are going to have those numbers by?

Mr. POWNER. Well, what we have heard this afternoon is we will not have a current GOES-R estimate until the President's budget comes out in the February timeframe. In terms of resurrecting the Q option, I don't believe that that is in the works right now.

Ms. GIFFORDS. Congressman Inglis, I am going to turn the questions over to you.

GOES ACQUISITION STRATEGY

Mr. INGLIS. Thank you, Madam Chair. Let us see. Ms. Kicza, in your testimony and the testimony of Mr. Powner, you mentioned the splitting of the acquisition contract into a flight segment and

a ground segment. And what was the rationale behind splitting the two aspects of the acquisition and contract?

Ms. KICZA. Okay. Over the course of the last year we have done a lot of examination, examination of the current contracting structures resident with NOAA, examination of recent reports, both IG and GAO about the pros and cons of different contracting strategies, and we had our own independent review team led by Tom Young, who offered recommendations. We made the decision to go from a single systems prime to split contracts to assure that we had government oversight on every key element of the GOES-R System; the spacecraft the ground systems, and the instruments.

We believe, and that is also very consistent with the way our primary partner, NASA Goddard, has traditionally done this type of acquisition. So the acquisition allows us to benefit from each agencies' core competencies. It is consistent with our partner's traditional use, and it provides direct government oversight on all the key elements.

All of those we felt were reasonable reasons to proceed with a change in the contracting and management strategy.

Mr. INGLIS. And GAO says the splitting of the contracts caused delays in the program. Do you find that to be the case?

Ms. KICZA. We did have some delay as a result, about three to six months in terms of extending the current PDRR¹ contract so we could get additional information, and then revving up our own capability internally.

So, yes, we did have some delay as a result of that. We also uncovered some things that I think we would not have otherwise seen and have been able to take action in preparing for the major acquisitions.

Mr. INGLIS. Mr. Powner, you have any comment on those things?

Mr. POWNER. The only comment is that the short delay extending the awarding of those contracts, that probably makes sense because those preliminary design reviews and those meetings for those key decision points are very critical going forward. I think historically when you look at NPOESS a lot of times we push decisions through rather quickly instead of actually having a real solid design review in the critical technical reviews prior. So that delay makes sense.

Mr. INGLIS. Ms. Kicza, Ms. Giffords was just mentioning the Q line and the possibility of resurrection, resurrecting that line. Is that current technology, or is it outdated technology?

Ms. KICZA. Let me talk a little bit about that. The original series N, O, and P was an N, O, P, Q. We had planned for four satellites. In 2003, we made the decision not to exercise that option on that procurement and for good reasons. We ended up getting a more powerful launch vehicle that allowed us to extend the lifetime of the N, O, P spacecraft. That option is no longer available to us. We would have to go out with a separate procurement. So we would have to go out and procure new spacecraft. The instruments aren't there. We would have to go build new instruments again, and so we didn't find, and we would have to build three spacecraft as opposed to two spacecraft, which is what we have got with the 10-year mission life on GOES-R.

¹ Program Definition and Risk Reduction

We went through that analysis last year as part of the decision to go from four to two. We did a wide number of options on where we should go and the continuity of the N Series was one of the options that we examined.

CONTRACTOR PERFORMANCE

Mr. INGLIS. Thank you. I have no further questions.

Ms. GIFFORDS. Mr. Powner, your report seems to state that NOAA can't discuss both the cost and also the schedule data directly with contractors on the space segment. Why do you think that the GAO considers that such a significant issue?

Mr. POWNER. Well, I think there are processes that are currently being established right now so that NOAA does have insights into the, what is going on from the NASA component of this. That is very important. If you look, for instance, if you look, if you compare this to the NPOESS Program where we have joint program with NOAA and DOD and the scrubbing of some of the cost and schedule data from the contractors, that has proven a very effective best practice, even down to the point where they scrub that data on a weekly basis, and they get ahead of the curve and anticipate problems with both costs and schedule.

Something like that would be a good model to consider with the GOES Program.

Ms. GIFFORDS. Ms. Kicza, did the management documents that you described in your testimony give NOAA, the managers, the authority to obtain any data they believe is needed to manage the GOES-R Program?

Ms. KICZA. Yes. In fact, the way the program is structured, the program office manages the cost data that comes in, and we matrix that support into the project. So we have complete insight into what is going on with the contracts, who they are performing in terms of cost and schedule.

I agree with David that we really need to keep a close eye and a firm handle on insight into how the contractors are performing. I believe we have that at his point in time. We were talking about it before we started the hearing. We have to make sure that we keep our eyes on it. We don't let the, you know, let it get out of our sight, because then it should become a risk. Right now I personally don't believe it is a risk because we do have eyes on it.

And so that was my rationale for not agreeing. It is not to say it is not important to keep a good close eye on how the contractors are performing, whether that be on the space segment side, which is NASA's, or on the ground segment side, which is NOAA's.

Ms. GIFFORDS. One final question. The disagreement in your statements considering management of program reserves, to me focuses on how the reserves are distributed, but isn't it really a question of whether there will be sufficient reserves to carry the program to its conclusion?

Ms. Kicza, you said that it will, but Mr. Powner says that the Advanced Baseline Imager already made a hefty call in reserves and still has 40 percent of its work remaining. Should this committee be concerned that you will run out of reserves as happened with the NPOESS Program?

Ms. KICZA. As I had indicated in my testimony, right now we are developing an estimate or have an estimate which keeps 25 percent management reserve overall on the program. In fact, more than that. We have, at the time that Mr. Powner's team was looking at it, they did not see that reserve posture because we had not allocated it down to the project. So they saw a small amount of reserve on the instrument contract. They saw no reserve at the project level.

Since that time we have allocated reserve. We have 25 percent on the flight project, 30 percent on the ground project. We require the flight project manager to maintain a minimum of 20 percent unliened reserve on cost to go, and we actually visually check that on a monthly basis at my level. I can see where his liens are and whether or not he is keeping that threshold that we think is best business practices.

Ms. GIFFORDS. But is the total reserve left to carry through, it is going to be left to carry through to the next program?

Ms. KICZA. No. It is not going to carry through. The reason you put reserve on the programs is you expect you will spend it by the time you launch. But you always want to have it there because you, when you need it, you need to have ready access.

Ms. GIFFORDS. Okay. But it is going to get us to the launch then?

Ms. KICZA. Yes, absolutely, and beyond. We have reserve posture for the operational, operation of those satellites as well.

Ms. GIFFORDS. Okay. Let me just follow up with one last question. Does the contractor for the Advanced Baseline Imager have any of its own money set aside to reserves?

Ms. KICZA. The contractor does keep a small reserve, but traditionally with the way NASA manages contracts, they tend to keep very little reserve in the contract, and they hold it at the project level, and then they control the allocation back to the contract when it is time to do so.

Ms. GIFFORDS. Do we know how much of that reserve exists?

Ms. KICZA. As I said, right now they are at 25 percent, and they are expected to keep 20 percent unliened on cost to go, and that is being maintained.

RECENT CONGRESSIONAL ACTIONS

Mr. INGLIS. I have just one more question, Madam Chair, and that is, Ms. Kicza, the Senate included language in the CJS appropriations bill that would require a Nunn-McCurdy type review for NOAA in the event of cost overruns, and the House passed similar language in the last Congress, but there is some differences between those provisions. And maybe you could tell us how those provisions would affect NOAA's ability to manage programs like GOES.

Ms. KICZA. Yes, and actually I appreciate the question. First of all, I want to indicate that I appreciate that type of Congressional oversight, and I think it is entirely appropriate for Congress to hold us accountable to deliver spacecraft on cost, on schedule, and within program scope.

As you noted, the Senate has an amendment out, the House has recently passed an amendment relative to NASA. I would like to

indicate that the Senate amendment does pose some difficulties for us.

First of all, it would propose baselining the program at last year's cost estimate. Typically in spacecraft acquisition you baseline a program in terms of performance measurements and measuring against baseline at the time of PDR.² We are not there yet. We are about a year and a half away from that.

I fully expect to be baselined and measured against baseline. We need to make sure it is the right baseline to be measured against.

The Senate amendment also has a prohibition on spending current and prior year funds until the certification process is completed. And so they would basically turn off the fund faucet while we are certifying, in the event we say we are going to have a cost overrun. That would basically halt the program in its tracks and prevent us from being able to launch. We are concerned about that.

We have looked at the NASA language. We find that language to be more consistent with what we would expect in a satellite acquisition system, and as I said, from the get go, we expect to be held accountable for delivering a program.

Mr. INGLIS. No further questions.

Ms. GIFFORDS. Ms. Kicza, would you please submit for the record the following documents? The June 15 memorandum of understanding between NOAA and NASA for the GOES-R Program, also the GOES-R management control plan, and the report submitted from the Independent Review Team to NOAA, except the January 3, 2007, report that has already been provided?³

Ms. KICZA. Absolutely.

Ms. GIFFORDS. In closing, the Subcommittee would like to wish fair weather to Captain Garner Yates, who is with us today, of the NOAA Commissioned Corps, who is retiring from federal service this Friday. Captain Yates has served as NOAA's Congressional liaison for satellite issues for a very long time, and we know that this has not been an easy job in the past few years, but our staff is going to miss you. And we thank you for your service to the Federal Government.

I would also like to thank all of you for appearing before the Subcommittee this afternoon. Under the rules of the Committee, the record will be held open for two weeks for Members to submit additional statements and any additional questions they might have for witnesses. If there is no further questions, then this meeting is adjourned. Thank you.

Ms. KICZA. Thank you.

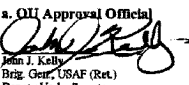

[Whereupon, at 3:30 p.m., the Subcommittee was adjourned.]

² Preliminary Design Review

³ These documents appear in the Appendix.

Appendix:

ADDITIONAL MATERIAL FOR THE RECORD

| DEPARTMENT OF COMMERCE INTERAGENCY AND OTHER SPECIAL AGREEMENTS | |
|---|--|
| 1.a. AGREEMENT NUMBER | 1.b. AMENDMENT NUMBER (if applicable) |
| 2. PARTIES TO THE AGREEMENT | |
| a. NAME OF OPERATING UNIT AND OFFICE (Name of administrative contact, including address, telephone and FAX numbers and e-mail.) ALC: 13140001 DUNS: 784769085 U.S. Department of Commerce, National Oceanic and Atmospheric Administration National Environmental Satellite, Data, and Information Service 1335 East-West Highway Silver Spring, MD 20910-3283 Admin POC: Lisa Hurt email: Lisa.hurt@noaa.gov Phone: 301-713-0088 x165 Fax: 301-713-3599 <input checked="" type="checkbox"/> Requesting OU <input type="checkbox"/> Servicing OU | b. NAME OF OPERATING UNIT AND OFFICE (Name of administrative contact, including address, telephone and FAX Numbers, and e-mail.) ALC: 80000002 DUNS: 042273664 National Aeronautics and Space Administration Goddard Space Flight Center 8800 Greenbelt Road Greenbelt, MD 20771 Admin POC: Steven J. Dobrosielski email: Steven.J.Dobrosielski@nasa.gov Phone: 301-286-7931 Fax: 301-286-9777 <input type="checkbox"/> Requesting OU <input checked="" type="checkbox"/> Servicing OU |
| 3. PROJECT TITLE OR PURPOSE GOES-R Program Support | 4. GOODS AND SERVICES BEING EXCHANGED (The description of goods and services being exchanged and delivery requirements are included in the attached terms and conditions.) |
| 5. LEGAL AUTHORITY National Aeronautics and Space Act of 1958, codified at 42 USC section 2473(c)(5) and (6). See Section 2 of the attached terms and conditions. | 6. ANTICIPATED PERIOD OF AGREEMENT START DATE: See last date of signature in Block 8 COMPLETION DATE: See Section 15 |
| 7. FUNDING | |
| a. Estimated Total Cost See Section 7 | b. Funds Citation/Cost Center See Section 7 Frequency of Distribution: See Section 7 (quarterly, monthly, etc.) |
| c. Cost Allocation <input type="checkbox"/> 100% reimbursed by requesting Operating Unit <input checked="" type="checkbox"/> Other. Explain: See Section 7 | |
| d. Funds Availability/Budget Approval : See Section 7 | |
| 8. EXECUTION OF THE AGREEMENT | |
| a. OU Approval Official  John J. Kelly Brig. Gen. USAF (Ret.) Deputy Under Secretary for Oceans and Atmosphere Date: 06.10.07 | b. OU Approval Official  Rex D. Geveden Associate Administrator National Aeronautics and Space Administration Date: 06.12.07 |

**MEMORANDUM OF UNDERSTANDING BETWEEN
THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
AND
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
REGARDING THE
GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE, SERIES R**

1. PURPOSE

The U.S. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Environmental Satellite, Data, and Information Service (NESDIS), and the National Aeronautics and Space Administration (NASA) are committed to successful planning, acquisition, and operation of the Geostationary Operational Environmental Satellite Series R (GOES-R) program. The purpose of this agreement is to define a relationship between the parties that results in the successful planning, implementation, and management of the GOES-R program. This agreement, in and of itself, does not obligate or transfer funds.

2. AUTHORITY

NOAA and NASA have authority to enter into this agreement pursuant to section 203(c)(5) and (6) of the National Aeronautics and Space Act of 1958, codified as 42 USC section 2473(c)(5) and (6). These sections authorize the provision of services, equipment, personnel, and facilities by either agency as necessary to meet the objectives of the agreement, on such terms as may be deemed appropriate. In addition, NOAA has programmatic authority for the activities described herein pursuant to 15 USC section 313 and 49 USC section 44720.

3. BACKGROUND

NOAA operates a system of environmental satellites in geostationary orbits known as GOES. These satellites provide continuous monitoring from the same longitude, allowing the tracking and detection of environmental phenomena that cannot be achieved using polar-orbiting satellites, which provide global coverage that geostationary satellites cannot. GOES spacecraft provide critical atmospheric, oceanic, climatic, solar, and space data images in near real-time and support weather forecasting, climatologic analysis and prediction, ecosystems management, and safe and efficient public and private transportation.

For GOES-R, NOAA will continue to have overall responsibility and accountability for the program. Both NOAA and NASA will acquire elements of the system under the auspices of an integrated NOAA/NASA program office, led by NOAA and located at the Goddard Space Flight Center (GSFC). The GOES-R program must have dedicated, collocated program management, systems engineering, and scientific support for which NOAA will provide reimbursement funding to NASA. This agreement is necessary to define the scope of support including the level of reimbursable, dedicated services that will be provided from NASA to NOAA.

4. SCOPE

The activities to be undertaken pursuant to this agreement include all support required to ensure the GOES-R system meets program requirements and schedule milestones. The GOES-R program includes the Program Office, the Flight Project, and the Operations Project. The Program Office includes all program management, acquisition strategy management, program level Systems Engineering and Integration, scientific, technical, and administrative support. The Flight Project includes the instruments, spacecraft, launch services, satellite integration, and on-orbit satellite initialization and checkout. The Operations Project includes the mission management, data calibration, product generation, product distribution, archive and access, user interface, and operations support.

Nothing contained in this agreement shall be interpreted in a manner that is inconsistent with or contrary to the purpose or intent of any Act of Congress establishing, affecting, or relating to the agreement or any applicable Federal or state law.

5. GOVERNING DOCUMENTS

Applicable Documents: The implementation and execution of this agreement shall be in accordance with the requirements of the GOES-R Management Control Plan (MCP). The MCP will be drafted by the GOES-R Program Office and approved by NESDIS and GSFC within 90 days of the signing of this agreement. Authority to extend the 90-day period is jointly delegated to the Assistant Administrator, NOAA Satellite and Information Service (NESDIS AA) and to the NASA Chief Engineer; such authority will be exercised jointly by the NESDIS AA and NASA Chief Engineer.

Guidance Documents: Guidance for processes for this program will be derived from the NASA Procedural Requirements (NPR) 7120.5D as provided in the MCP. Although NPR 7120.5D and other NASA technical oversight processes are referenced throughout this MOU, all references to any such technical oversight processes or other processes throughout this MOU are specifically defined by the MCP and the express understanding of the parties hereto that the NESDIS, NOAA or DOC (as appropriate) will play an oversight role, or other specific roles as outlined in the MCP, in the application of those NASA processes to the GOES-R program. The GOES-R Flight Project will be managed in accordance with NPR 7120.5D, as specifically implemented by the MCP as needed and agreed to by both parties.

6. SPECIFIC DUTIES AND RESPONSIBILITIES

NOAA (NOAA includes DOC, NOAA and NESDIS throughout this MOU, unless specified otherwise) and NASA shall each provide sufficient personnel to support their program/project functions as specified in the approved MCP.

Consistent with Section 5 and standard NOAA and NASA practices, the parties agree to the following:

A. NOAA and NASA shared responsibilities include:

1. NOAA and NASA Administrators will meet at least annually and on an as needed basis to assess the status and progress of the program.
2. NESDIS and GSFC shall ensure the GOES-R MCP is completed and signed within 90 days of the signing of this agreement, unless extended in accordance with Paragraph 5.
3. NOAA and NASA will support an integrated program/projects approach with co-located program and project offices.
4. Systems Engineering and Integration (SE&I) will be a government led activity residing within the Program Office. The Program Systems Engineer (PSE) position will initially be staffed by NASA but NOAA will maintain significant involvement in the SE&I function. The parties to this MOU understand that the goal is to eventually transition the PSE position for SE&I from a NASA employee to a NOAA staffed employee.
5. NOAA and NASA will jointly establish a Standing Review Board in accordance with NPR 7120.5D.
 - a. Standing Review Board shall be co-chaired by NOAA and NASA
 - b. Standing Review Board purpose and membership will be coordinated between NOAA and NASA.
6. The Joint Mission Readiness Review.
7. The Joint Flight and Launch Readiness Reviews.
8. The program and projects will be executed in accordance with applicable NASA/GSFC and NOAA/DOC technical standards and practices as outlined in the MCP.
9. Management, reporting, and oversight of activities will be accomplished through both DOC/NOAA and NASA processes.
 - a. NOAA's Program Management Council (PMC) oversees the GOES-R Program, including the Flight and Operations Projects.
 - b. NASA's GSFC Center Management Council (CMC) oversees the activities, products, and performance of the GOES-R Flight Project and provides advice to NOAA regarding the activities, products, and performance of the GOES-R Operations Project.
10. Coordination of all GOES-R legislative actions, including congressional testimony and questions for the record; public affairs releases and educational; training; or other releases to industry or the public. NOAA retains lead agency status for all legislative efforts. NASA agrees to provide assistance to NOAA as requested.
11. NOAA and NASA agree to form a collaborative GOES-R Program contracting partnership to ensure effective and efficient support for all GOES-R Program and Project contract actions. NOAA and NASA Contracting Officers will retain full agency authorities and continue agency reporting responsibilities while operating in partnership with each other. The partnership intends to collaborate through the sharing of contracting staff resources for NOAA and NASA contracts, establish action approval levels for Program review, and operate within appropriate current or future NOAA/NASA processes, policies, and procedures.
12. For Program and Project Office operations the NESDIS and GSFC Chief Information Officers (CIOs) shall agree on procedures for any information technology (IT) issues affecting NOAA hardware, software, connectivity, or the

security of NOAA information. Procedures shall be in accordance with DOC and NASA policies, federal law, and other federal guidance.

- B. NOAA is ultimately responsible and accountable for overall success of the GOES-R program. Specific responsibilities include:
1. Decision authority for Key Decision Points as described in MCP. (Currently DOC)
 2. Decision authority for mission readiness, flight readiness and launch readiness.
 3. Decision authority for overall acquisition strategy. (DOC)
 4. Procurement, management, and execution of the Operations Project.
 5. Staffing for the senior leadership of GOES-R. NOAA designated key positions include:
 - a. System Program Director (SPD)
 - b. Deputy SPD
 - c. Program Control Lead
 - d. Operations Project Contracting Officer
 - e. Program Scientist
 - f. Deputy Flight Project Manager
 - g. Operations Project Manager.
 6. Perform program control functions as described in the MCP.
 7. Participate in the program systems engineering function and assume lead for this function in any transition from NASA to NOAA.
 8. Lead Program budget development for fiscal year and life cycle in accordance with DOC/NOAA processes based upon inputs from the projects and utilizing the processes described in the MCP.
 9. Participate in NASA acquisition and contract execution activities as identified in the approved acquisition strategy, including, at a minimum: The NESDIS AA will attend any Source Evaluation Board (SEB) briefings to the NASA Source Selection Official (SSO) concerning this acquisition or the source selection thereof.
 10. For award fee contracts, the GOES-R SPD will chair the Performance Evaluation Boards (PEB) for the spacecraft and major ground contracts and make recommendations to both the NOAA Fee Determination Official (FDO) and the NASA FDO in award fee determinations.
 11. Determine, in consultation with NASA, the composition and procedures for any Failure Review Board or Mishap Investigation Board for ground failures or mishaps at the major assembly level or any on-orbit failure that impacts Level I performance requirements. Flight Project Failure Review Boards or Mishap Investigation Boards shall be conducted in accordance with NASA procedures.
 12. Provide all briefs and interactions with the Executive and Legislative branches on GOES-R unless specifically delegated to NASA or specifically requested from NASA.
 13. Lead all international agreements and other partnership agreements external to NOAA/NASA relating to GOES-R.
 14. Develop and control the Level I requirements, Mission Requirements Document (MRD), and Concept of Operations (CONOPS).
 15. Develop and control the Program Plan and approval of the Project plans.

C. NASA responsibilities include:

1. Procurement, management, and execution of the Flight Project.
2. Staffing GOES-R senior leadership positions including:
 - a. Assistant SPD
 - b. Flight Project Manager
 - c. Deputy Operations Project Manager
 - d. Program Mission Assurance Lead
 - e. Program Systems Engineering Lead
 - f. Flight Project Contracting Officer
3. Provide project budget requirements to the program.
4. Provide standard NASA technical oversight resources pursuant to the MCP.
5. NASA GSFC is responsible for Program and Project mission assurance management and infrastructure.
6. As specifically described in the MCP and provided as in Section 5 to this MOU, NASA GSFC is responsible for the Technical Authority process including leading technical reviews associated with the Technical Authority process.
7. As part of the SSO source selection briefing(s), the NESDIS AA will be afforded the opportunity to provide comments, and raise questions or concerns for the SSO to consider prior to selection
8. For major elements of flight project award fee contracts, the NASA FDO shall brief NESDIS AA on decision and rationale.

7. COSTS

a. All activities under or pursuant to this agreement are subject to the availability of appropriated funds, and no provision herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 USC 1341.

b. Using the process and limitations set forth herein, NASA shall be reimbursed its actual, allowable and allocable direct and indirect costs for labor, contracted support services as well as facility and IT support for all Federal and support contractor personnel assigned to the GOES-R program and working at the GSFC facility. NASA has changed its approach to calculating full cost. It has eliminated separate rates for pools (IT, Facilities, Center G&A) and combined them into a larger Center Management and Operations overhead structure. For purposes of this agreement, reference to separate pools is maintained to provide traceability to the pre-negotiated agreement from March 2005. The parties agree to the following:

A. GSFC TECHNICAL MANAGEMENT:

1. FY07: Facilities and IT costs applicable to GSFC Tech Management are waived. Center G&A is applicable.
2. FY08: Facilities and IT costs applicable to GSFC Tech Management are applicable and shall be consistent with a separately negotiated NOAA/GSFC use permit.

B. NOAA GOES-R HOUSING:

1. FY07: Facilities and IT costs are applicable. Center G&A is waived.

2. FY08: Facilities and IT costs are applicable and shall be consistent with a separately negotiated NOAA/GSFC use permit. Center G&A is waived.

C. NASA CORPORATE G&A:

1. NASA corporate G&A payments do not apply to this agreement

D. FY09 AND BEYOND

1. Funding for indirect support will be calculated to reflect the market value of services provided. The pricing applied will not result in reimbursable revenue that is in excess of the full cost of providing the work. Calculation of the market value will be consistent with guidance included in NASA Financial Management Regulations (FMR) Volume 16.

Criteria specified in this agreement for calculation of indirect costs are applicable only to the GOES-R Program Support agreement. Any agreements for new work beyond the GOES-R series will be separately developed consistent with NASA policy for reimbursable activities.

Funding from NOAA for the total estimated value of this agreement is not presently available and is subject to receipt of sufficient annual appropriations and quarterly apportionments. Funding for this agreement will be documented in the Level I requirements document which will be finalized as a part of the Department of Commerce KDP-C/D process. When funding becomes available, NOAA will issue an order in accordance with the following paragraph. Accordingly, the parties agree that NOAA is not obligated to transfer funding to cover the full value of this agreement, nor is NASA obligated to perform services that exceed the cumulative amount of funds actually transferred through orders issued against this agreement. Details of these procedures and the associated documents will be explained in the MCP.

NOAA will issue orders for products and services according to standard NOAA procedures. The detailed procedures will be described in the MCP. NOAA and NASA will agree upon the type and extent of work required consistent with the acquisition strategy and other management control plans; the cumulative amount of funds obligated and made available; and the estimated period of performance covered by the funding. Detailed procedures and requirements concerning NASA billing and NOAA reimbursements shall be in accordance with standard NOAA and NASA operating procedures.

8. REPORTING REQUIREMENTS

Timely and comprehensive financial, programmatic, and technical reporting to NOAA and NASA management is essential to ensure mission success. Both parties commit to complete transparency on all aspects of the GOES-R program.

At a minimum, the projects shall provide the following regarding their GOES-R activities to the SPD:

- A. Monthly status review reports.

- B. Monthly Contract Cost Performance Reports, including Earned Value Management data, for all contracts executed in support of GOES-R except as agreed to by the SPD.
- C. Quarterly Contract Cost Funds Status Reports for all contracts executed in support of GOES-R except as agreed to by the SPD.
- D. Monthly Contract Action Reports for all contracts. Specific content shall be coordinated with the SPD.
- E. Additional technical and programmatic data as requested by the SPD on an *ad hoc* basis.

At a minimum, the program and projects shall provide the following regarding their GOES-R activities:

- A. Monthly Status Reviews to NOAA PMC. Specific content shall be coordinated with the SPD.
- B. Quarterly Status Reviews to DOC.
- C. Monthly Status Reviews to GSFC CMC and, if requested, to the appropriate NASA HQ PMC.
- D. Reports as required to fulfill information resource investment management and information security requirements.

The format and content for these Status Reviews from the program and projects shall be coordinated by the SPD, with GSFC Monthly Status Review (MSR) reporting meeting at least the minimum reporting requirements of the GSFC CMC.

DOC, NOAA, and NASA management shall be invited to participate in each others' management reviews of GOES-R activities.

9. CONTROL OF GOVERNMENT OWNED PROPERTY

NOAA requires identification and tracking of all property acquired using its funds as described in the MCP.

10. RELEASE OF TECHNICAL AND PUBLIC INFORMATION INCLUDING DATA ACCESS AND UTILIZATION

All scientific and technical data developed or otherwise obtained or produced shall be shared between the parties to this agreement. All contracts and agreements entered into by each party shall ensure there is no restriction on the sharing of data between NOAA and NASA. It is the responsibility of the party producing the data to ensure that any restrictive markings associated with third party access to data or information is included with such data/information when provided to the other party. Support contractors having properly executed a non-disclosure agreement and having no conflict of interest shall also be entitled to view such data/information subject to the discretion of the party managing the contract.

Each party is responsible for complying with the terms of restrictive markings that may be placed on data or information. To the extent that data or information is properly released, appropriate

credit shall be given to NOAA and NASA as may be specifically directed in the approval for public release.

11. LIABILITY

Each party agrees to assume liability for its own risks associated with activities undertaken in this agreement.

12. BUILDING OPERATIONS, MAINTENANCE, AND PROTECTION

GSFC managers shall allocate sufficient work space, including class A office space, at NASA's GSFC facility, in accordance with the GSFC-NOAA use permit, for all GOES-R program office badged government and on-site support contractor personnel. NOAA will reimburse NASA for any product or service considered in excess of those normally provided for GSFC programs of similar scope and cost. As a minimum, support will include:

- A. Facility management, security protection including badges for on-site personnel, and maintenance of the premises occupied by the GOES-R Program Office.
- B. Access to all GSFC common-use areas including library, health unit, fitness unit, cafeteria, and parking and use of the GSFC motor pool and other transportation services in accordance with normal GSFC regulations. Certain areas, such as the health and fitness units and the motor pool, are restricted to civil servant use only.
- C. IT systems support and maintenance for all personal computers and other equipment at a priority level commensurate to other GSFC programs of equivalent magnitude.
- D. Facility maintenance and unscheduled repair services in accordance with GSFC regulations.

NOAA agrees that all GOES-R permanent program office personnel will comply with all GSFC facility regulations, security procedures, safety and environmental regulations, and training requirements.

13. RESOLUTION OF DISAGREEMENTS

Nothing in this agreement is intended to conflict with current DOC or NASA directives. If the terms of this agreement are inconsistent with existing directives of either of the offices entering into this agreement, those portions of this agreement which are determined to be inconsistent shall be invalid, but the remaining terms and conditions not affected by the inconsistency shall remain in full force and effect. At the first opportunity for review of this agreement, all necessary changes will be accomplished either by an amendment to this agreement or by entering into a new agreement, whichever is deemed expedient to the interests of both parties. Should disagreement arise about the interpretation of the provisions of this agreement or amendments and/or revisions thereto that cannot be resolved at the operating level, the area(s) of disagreement shall be stated in writing by each party and presented to the other party for consideration. If an agreement on interpretation is not reached within thirty (30) days, the parties shall forward the written presentation of the disagreement to respective higher officials for appropriate resolution. Disagreements concerning programmatic issues that cannot be resolved by the GOES-R SPD shall

be documented in writing and elevated to the NESDIS Assistant Administrator and the GSFC Director for resolution. Failing resolution at that level, the issue shall be elevated to the signatory positions to this agreement and successively higher positions as necessary for final resolution.

14. DURATION OF AGREEMENT

This agreement will become effective when signed by all parties and will remain in effect throughout the life of the GOES-R program.

The NESDIS Assistant Administrator and the GSFC Director will review the agreement annually to determine if it should be revised, renewed, or canceled. This review can be combined with the preparation of annual project spend plans. Proposed revisions to the succeeding year's agreement shall be provided to the other party one month prior to the end of the fiscal year.

15. AMENDMENT AND TERMINATION

Amendments to this agreement shall be in writing and are subject to the mutual agreement of the parties.

This agreement may be terminated at any time by either party; the terminating party must provide advanced written notice to the other party three hundred and sixty-five (365) calendar days prior to termination. In the event of termination of this agreement by NOAA, NOAA shall reimburse NASA for costs associated with this termination, including the termination costs for terminating contracts entered into by NASA pursuant to this agreement and costs necessary for the orderly closeout of activities under this agreement. In the event of termination of this agreement by NASA, NASA shall bear the costs associated with this termination, including the termination costs for terminating contracts entered into by NASA and NOAA pursuant to this agreement and any costs necessary for the orderly closeout of activities under this agreement.

GOES-R Independent Review Team

Key Decision Point (KDP) C/D Preliminary Readiness Assessment

25 & 26 June 2007

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Acknowledgement

- The Independent Review Team (IRT) continues to be impressed with the professionalism and expertise of the GOES-R Team and NOAA, NASA, and DOC staff and management. Their knowledge and positive attitude again made for a productive and enjoyable review experience

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Topics

- Purpose
- Executive Summary
- Approach
- Preliminary Findings and Recommendations
- Follow-up Actions
- Appendices

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Purpose

- To conduct a preliminary review of the readiness of the GOES-R Program for KDP-C/D.
- Provide assessment and recommendations to assist Program Office, NOAA, NASA, and DOC with preparations for final KDP-C/D review process.

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Executive Summary

- DOC, NOAA, and NASA are taking the right steps to put together a sound GOES-R Program.
 - The nature and extent of the issues identified are not unusual for a Program of this complexity at this stage.
 - Issues need resolution but should not be cause for significant delay in the overall Program.
- The Program has made substantial progress toward being ready for a KDP-C/D.
 - Memorandum of Understanding (MOU) with NASA signed.
 - Development of Management Control Plan well underway.
 - Level I requirements document signed.
 - Mission Requirements Document baselined
 - Program System Engineering and Integration (SE&I) and Flight Project (Space Segment) in good shape.
 - Noticeable increase in Program maturity since last fall.

Executive Summary (cont)

- However, several issues must be resolved before proceeding with KDP-C/D.
 - Development of a plan that aligns Program scope, budget, schedule, and procurement approach.
 - FY2008 \$6.96B Program is unexecutable.
 - FY2009 NOAA Request fixes some FY2008 \$6.96B Program shortfalls; However, FY2008 and FY2009 funding shortfalls remain and FY2009 Request is inconsistent with Independent Cost Estimate (ICE) 80/20 estimate.
 - Plan needs to specifically address how FY2008 and FY2009 funding shortfalls will be accommodated.
 - Plan must identify how procurement and Program scope will be structured to align with assumed funding and how procurement and Program scope can accommodate potential changes in funding.

Executive Summary (cont)

- However, several issues must be resolved before proceeding with KDP-C/D (cont).
 - Complete reconciliation process to understand in more detail the deltas between the POE and ICE and the soundness of the decision that a budget within 15% of the ICE is acceptable.
 - An executable GOES-R Program must be budgeted to the most probable cost
 - Inflation indices should reflect most likely costs; Department of Defense (DoD) indices are definitely inadequate for satellite system related space and ground activities.
 - If a decision to not budget to the ICE is made, there needs to be a detailed understanding of the outstanding deltas and rationale for not incorporating in most probable budget; i.e., why ICE is greater than 80/20.
 - Important for an accurate understanding of where and what the Program cost risks might be.
 - Additional effort is needed to ensure Program schedule has adequate maturity (including identification of Program SE&I to Projects and inter-Project dependencies) and includes sufficient margin at Program, Space and Ground levels to ensure high confidence of meeting launch and/or operational need dates.

Executive Summary (cont)

- However, several issues must be resolved before proceeding with KDP-C/D (cont)
 - Resolution of a number of uncertainties and shortfalls in the Operations Project (Ground Segment).
 - Clarification of user and architectural requirements.
 - Resource shortfalls including funding and staffing.
 - Approach and schedule for Ground implementation including what capabilities are required when.
 - Establish Tiger Team to provide required expertise to address Ground shortfalls.
 - Short term activity (~several months)
 - Verify or update GOES-R requirements baseline as required to address user products uncertainty.
 - Identify minimum essential first launch Ground capability and the content and priority for subsequent deliveries of Ground capabilities.
 - Estimation of hardware and software required and updating of Cost Analysis Requirements Document (CARD).
 - Estimation of funding and schedule required including generation of an updated POE and ICE.

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Executive Summary (cont)

- However, several issues must be resolved before proceeding with KDP-C/D (cont).
 - Important that Ground recovery actions result in adequate level of technical maturity and resources prior to KDP-C/D and release of final Request for Proposal (RFP).
 - IRT estimates 6 months to a year; Project Lead estimated 6 months
 - The adequacy, phasing, and scope of Program SE&I resources.
 - SE&I staffing in the near years and in total appears insufficient.
 - Ensure SE&I activity has the same type of access to Ground expertise and resources from NOAA as it has for Space expertise and resources from NASA
 - Flight (Space) maturity is appropriate for KDP-C/D – technical, management, staffing, etc.
 - However, Program issues regarding scope of Program, budget, schedule, and procurement approach introduce uncertainties that may impact cost and schedule of Space procurement if not resolved prior to the KDP-C/D and final RFP release for Space procurement.
 - However, need to continue draft RFP process in a timely manner.

Executive Summary (cont)

- Depending on how long the resolution of the Ground issues will take, consideration should be given to possibly decoupling the Space and Ground procurements.
 - Separate KDPs and subsequent RFP releases.
 - Assess practicality, benefits, and risks of this and other alternatives.
 - While Flight (Space) is close to a KDP-C/D level of maturity, either with Ground or on its own, the KDP-C/D should be contingent on an executable plan (scope, budget, schedule, procurement) for both Space and Ground.
- Important to proceed with draft RFP activities to ensure industry is aware of latest Government thinking and has opportunity to provide feedback.
- Schedule for KDP-C/D process seems overly optimistic based on experience with KDP-B and other similar level decisions.

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Approach

- Reviewed a set of Program documents provided two weeks prior to IRT review meetings.
- Conducted two review meetings;
 - A subgroup met with Program and NOAA personnel on 19 June to review Program Office Estimate (POE), Independent Cost Estimate (ICE), reconciliation efforts and resultant GOES-R budget.
 - The IRT met with Program, Project, NOAA, and NASA personnel on 25 and 26 June.
- Based on NOAA and IRT belief that the Program was not ready for KDP-C/D and the need to identify the actions necessary to prepare for KDP-C/D, the focus of the review was on the KDP-C/D preparations with some discussion of associated Request for Proposals (RFP's), source selection, and Acquisition and Operations (A&O) phase execution preparations.

Approach (cont)

- Based on results of discussions, the IRT formulated a set of findings and recommendations intended to help the Program, Projects, NOAA, NASA, and DOC prepare for KDP-C/D.
- There were also a number of actions agreed to between the IRT and the Government for the final KDP-C/D readiness review.

Preliminary Findings and Recommendations

Program - Findings

- DOC, NOAA, and NASA are taking the right steps to put together a sound GOES-R Program.
 - The nature and extent of the issues identified are not unusual for a Program of this complexity at this stage.
 - Issues need resolution but should not be cause for significant delay in the overall Program.
- The Program has made substantial progress toward being ready for a KDP-C/D.
 - Memorandum of Understanding (MOU) with NASA signed.
 - Development of Management Control Plan well underway.
 - Level I requirements document signed.
 - Mission Requirements Document baselined
 - Program System Engineering and Integration (SE&I) and Flight Project (Space Segment) in good shape.
 - Noticeable increase in Program maturity since last fall.

Preliminary Findings and Recommendations (cont)

Program – Findings (cont)

- Additional work needs to be accomplished to ensure that the program scope and budget are executable.
 - FY2008 President's Budget (\$6.96B) and two satellite baseline program is unexecutable.
 - FY2009 NOAA Budget Request improves funding in outyears but fails to match Program Office Estimate (POE) or Independent Cost Estimate (ICE) in near years.
 - The addition of the FY2008 and FY2009 funding shortfalls to the outyears does not reflect the non-inflation impacts of non-optimal program phasing that can increase the outyear payback by a factor of two to as high as five.
 - FY2009 NOAA Budget Request does not reflect most probable program cost due to overly optimistic inflation indices and failure to match ICE estimate without sufficient rationale for difference; i.e., how is ICE greater than 80/20?

Preliminary Findings and Recommendations (cont)

Program – Findings (cont)

- Additional work needs to be accomplished to ensure that the program scope and budget are executable (cont).
 - The rationale for accepting a GOES-R budget within 15% of the ICE is questionable.
 - The ICE appears to have some credible issues unaddressed by the reconciliation process to date.
 - The weight of historical experience argues that both the POE and ICE are most probably less than what the eventual actual costs for the program will be.
 - The same historical perspective also indicates that a majority of the time the original ICE's have been closer than the POE's to the eventual program costs.
 - Use of unrealistic cost factors (e.g., use of DoD inflation indices) builds a lien into budget that effectively reduces contingency.
- The addition of two satellites and an advanced instrument to the FY2009 request will provide a more cost effective continuation of the required GOES-R satellite resources and a lesser cost approach for future incorporation an advanced instrument.
 - Supports more cost effective parts procurement.
 - Allows instrument accommodations to be factored into initial design and development efforts.

Preliminary Findings and Recommendations (cont)

Program – Findings (cont)

- Additional effort is needed to ensure Program schedule has adequate maturity (including identification of Program SE&I to Projects and inter-Project dependencies) and includes sufficient margin at Program, Space and Ground levels.
 - Confidence level for schedule was unstated; perhaps unknown
 - Ground schedule is mostly notional at this point.
 - Not clear if the satellite procurement has schedule margin and if so, is the schedule margin funded.
 - Program schedule appears to have no slack to the launch need date.
 - Experience says realized schedule will be the plan plus some additional time resulting from reality and problem recoveries.
 - Need to ensure separate Space and Ground procurements recognize critical tie points.
- Schedule for KDP-C/D process seems overly optimistic based on experience with KDP-B and other similar level decisions.

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Preliminary Findings and Recommendations (cont)

Program – Recommendations

- Complete reconciliation process to understand in more detail the deltas between the POE and ICE and the soundness of the decision that a budget within 15% of the ICE is most probable (80/20).
 - Inflation indices should reflect most likely costs; DoD indices are definitely inadequate for satellite system related space and ground activities.
 - If a decision to not budget to the ICE is made, there needs to be a detailed understanding of the outstanding deltas and rationale for not incorporating in most probable budget.
 - Important for an accurate understanding of where the program cost risks might be.
 - Reconciliation results should not be lumped into contingency or management reserve unless truly associated with non-specific or unknown risks.
 - Reconciliation results associated with specific risks should be identified as being associated with the specific risks.

Preliminary Findings and Recommendations (cont)

- **Program – Recommendations (cont)**
 - Immediately develop a plan that aligns Program scope and procurement approaches with a budget reflecting most likely costs and providing sufficient (~25%) margin, and a schedule with an appropriate level of likelihood and margin to the need date.
 - Plan must address how FY2008 and FY 2009 funding shortfalls will be addressed, either by add funding or changing scope and/or schedule, the impacts to desired contingency and carry forward levels, and how changes will impact out year effort, funding, and/or schedule.
 - Plan must identify how procurement and Program scope will be structured to align with assumed funding and how procurement and program scope can accommodate potential changes in funding assumptions.
 - Additional two spacecraft and advanced instrument accommodations are very important FY2009 NOAA Budget Request additions but fixing baseline GOES-R Program should be a budget must-do priority irrespective of decisions on additional spacecraft and advanced instrument accommodations.

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Preliminary Findings and Recommendations (cont)

- **Program – Recommendations (cont)**
 - Given an acceptable resolution to the budget and program scope issue, the Program should continue to move forward to ensure adequate development time (including margin) to meet required launch need date.
 - Complete development of integrated master schedule for Program
 - Identify critical paths through Program, Space, and Ground activities and major dependencies amongst the Program, Space, and Ground areas.
 - Identify schedule slack provisions in the Program, Space, and Ground areas.
 - Ensure internal development schedule has sufficient confidence level (greater than 50%) and slack time to provide high probability of meeting externally advertised launch and/or operational need dates.

Preliminary Findings and Recommendations (cont)

Program – Recommendations (cont)

- Depending on how long the resolution of the Ground issues will take, consideration should be given to possibly decoupling the Space and Ground procurements.
 - Separate KDPs and subsequent RFP releases.
 - Assess practicality, benefits, and risks of this and other alternatives.
 - While Space is close to a KDP-C/D level of maturity, the KDP-C/D, either for Space and Ground separately or together, should be contingent on an executable plan (scope, budget, schedule, procurement) for both Space and Ground.
- Given top level approval of Program scope, budget, and procurement approach through DOC, the Milestone Decision Authority for KDP-C/D should be delegated to NOAA.
 - Improve and increase decision maker interaction with Program regarding readiness to execute within parameters approved by DOC.
- Important to proceed with draft RFP activities as soon as possible to ensure industry is aware of latest Government thinking and has the opportunity to provide feedback.

Preliminary Findings and Recommendations (cont)

SE&I Findings

- Relatively new function within Program but good progress toward KDP-C/D maturity.
- Current definition of SE&I functional support arrangements and technical authority provisions is slanted toward Space activities and GSFC.
 - Insufficient identification of similar provisions regarding Ground efforts and NOAA
- Staffing appears insufficient in near years and in total for the anticipated work load.
- Program SE&I roles and responsibilities may overlap the Project SE&I roles and responsibilities more than is beneficial.

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Preliminary Findings and Recommendations (cont)

SE&I Recommendations

- Ensure definition of SE&I functional support arrangements and technical authority provisions are in place with respect to Ground activities and NOAA.
- See recommendations regarding schedule maturity and slack under Program – Recommendations.
- Ensure Program and Projects SE&I roles and responsibilities and resources are sufficient and properly allocated. See related follow-up action item.

Preliminary Findings and Recommendations (cont)

Flight (Space) Project – Findings

- Maturity is appropriate for KDP-C/D – technical, management, staffing, etc.
- However, Program issues regarding scope of program, budget, schedule, and procurement approach introduce uncertainties that may impact cost and schedule of Space procurement if not resolved prior to the KDP-C/D and final RFP release for Space procurement.
 - However, need to continue draft RFP process in a timely manner.
- Not clear that Space budget and procurement has budgeted schedule slack to the launch need date.
- Concern regarding use of Technology Readiness Level (TRL) metric as requirement for determination of approach for sparing and testing that may result in a hardware poor procurement with limited ability to respond to hardware related problems.

Preliminary Findings and Recommendations (cont)

Flight (Space) Project – Findings (cont)

- The problems being encountered by the Advanced Baseline Imager (ABI) are typical for the development of a complex instrument like ABI at this stage.
 - Program and Project appear to be taking the proper technical and management actions.
- However, at this point (past CDR) in the procurement of the ABI, the fact that there are five unreconciled estimates for the cost of the ABI is probably an indicator that more effort is required to understand the potential magnitude of the eventual ABI costs.
 - Important to ensure the principal GOES-R instrument has sufficient budget, including contingency to successfully complete development without negatively impacting other portions of the Program.

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Preliminary Findings and Recommendations (cont)

Flight (Space) Project – Recommendations

- See recommendations regarding resolution of Program scope and resources under Program – Recommendations.
- See recommendations regarding schedule maturity and slack under Program – Recommendations.
- See recommendation regarding Program and Projects SE&I roles and responsibilities and resources under SE&I – Recommendations. See related follow-up action item.
- Consider specifying minimum level of sparing (parts, components, subsystems) to ensure ability to address highest risk potential hardware problems.
 - Should consider integration and testing approach and possible failure scenarios that might be mitigated with additional hardware.
- Need to reconcile the multiple cost estimates for ABI to ensure a comprehensive understanding of the possible risks to the completion of the principal GOES-R instrument.
 - Resulting budget should provide adequate contingency to support continued risk mitigation and efficient problem resolution activities.

Preliminary Findings and Recommendations (cont)

- **Operations (Ground) Project – Findings**
 - Operations Project (Ground) is very immature relative to the level required for a KDP-C/D.
 - New Project Lead has clearly accomplished a lot in terms of identifying the status of the Ground and issues that need resolution in order to move forward in a reasonable manner.
 - Significant uncertainty seems to exist regarding the nature of the required GOES-R products to meet user requirements.
 - Calls into question the soundness of the requirements baseline for GOES-R.
 - The Ground is the most impacted element of the unexecutable FY2008 \$6.96B Program.
 - Ground funding is inadequate both in terms of total funding and near year profile
 - The FY2009 NOAA Budget Request improves the budget situation for the Ground in total but still presents near year shortfalls.

Preliminary Findings and Recommendations (cont)

Operations (Ground) Project – Findings (cont)

- The Ground also believes that the original Ground scope can not be delivered in time to support the December 2014 launch date.
 - The Ground has adopted a notional phased approach to delivering the Ground capabilities to address both the near year funding situation and the schedule concern.
 - However, this plan has not yet progressed to the level of a System Concept Review or KDP-C/D including the definition of what capabilities will be delivered when, the hardware and software architecture and scope, what schedule and funding is required, and what are the risks and mitigation activities.
- New Ground approach may negatively impact prior Ground maturity level and require additional definition work to achieve level required for KDP-C/D.
 - Until new approach is better defined, unclear how much of the prior Ground definition work will still be applicable.
- The Ground has significant staffing shortfalls for both Government and contractor personnel in terms of numbers, experience and expertise.
 - Directly impacts ability of Ground to complete activities necessary to mature new Ground approach and prepare for KDP-C/D and A&O acquisition.

Preliminary Findings and Recommendations (cont)

- Operations (Ground) Project – Recommendations
 - See recommendations regarding resolution of Program scope and resources under Program – Recommendations.
 - See recommendations regarding schedule maturity and slack under Program – Recommendations.
 - See recommendations regarding Program and Projects SE&I roles and responsibilities and resources under SE&I – Recommendations. See related follow-up action item.
- Establish Tiger Team to provide required expertise to address Ground shortfalls.
 - Short term activity (~several months)
 - Verify or update GOES-R requirements baseline as required to address user products uncertainty.
 - Identify minimum essential first launch Ground capability and the content and priority for subsequent deliveries of Ground capabilities.
 - Estimation of hardware and software required and updating of Cost Analysis Requirements Document (CARD).
 - Estimation of funding and schedule required including generation of an updated POE and ICE.

Preliminary Findings and Recommendations (cont)

Operations (Ground) Project – Recommendations (cont)

- Address staffing shortfalls as rapidly as possible.
 - Prioritize based on criticality to Ground definition and RFP preparations.
- Important to ensure schedule pressures do not result in dependence on shortcuts or a lack of due diligence regarding Ground readiness for KDP-C/D, final RFP release and A&O execution.

Follow-up Actions

- Program to provide updated GOES-R launch need date analysis.
- Program to demonstrate that Level I requirements are consistent with available resources.
- Program and Projects to provide an integrated summation of the SE&I roles and responsibilities and resources for the Program and Projects in enough detail to assess the completeness of the total set of GOES-R SE&I activities and the adequacy of the amount and phasing of resources between the Program and Projects to accomplish the work.
- Program to provide a description of the roles and responsibilities of the Program SE&I and the Program Scientist and how their roles and responsibilities are consistent and not in conflict.
- Program and Projects to provide details on proposed Space and Ground fee structures and other means that will be used to specify, prioritize, and incentivize mission success including Program SE&I activities.
- Program and Projects to provide summary of Test and Evaluation Strategy and related requirements incorporated into procurements.
- Address recommendations in front portion of report
- Algorithm working group to provide summary of plan for developing and delivering algorithms.

Appendices

- A: Task Two IRT SOW
- B: Read Ahead Document List
- C: 25, 26 June Agenda
- D: IRT Members

Appendix A - IRT Task Two

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IRT Task Two

- GOES-R Program Readiness for A&O: Review and assess program readiness for KDP-C/D, A&O RFP and source selection, and A&O phase execution. Review and assessment includes, but is not limited to adequacy of the:
 - requirements (GOES-R Program Requirements Document (GPRD), Mission Requirements Document (MRD), and Concept of Operations (CONOPS)) to support acquisition including their validity, stability, structure, and characterization,
 - plans for requirements management including updates, prioritization, and affordability tradeoffs during program execution,
 - baseline budget and schedule for A&O phase execution,
 - plans for budget and schedule management including approach for reviewing and updating cost and schedule estimates and the approach for management reserve establishment and allocation,
 - technical baseline to meet mission and programmatic requirements including possible contractor implementation trade space relative to the system architecture,
 - plans for management of the technical baseline including resolution of any outstanding issues or trade space,
 - software architecture and plans and processes for executing and managing software development,
 - plan for product algorithm development including government and contractor roles and responsibilities,

IRT Task Two (cont)

- GOES-R Program Readiness for A&O (cont): Review and assess program readiness for KDP-C/D, A&O RFP and source selection, and A&O phase execution. Review and assessment includes, but is not limited to adequacy of the:
 - requirements and plans for accrediting and certifying information technology elements of the program,
 - risk identification, mitigation, and management activities and plans including any technology readiness assessment and maturation activities,
 - requirements validation and verification approach and methodologies,
 - test strategy and supporting plans,
 - strategy and requirements for integrated logistics support including operations and support activities,
 - program/project organization, resources, and execution management plans and processes (e.g., System Engineering, Risk Management, Configuration Management, Mission Assurance, etc),
 - planned DOC/NOAA/NASA and program/project management reporting and oversight,
 - A&O RFP and source selection plan,
 - A&O incentive plan, and
 - responses to prior IRT findings and recommendations.

Appendix B – Read Ahead Document List

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Read Ahead Document List

- IRT Task Two Statement of Work
- Current Agenda for IRT review.
- IRT Task One Final Report
- NOAA report regarding disposition of IRT Task One recommendations.
- Deputy Secretary of Commerce Decision Memorandum approving modified GOES-R management and acquisition strategy.
- Draft NOAA-NASA MOU implementing GOES-R management and acquisition strategy.
- Draft Management Control Plan (MCP).
- Level I Requirements Document.
- Mission Requirements Document.
- GOES-R CONOPS.
- NASA NPR 7120-5D.
- Program Office Estimate (POE) to ICE Reconciliation Briefing.
- Operations Project and Algorithm Working Group Status.
- Program Mission Assurance Plan
- Program System Engineering Management Plan
- Program Risk Management Plan

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Appendix C – 25, 26 June Agenda

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Agenda

25 June 2007

- 0800 to 0815: Executive Session
- 0815 to 0830: NOAA and NESDIS Welcome – Jack Kelly and Mary Kicza
- 0830 to 0845: GSFC Welcome – Dolly Perkins
- 0845 to 0930: Summary of Program Status – Tony Comberiate
- 0930 to 1015: Cost and Budget Status – Jim Ketchum
- 1015 to 1045: Status of NOAA-NASA Agreement – Mark Mulholland
- 1045 to 1145: Program SE&I Approach – Barbara Pfarr
- 1145 to 1245: Flight Project – Tim Walsh
- 1145 to 1230: Working Lunch
- 1245 to 1345: Operations Project – Brigitte Horner
- 1345 to 1445: GSFC and NESDIS oversight – Abby Harper and George Morrow
- 1500 to 1700: Executive Session

Agenda

26 June 2007

- 0800 to 1000: Action follow-up from prior day if required
- 0800 to 1400: Executive Session
- Finalization of preliminary findings and recommendations
- 1400 to 1500: Preliminary out briefing to NOAA and NASA management
- 1500 to 1700: Schedule Reserve

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Appendix D

IRT Members

Independent Review Team

| | |
|-----------------------------|---------------------|
| • Mr. Tom Young | Chairman |
| • Mr. Jimmie Hill | Member |
| • RADM (ret) Tom Betterton | Member |
| • MGEN (ret) Don Hard | Member |
| • Dr. Wanda Austin | Member |
| • Mr. Joe Rothenberg | Member |
| • Dr. Paul Menzel | Member |
| • Mr. Steve Mango | Member |
| • Col (ret) Jon Bryson | Member |
| • Col (ret) Jim Mannen | Member |
| • Mr. George Morrow | Observer |
| • LTC (ret) Curt Munechika | Technical Advisor |
| • Dr. Harry Gross | Technical Advisor |
| • Col (ret) Mike Kimberling | Executive Secretary |
| • Ms. Deb Pekelo-Hubbard | Executive Support |
| • Mr. Rich Rivera | Executive Support |



GOES-R MANAGEMENT CONTROL PLAN (MCP)

VERSION 1
December 4, 2007

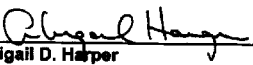


U.S. Department of Commerce (DOC)
National Oceanic and Atmospheric Administration (NOAA)
National Environmental Satellite, Data, and Information Services (NESDIS)

Management Control Plan
CM-P417-R-PLN-0067

Geostationary Operational Environmental Satellite – R Series (GOES-R)
Management Control Plan (MCP)

Submitted by:

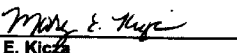

Abigail D. Harper
GOES-R System Program Director

Date 12/4/07

Approved by:


Edward J. Weiler
Director, Goddard Space Flight Center

12-5-07
Date


Mary E. Kicza
NOAA Assistant Administrator for
Satellite and Information Services

12-5-07
Date

Management Control Plan
CM-P417-R-PLN-0067

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CM-P417-R-PLN-0067

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1 INTRODUCTION

The National Oceanic and Atmospheric Administration (NOAA) operates a system of environmental satellites in geostationary orbits to provide continuous weather imagery and monitoring of meteorological data for the United States, Latin America, much of Canada and most of the Atlantic and Pacific ocean basins. Geostationary Operational Environmental Satellites (GOES) provide critical atmospheric, oceanic, climatic, and solar products supporting weather forecasting and warnings, climatologic analysis and prediction, ecosystems management, and safe and efficient public and private transportation. The GOES satellites also provide a platform for space environmental observations, and auxiliary communications services that provide for GOES data rebroadcast, data collection platform relay, low resolution imagery, emergency weather communications, and satellite aided search and rescue.

GOES-R is a collaborative development and acquisition effort between NOAA and the National Aeronautics and Space Administration (NASA). Program activities occur at the co-located Program and Project Offices at Goddard Space Flight Center (GSFC), Greenbelt, MD.

The GOES-R program acquisition and management strategy was restructured at the end of the Program Definition and Risk Reduction (PDRR) Phase from a single-system prime NOAA contract acquisition to an inter-agency dual-contract acquisition for the Acquisition and Operations (A&O) Phase of the Program. Under a dual-contract acquisition strategy, the National Aeronautics and Space Administration (NASA) will procure the Space Segment and NOAA will procure the Ground Segment. The overall System Engineering and Integration will be performed by the GOES-R Program Office. As a result of the change to the acquisition and management strategy, NOAA and NASA have agreed to tailor procedures to apply to the GOES-R program in order to meet the unique demands of this joint inter-agency acquisition. These needs include safeguarding NOAA's oversight of the entire GOES-R program, including the Flight Project (e.g., Space Segment) and the Ground Segment Project (Ground Segment) and also safeguarding NASA's effective exercise of its expertise over the Flight Project.

Figure 1 below graphically depicts the acquisition and management strategy for the A&O Phase of the GOES-R Program.

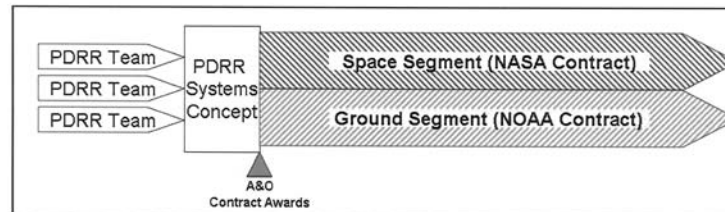


Figure 1: GOES-R Acquisition Strategy for A&O Phase

DOC provides policy oversight and guidance to NOAA for successful procurement and operation of the GOES-R system. In order for the Department to exercise meaningful oversight over the processes utilized for the effective management of the GOES-R Program, which includes both Projects and the Systems Engineering and Integration (SE&I) function, the Department may institute reviews, require reports, and exercise any other oversight mechanism to provide the Department with adequate information to determine whether the GOES-R Program meets the cost, schedule and technical baselines. Nothing in this MCP should be construed to limit the inherent right of the Department to conduct effective oversight of the GOES-R Program.

Disagreements that can not be resolved by the GOES-R SPD shall be documented in writing and elevated to the NESDIS Assistant Administrator (AA) and the GSFC Center Director for resolution. Failing resolution at that level, the issue shall be elevated to the signatory positions of the MOU and successively higher positions as necessary for final resolution.

2 PURPOSE OF DOCUMENT

This Management Control Plan (MCP) is authorized by the Memorandum of Understanding between NOAA and NASA dated June 15, 2007 and documents the business processes, management controls, and organizational structure of the GOES-R program. The MCP is derived from NASA Procedural Requirement (NPR) 7120.5D and outlines the specific implementation of 7120.5D as it applies to the GOES R program and projects. The MCP forms the basis for the Projects Plans of the Flight and Ground Segment Projects.

The contents of the GOES-R MCP satisfy the requirements of DAO 208-3, "Major System Acquisitions for the Department of Commerce," which requires major systems to document a program management and control structure that describes the Program's business processes.

The MCP is meant to be a management tool, with conflicts resolved at the lowest practical level. The System Program Director retains the authority to resolve all internal disputes within the GOES-R program.

2.1 Relationship to Other Documents

Figure 3 depicts the relationship of the GOES-R MCP to other GOES-R documents.

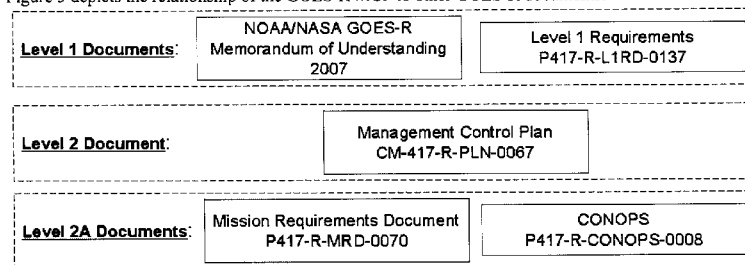


Figure 2: Management Control Plan relationship to Other Program Documents

The hierarchical description of documents in Figure 2 is effective for purposes of resolving any conflicts between any of the documents listed in Figure 2. Thus, the Memorandum of Understanding between NOAA and NASA dated June 15, 2007 supersedes any conflicting provisions of this MCP. Section 5 of the MOU identifies this MCP as the implementation for the MOU and NPR-7120.5D. Any conflict between the provisions of the Memorandum of Understanding and this MCP will be resolved by the NESDIS AA and GSFC Director by consulting the letter and intent of the Memorandum of Understanding. The GOES-R System Program Director resolves conflicts between GOES-R Level 2 and 2A documents.

3 PROGRAM IMPLEMENTATION

3.1 Technical Architecture

The end-to-end (ETE) GOES-R system includes spacecraft, instruments, launch services, and all associated ground system elements and operations. Figure 3 below illustrates the functional GOES-R End-to-End System.

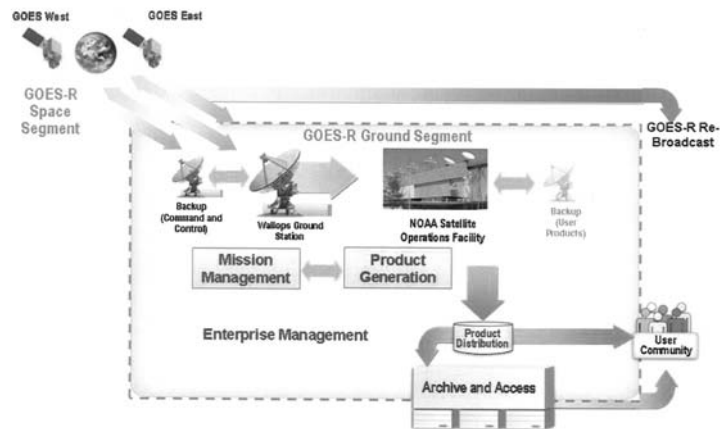


Figure 3: Baseline GOES-R series System Configuration

The GOES-R operational lifetime extends through December 2027.

Figure 4 provides the locations of the GOES-R fleet. Two operational satellites positioned at 137 degrees West longitude for the Western Operational station, and at 75 degrees West longitude for the Eastern Operational station. During the on-orbit storage period, the satellites will be positioned at 105 degrees West longitude and a Launch/Check-out position is reserved at 90 degrees West longitude.

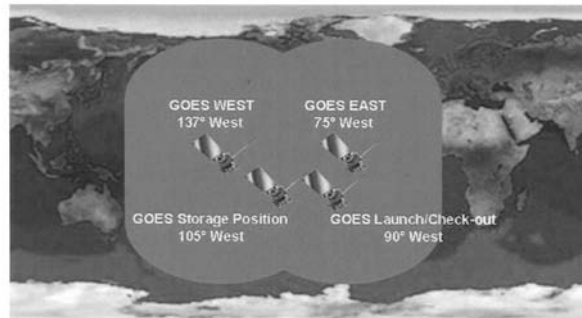


Figure 4: Technical Architecture

3.1.1 Space Architecture

The GOES-R space architecture will accomplish the following:

- Maintain continuous service from a GOES system that meets the remote sensing requirements as specified by NOAA; that is, to provide for continuous observations of the Earth, its atmosphere, and the solar and space environment, from a geosynchronous orbit.
- Provide for reception and relay of data from ground based Data Collection Platforms (DCP) to the NOAA prime and backup Command and Data Acquisition (CDA) ground stations.
- Provide for continuous relay of weather facsimile (WEFAX) and other data to small users, independent of all other functions.
- Permit relay of distress signals from aircraft or marine vessels to the Search and Rescue ground stations of the Search and Rescue Satellite Aided Tracking (SARSAT).
- Provide a spacecraft capability for permitting data transmission via the Emergency Manager's Weather Information Network (EMWIN).
- Provide satellite platforms suitable for supporting the instrument payloads.

The Flight Project will implement the space architecture by issuing separate contracts for the development of the instruments and the spacecraft. The Flight Project includes the instruments, spacecraft, launch services, satellite integration, and on-orbit satellite initialization and checkout. The Flight Project will provide launch services and instruments as government furnished equipment (GFE) to the spacecraft contractor. After launch, the spacecraft contractor will support the NOAA Satellite Operations Control Center (SOCC) until the spacecraft checkout is completed and the spacecraft is turned over to NOAA for operations.

The Advanced Baseline Imager (ABI) will provide key performance parameters hemispheric, synoptic, and mesoscale imagery for global and Continental United States (CONUS) forecasting and severe weather warning. Additional instruments include Space Environment In-Situ Suite (SEISS), Extreme Ultraviolet Sensor/X-Ray Sensor Irradiance Sensors (EXIS), Solar Ultraviolet Imager (SUVI), Geostationary Lightning Mapper (GLM), and Magnetometer (MAG). The instruments will be provided to the Space Segment A&O contractor as Government Furnished Equipment (GFE) for integration into the spacecraft.

3.1.2 Ground Architecture

The Ground Segment encompasses the following four major functions: 1) Mission Management (MM), 2) Enterprise Management (EM), 3) Product Generation (PG), and 4) Product Distribution (PD). These functions comprise the core Ground Segment functional architecture.

Mission Management (MM) includes mission scheduling, satellite (including instrument) operations, satellite state-of-health trending, orbital analysis, and ground operations.

Enterprise Management (EM) supports all operational functions by monitoring, assessing, and controlling the configuration of the operational systems, networks, and communications for the GOES-R ground segment. EM serves as the “glue” that links the MM, PG, and PD elements and provides for a degree of automated control. EM thus contributes to greater operational availability, efficiency, and safety of the GOES-R system.

Product Generation (PG) includes algorithm support, processed raw data, processing to Level Ib (including calibration, navigation and registration), generation of the data for rebroadcast and for higher level data creation including operational derived products. The government will provide the necessary science algorithms for the generation of user products.

Product Distribution (PD) includes distribution of Level Ib, Level II+, and derived products to user portals while addressing interfaces with the user for accessing GOES data. The primary user portals include the GOES-R satellite series (e.g., for uplink of Global Re-Broadcast (GRB)) NOAA’s National Weather Service (NWS).

3.1.3 End to End Architecture Validation

The GOES R Program will have an ETE test program which focuses on the validation and compatibility of flight and ground hardware, software, and communications interfaces in a mission operations context. The ETE test program is intended to supplement the project level Verification and Validation (V&V) programs using operational configurations and procedures. The details of the ETE test program are described in the GOES R Test & Evaluation Management Plan (P417-R-PLN-0083).

3.2 Organizational Structure and Interdependencies

This section describes the relationship of the GOES-R Program and Projects to one another and to other organizations within NOAA, the National Environmental Satellite Data Information Service (NESDIS), and NASA.

3.2.1 Relationships

Figure 5 summarizes the organizational structure and interdependencies between NOAA, NESDIS, NASA and the GOES-R Program.

| Function | Organization | | | | | Project Managers |
|---|---|---|--|--|--|---|
| | NOAA USDI/US | NESDIS AA/DAA | NESDIS Operational & Data Ctr | NASA | System Program Director | |
| Concept studies | -Serve as selection official for PDRR selections | -Develop direction & guidance for concept studies | | -Provide technical management of concept studies (GSFC) | -Perform architecture studies - Develop and execute study contracts - Provide contract management for concept studies | -Support and conduct concept studies consistent with direction and guidance from program / NESDIS |
| Development of Program and Project Level Requirements | -Approve GOES-R system Level I requirements | - Execute Level I requirements - Approve Level II requirements | | | - Execute level 2 and 2a requirements - Allocate requirements to projects - Approve level IIa and III | - Execute Level III requirements - Approve level IIIa requirements |
| Resource management (Program Budget) | - Develop & execute NOAA budget - Conduct annual budget submission reviews - Approve individual program budgets | - Establish GOES-R budget - Execute budgets for GOES-R supporting infrastructure | -Establish budget for necessary support functions -Implement support functions consistent with budget | GSFC: -Approve annual submission of NOAA project budgets -Manage project budget management of NOAA resources applied to NASA -Approve cost estimates for NASA functions | -Develop GOES-R program budget for fiscal year and life cycle -Implement program consistent with budget -Provide annual budget submission input -Coordinate development of cost estimates for support functions | - Provide project budget requirements to GOES-R Program Office (GPO) - Execute project budget |
| Inter-government Agreements | -Sign agreement for NOAA | -Support execution of agreement | | Sign for NASA (NASA HQ) | -Manage program IAW agreement | Support SPD |
| Staffing Mgr | | -Establish NESDIS civil servant staffing | -Develop staffing plan necessary for support functions | -Provide staff in accordance with annual staffing plan (GSFC) | -Develop program staffing plans - Implement staff plans | -Develop project staffing plans - Implement staffing plans |
| Project Plans | | | | | -Approve as needed | -Develop and execute |

| Function | Organizations | | | | | System Program Director | Project Managers |
|---|---|---|-------------------------------|---|--|--|--|
| | NOAA US/DUS | NESDIS AA/DAA | NESDIS Operational & Data Ctr | NASA | | | |
| Program / Project Performance Assessment | - Chair NOAA PMC | - Award fee determination for ground contracts - Review program/project performance via - Management interaction - Special issue topic resolution - Award Fee Determination - Review reports from NASA - Award Fee Determination Official on decision and rationale for Flight Project Award fees | | - Award fee determination for flight contracts (GSFC Code 400) - Review Program and Projects (GSFC CMC) | | - Chair Performance Evaluation Board (PEB) for all spacecraft and major ground contracts - Concur with Award Fee Plan | - Chair PEBs as delegated by SPD |
| Launch Commit | - Approve mission readiness - Approve IRT membership | - Approve flight and launch readiness | | GSFC - Concur with launch readiness statement - NASA AA: Determines SRB scope & chairmanship - GSFC CMC: Manage SRB infrastructure - GSFC Deputy Ctr Dir: Approve SRB membership & SRP | | - Provide launch readiness statement | - Develop launch readiness criteria |
| Independent Reviews | - Receive reports from IRT & SRB - Determine SRB scope & chairmanship | - Approve SRB membership & SRP - Approve System Review Plan - Receive reports from IRT and SRB | | | | - Support IRTs - Review and respond to SRB results | - Support SRBs |
| Acquisition | - Serve as selecting Official for NOAA Contracts | - Review IT acquisition requests | | - Serve as Selecting Official for SRB (SRSC) - Act as selecting office for instrument procurements (Code 400) - Key Milestone Readiness - Critical milestone concurrence for flight (GSFC) | | - Provide support and oversight of source selection process | - Manage and execute contracts - Execute Source Selection process |
| Schedule Baseline Control (Section 5.2.2.2) | - Key Milestone concurrence | - Critical Milestone Approval | | | | - Critical milestone readiness - Program milestone approval | - Project milestone approval - Program milestone readiness |
| Decision Authority for Reviews | - Program Gateway Review - Approve readiness for KDP-1 - Approval authority for KDP-1 | - Project Entrance Review Approval | | | | | |
| Certification and Accreditation Organization | | - Perform C&A related authorizing official activities - Designate a certification agent | | | | - Perform C&A-related system owner activities - Appoints a GQES-R Information System Security Officer (ISSO) | |

Figure 5: Organizational Interdependencies Summary

3.2.1.1 National Oceanic and Atmospheric Administration (NOAA) Organizations

NOAA is accountable to DOC for successful GOES-R development and operational mission success. NOAA provides direct oversight for the GOES-R Program, Flight and Ground Segment Project through the NOAA Program Management Council (PMC).

The GOES-R System Program Director (SPD) reports to the Deputy Assistant Administrator (Systems) (DAAS) in the NOAA Office of Satellite and Information Services (NESDIS).

The Flight Project Manager (a NASA employee) and the Ground Segment Project Manager (a NOAA employee) report to the GOES-R SPD, a NOAA employee.

3.2.1.2 National Environmental Satellite, Data, and Information Services (NESDIS)

The NESDIS Assistant Administrator (AA) retains authority to conduct program reviews and coordinate with NOAA.

NESDIS will provide technical authority resources for the ground segment.

Office of the Chief Information Officer (OCIO) performs certification and accreditation related Authorizing Official Designated Representative (AODR) responsibilities, appoints a Certification Agent, and oversees SPD compliance with IT security requirements.

3.2.1.3 NASA Headquarters

As agreed in the MOU, the Administrator of NASA will meet at least annually and on an as needed basis with the NOAA Administrator to discuss program progress and status.

NASA Science Mission Directorate (SMD) will have representation on the GSFC CMC for monthly status and gateway readiness reviews. NOAA will also extend an invitation for NASA SMD to participate as a voting member for Flight Project and ad-hoc member for Ground Segment and Program at NOAA PMC Gateway and Gateway Readiness Reviews.

3.2.1.4 NASA GSFC Organizations

NASA Goddard Space Flight Center (GSFC) is responsible for procurement, management, and execution of the Flight Project in accordance with overall NOAA guidance, standard technical oversight resources for program and projects, staffing of senior leadership positions outlined in the MOU.

Standard NASA technical oversight resources are defined as the Mission Assurance function, Technical Authority as defined in paragraph 4.3, Standing Review Board (SRB) management, and other exercise of NASA technical expertise through the NOAA PMC. NASA GSFC will co-manage the SRB together with NOAA.

The GOES-R SPD and senior GSFC managers will coordinate the assignments of individuals to key program and project office contract management positions.

The GSFC Center Management Council (CMC) oversees in accordance with overall NOAA guidance the activities, products, and performance of the GOES-R program.

In the event of any defense, litigation or settlement of any claim or protest brought pursuant to any GOES-R procurement, the GSFC legal counsel will fully inform and seek concurrence from DOC GOES-R legal counsel of any actions that it proposes to take.

3.2.1.5 GOES-R Program Office

Figure 6 provides a graphic illustration of the GOES-R Organization. The GOES-R program is NOAA led, with an integrated NOAA-NASA program office organization, staffed with personnel from NOAA and NASA, and co-located at NASA/GSFC to maximize program/project office efficiency. Unless otherwise directed by the System Program Director (SPD), the Program Office staff has unfettered access to all project activities.

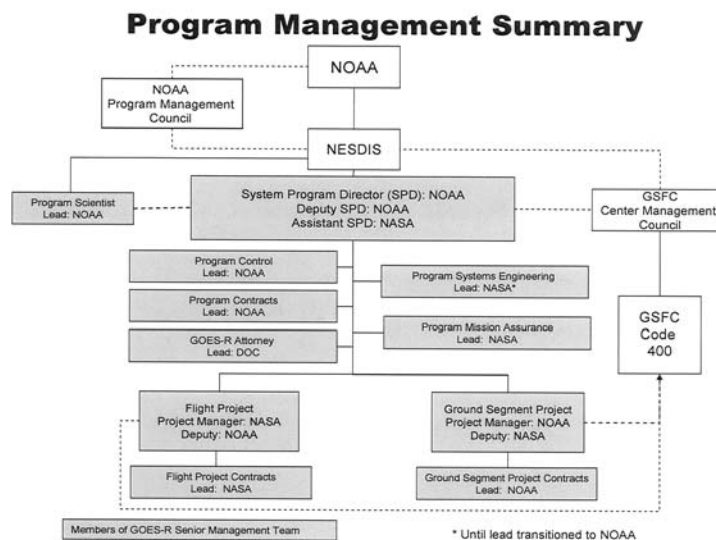


Figure 6: GOES-R Organizational Structure

The GOES-R Program Senior Management Team (SMT) consists of the System Program Director, (SPD), the Deputy System Program Director, (DSPD), Assistant System Program Director, the Program Scientist, the Program Control Lead (Budget Officer), Program Systems Engineering Lead, Mission Assurance, Program Legal Counsel, Flight and Ground Segment Project managers and the Program Contract Lead, Flight and Ground Segment Projects Contracting Officers. The SMT is responsible for program leadership and the integrated functional management of operational, research, development, administrative and programmatic activities. The SMT is the senior advisory board to the System Program Director for decision making and issue resolution.

3.2.1.5.1 GOES-R System Program Director (SPD)

Notwithstanding other duties set forth in the MCP, the SPD (a NOAA employee) has ultimate authority and responsibility for managing the overall performance and operation of the GOES-R program. The SPD reports to the NESDIS Deputy AAS. The SPD is accountable to NOAA / NESDIS management for all aspects of the GOES-R program, including financial, technical, information security, programmatic, and operational performance. The SPD sets the direction of the organization, articulates the vision, develops the goals, sets the programmatic and budget priorities, and guides internal policies and processes. The SPD is responsible for all program status reporting to oversight activities and has sole authority within the program office to propose changes to policies and procedures as they apply to GOES-R. The SPD prepares, defends and executes the GOES-R budget, represents GOES-R to external organizations and is the focal point and principal interface with internal NOAA/NESDIS components, Congress, oversight agencies, and Mission Partners. A summary of the SPD roles and responsibilities is provided below.

- Oversees the success of the GOES-R mission and implementation of the program and has ultimate functional authority over the program and projects
- Leads the development of and approve acquisition strategies, approaches, and RFP documentation for the system PDRR and A&O Phase contracts per the FAR, and NOAA acquisition rules and regulations
- Selects and evaluates the Deputy System Program Director, Ground Segment Project Manager, and Budget Officer (Program Control Lead)
- Approves selection and provides performance inputs for Flight Project Manager, Assistant System Program Director, Program Systems Engineer and Program Mission Assurance Manager in accordance with NASA policy
- Provides selection and performance inputs for program and project personnel
- Prepares, defends and executes the GOES-R budget in accordance with NOAA Planning, Programming, Budgeting, Execution System (PPBES) process.
- Utilizes Program Operating Plans (POP) developed for funding NASA personnel and facilities and NASA contracted efforts as part of the overall NOAA budgeting process
- Designates teams and approve process for evaluations for the GOES-R contracts
- Chairs the Performance Evaluation Boards (PEBs) for the spacecraft and major ground contracts, and will make recommendations to both the NASA and NOAA Fee Determination Officials (FDOs)
- Attends all pre-briefs and source selection evaluation meetings for the GOES-R NASA contracts and will give comments, questions and concerns to the NASA Source Selection Authority (SSA)
- Maintains integrated program schedule to include determination and monitoring of critical path functions in coordination with Program Systems Engineering, Project Managers and team leads
- Performs all certification and accreditation related System Owner activities as identified in DOC, NOAA, NESDIS, and National Institute of Standards and Technology (NIST) IT Security policies and guidance, respectively
- Chairs all program level boards
- Provides functional oversight and direction to Senior Management Team members
- Assures compliance with DOC, NOAA, and NIST Special Publication 800 Series of guidance.

3.2.1.5.2 Deputy System Program Director (DSPD)

The DSPD, a NOAA employee, is responsible for the day-to-day operations of the Program, assuming any responsibilities delegated by the SPD. The DSPD has responsibility for managing the integration and execution of program activities and resources across GOES-R at the discretion of the SPD. In the absence of the SPD, the DSPD assumes full decision-making authority for all program functions and activities.

A summary of the DSPD roles and responsibilities is provided below.

- Provides technical oversight and input to Program Control for GOES-R responses to external and internal NOAA information requests, technical issues (i.e., system anomalies) and Congressional inquiries. This includes coordination of technical responses with cognizant GOES-R division/project personnel
- Provides technical oversight and input to Program Control for the development of all program-level briefings prepared for NOAA/NESDIS senior management and customers
- Supports the preparation of decision packages and progress reports for KDP briefings
- Promotes continuous improvement by identifying deficiencies and redundancies in GOES-R internal and external processes, facilitating agreement and acceptance of approved corrective action, communicating procedural changes, and monitoring the effectiveness of the implementation
- Serves as a Member and Alternate Chair of all Program Boards (Management, Configuration Control, Risk)

3.2.1.5.3 Assistant System Program Director (ASPD)

The Assistant System Program Director (ASPD) is a senior NASA employee who reports to the SPD. The ASPD serves as the SPD and DSPD's bridge to NASA organizations, provides a NASA voice for GOES-R issues which have impacts to NASA, and provides insight on NASA decisions which impact GOES-R. The SPD and DSPD may utilize the ASPD's expertise to assist in any of their specific responsibilities and delegate responsibility as required. ASPD specific responsibilities include, but are not limited to:

- Attend and provide feedback from NASA Goddard Space Flight Center (GSFC) oversight councils to include: Monthly Status Reviews (MSRs), Preliminary MSRs, Quarterly Status Reviews (QSR) and ensure compliance with applicable NASA documentation and processes in coordination with the Project Managers
- Assure NASA Readiness Review process is consistent with Key Decision Point (KDP) requirements
- Attend and provide feedback from NASA instrument and peer reviews, assuring requirements are met in coordination with the Program Scientist and the Project leads
- Provide oversight of the Program's Mission Assurance process through the Mission Assurance lead
- Serve as a member of the program interview panel for both NOAA and NASA employees as required
- Provides technical oversight and input to Program Control for GOES-R responses to external and internal technical inquiries with cognizant GOES-R division/project personnel

3.2.1.5.4 Program Scientist

The Program Scientist will be a NOAA employee at the program office level charged with providing the link between the operational user community of GOES-R and the program office. The Program Scientist reports administratively to the SPD and functionally to the NESDIS AA. The Program Scientist will perform liaison functions with NASA as assigned by the SPD, but primary responsibility will be as science authority representing the user community to the program office. The Program Scientist will work in coordination with a Flight Project and Ground Segment Project Scientist to accomplish the specific duties listed below:

- Collaborates with the NOAA, NESDIS, and GOES user community to define the users' needs, operational requirements, and science data product requirements for the GOES-R mission
- Chairs the GOES-R Operational Requirements Working Group (GORWG)
- Provides the principal scientific guidance to the System Program Director throughout the lifecycle of the program.
- Serves as a member of the NOAA senior science staff
- Supports the formulation of the mission-level architecture of spacecraft and instruments to optimize scientific return

- Convenes science and application working groups to suggest revisions of the system requirements for senior management review and to review program accomplishments in coordination with Flight and Ground Segment Projects.
- Communicates with program and users on matters of inter-agency and international scientific coordination
- Ensures GOES-R user requirements and the program constraints, appropriate to the mission, are captured in the GOES-R Level I Requirements Document
- Provides support as key scientific advisor to the SPD in decisions that trade among performance, cost and schedule as well as decisions that trade among competing instrument suites and operational constraints on the spacecraft

3.2.1.5.4.1 GOES-R Operational Requirements Working Group (GORWG)

The GOES-R Operational Requirements Working Group (GORWG), working under the leadership of the GOES-R Program Scientist, is a system specific working group of the NOAA Observing System Council established to identify and represent NOAA user observational requirements.

The primary role of the GORWG will be to represent NOAA users whose observation requirements have been allocated to the GOES-R Series System through the Level I Requirements Document. Specific responsibilities of the GORWG are:

- Serves as the Focal point for all GOES-R Series operational requirements issues
- Supports the development of the GOES-R Series System Level I Requirements Document
- Provides a science assessment to the NOSC of optimal instrument configuration and system implementation for the GOES-R Series system
- Assesses user requirements impacts of the configuration change requests to the Level I Requirements
- Assesses anomaly impacts, mitigation strategies, including next launch needs

3.2.1.5.4.2 GOES-R Series Technical Advisory Panels (TAPs)

Technical Advisory Panels (TAPs) serve as Advisory Panels to the GOES Program Office (GPO), co-chaired by both a GORWG and GPO representative. Specific responsibilities include:

- Assess the GOES-R Program Requirements Level I Document and translate the GOES-R observational requirements into specific GOES-R technical specifications for the MRD
- Work with the users and the GOES Program Office on any user-requested modifications to L1 requirements and resulting modifications to the MRD
- Assess impacts to L1 requirements due to system constraints provided from the GOES Program Office
- Serve as an advisory board to the GORWG in its role of assessing operational requirements for decision by the NOSC
- Work with users on resolution of modifications needed to any L1 requirements due to GOES-R system constraints
- Serve as an advisory panel to any GOES Program Office Change Control Board (CCB) created to assess suggested changes to the MRD specifications
- Evolve from an advisory panel in the GOES-R Requirements Definition Phase to working groups supporting the GOES-R Development, Test, Implementation, Verification/Validation and Operations Phases

3.2.1.5.5 Program Control

Program Control provides the expertise required to manage the business and financial aspects of all GOES-R activities. The Budget Officer, who serves as the head of the Program Control, reports to the SPD and is responsible for the day-to-day monitoring, management and control of all budget and financial management activities. GOES-R Program Control will provide integrated support to all organizational elements within the GOES-R Program. Primary responsibilities include program-level strategic planning, action item management, policy development and coordination, Federal Managers' Financial Integrity Act (FMFIA) execution, communications, human resource administration and management services, budget formulation, execution, financial analysis and programmatic planning to include Earned Value Management (EVM), Capital Planning, property management and inventory control. A summary of Program Control responsibilities is provided below.

- Executes the program-level strategic management activities
- Facilitates integrated budget development and program control oversight functions with NESDIS AA and NOAA Chief Financial Officer
- Develops all related and back-up material for the NOAA Budget Process
- Oversees all capital planning (OMB 300) and other budgetary documents
- Integrate Project-supplied budget inputs into the GOES-R budget preparation and conduct programmatic defense
- Prepares coordinated GOES-R responses to external and internal NOAA information requests, and Congressional inquiries
- Coordinates all GOES-R NOAA/NESDIS/Program level actions
- Coordinates review of GOES-R, NOAA and external policy documents
- Maintains the GOES-R MCP, auditing GOES-R internal office procedures
- Facilitates the weekly Senior Management Team (SMT) meeting. This administration includes developing agendas, coordinating briefings and publishing meeting minutes
- Coordinates the development of all program-level briefings prepared for NOAA/NESDIS senior management and customers
- Implements and manages program-level logistics, communications, facilities support, human resource management and administrative support
- Manages the financial control and funds execution in accordance with SPD direction
- Matrixes personnel to the Projects and provide oversight of the EVM process.
- Manages the Workforce planning and support agreements as directed by SPD
- Track and reports contract performance in association with the Contracts Division
- Performs administrative functions for the program office

3.2.1.5.6 Contracts Division

NOAA and NASA agree to form a collaborative GOES-R Program contracting partnership to ensure effective and efficient support for all GOES-R Program and Project contract actions. NASA and NOAA Contracting Officers will retain full agency authorities, respectively, and continue agency reporting responsibilities while operating in partnership with each other. Contracting Officers must have appropriate warrant authority as required by NOAA and NASA regulations, policies, and procedures. The partnership intends to collaborate by;

- Sharing of contracting staff resources for NASA and NOAA contracts
- Establishing action approval levels for Program review
- Operating within current NASA/NOAA processes, policies, and procedures

The GOES-R Contracts Division provides procurement authority and expertise required for planning and contracting GOES-R business-related matters while ensuring GOES-R compliance with the Federal Acquisition Regulation (FAR), local (DOC, NASA) acquisition regulations, as well as applicable DOC,

NOAA and NASA acquisition policies and procedures. The Contracts Division will be staffed as a matrix support activity with personnel from the NOAA Acquisition and Grants Office (AGO) organization and the NASA GSFC contracts office and will be located with the GOES-R Program. GOES-R Contracts Division will provide integrated support to all organizational elements within the GOES-R Program. A summary of the Contracts Staff includes the following responsibilities for Program Office Contracts, Flight Project Contracts and Ground Segment Project Contracts.

3.2.1.5.6.1 Program Office Contract Chiefs

- Acts as contract advisor to SPD
- Interacts with Flight and Ground Segment Project Contracting Officers for the purpose of maintaining communication relative to contractual matters.
- Provides Program review of GOES-R related acquisition planning and implementation documents (e.g. acquisition and source selection plans, solicitations, awards, and modifications)
- Works with other government contracting support organizations to meet GOES-R Program contract administration requirements
- Provides contractual advice to the SPD on all the GOES-R Award Fee efforts
- Coordinates interaction between Program Office, NOAA AGO contracting staff and NASA GSFC contracts office

3.2.1.5.6.2 Flight Project Contracting Officers and Specialists

- Utilizes NASA procedures as defined in the Goddard Procedural Requirements on Procurement (GPR-5100.1F)
- Reports to the GSFC Assistant Chief for GOES-R Procurement and matrixed to the Flight Project Manager in performance of their duties
- Provides bi-monthly summaries to the Program Office Contracting Officer
- Communicates contractual issues and actions that may have a significant effect on cost/schedule as they occur.
- Tracks and reports Flight Project contract performance and contract modifications in association with Program Control
- Authorizes, with SPD concurrence, changes to the GOES-R Flight Project contracts

3.2.1.5.6.3 Ground Segment Project Contracting Officers and Specialists

- Ensures all Ground Segment Project Contracts will be in accordance with NOAA AGO procedures and as specified in this section of the MCP
- Reports to NOAA AGO and matrixed to the Ground Segment Project Manager in performance of their duties
- Provides bi-monthly contractual summaries to the Program Office Contracting Officer
- Communicates contractual issues and actions that may have a significant effect on cost/schedule as they occur
- Tracks and reports NOAA Ground Segment Project contract performance and contract modifications in association with Program Control
- Authorizes, with SPD concurrence, changes to the GOES-R ground segment A&O contract, and other NOAA-managed contracts as they relate to the Ground Segment

3.2.1.5.7 Program Systems Engineering (PSE)

The Program Systems Engineering lead reports to the SPD and is responsible for end-to-end systems integration, planning, coordination, and adjudication of the space and ground segments for the GOES-R Program Systems Engineering functions. The Program Systems Engineer will initially be staffed by a NASA person, but the goal is to eventually transition the PSE lead to a NOAA person. Both NOAA and NASA retain significant involvement in the Systems Engineering and Integration function. As NOAA

systems engineering experience, organizational and training infrastructure mature, a viable NOAA senior systems engineer will eventually be selected to assume the GOES-R PSE lead. The Program Systems Engineering Lead's duties and responsibilities are:

- Perform verification of GOES R System to ensure that Level 1 requirements are met.
- Defines, documents, and manages Level 2a requirements for the GOES-R architecture and end-to-end performance in coordination with GOES-R mission internal and external stakeholders including continuity of operations
- Defines, documents, and manages the GOES-R program systems engineering processes ensuring End-to-End systems integration and performance in accordance with the MCP and the Systems Engineering Management Plan (SEMP)
- Provides recommendations to SPD for standards, references, and technical tools to be applied on the GOES-R Series program
- Provides periodic reports to the SPD on status issues, problems, deviations/waivers and corrective actions associated with program systems engineering efforts
- Conducts, in support of the GOES-R SPD, program level technical reviews and convening working groups on program level issues
- Oversees the program level risk management process
- Chairs the GOES-R Program Engineering Change Review Board (ECRB) for changes to the Level 2 requirements and other program documents
- Performs configuration management of necessary interface requirements and interface control documents in coordination with Flight and Ground Segment Projects
- Develops program level configuration management process
- Manages cross project and program level technical margins in coordination with Flight and Ground Segment Projects
- Performs program level baseline and trade studies, technical analyses, and engineering peer reviews
- Co-chairs any joint systems engineering working groups within NOAA/NESDIS or NASA as required
- Serves as the focal point for any GOES-R continuity of operations (COOP) issues in coordination with the Ground Segment Project
- Participates in the GORWG in an advisory capacity.

3.2.1.5.8 Mission Assurance

The Program Mission Assurance Manager (PMAM) serves as the mission assurance focal point for the Program Office and leads the team of assurance engineers and segment Mission Assurance Managers (MAMs) that support the program and its projects. The Program Mission Assurance Manager is matrixed to the program office, and maintains an independent reporting path to the NASA GSFC Office of Systems Safety and Mission Assurance (OSSMA).

Specific disciplines within the Assurance Management functions include:

- Systems safety, industrial safety, quality assurance, reliability, parts control, materials and process control, environmental verification, contamination control, workmanship standards and processes, software assurance, and design/technical reviews of all systems and instruments

Specific responsibilities include:

- Manages and directs the overall mission assurance activities
- Formulates approaches and concepts and provides the recognized technical leadership and engineering responsibility in execution of the assurance management functions of the program

- Ensures the generation and implementation of the Systems Safety Plan
- Conducts assessments of the Mission Assurance functions to ensure that proper levels of effort are being expended
- Ensures program deficiencies are being identified and corrected
- Ensures that assigned mission assurance personnel are properly directed and motivated to produce the best feasible product.
- Supports Program Systems Engineering to ensure spacecraft, instruments and ground systems meet Mission Assurance objectives

3.2.1.5.9 Flight Project Manager (FPM)

The Flight Project Manager (FPM) reports functionally to the SPD and receives line supervision from the GSFC Code 400 Director of Flight Projects in accordance with NASA personnel policy. The GOES-R FPM is responsible for all aspects of the Flight Project development and implementation lifecycle including conformance to GOES-R technical performance, cost, and schedule requirements. FPM is responsible for overseeing the contractor development and implementation of satellite, launch vehicle and related efforts. This includes acquiring, developing and deploying a satellite system that generates earth observation imagery in response to user needs. The FPM works with other SMT members to oversee the development of the GOES-R architecture. The Flight Project Manager's specific responsibilities include:

- Manages and implements the GOES-R Space segment
- Manages and oversees the acquisition of individual instruments and spacecraft
- Reports functionally to the SPD
- Manages the Flight Project budget, including allocated reserve
- Controls and assesses all project activities consistent with the program/project plans
- Works with the Program Systems Engineer and the Ground Segment Project Manager to confirm contractor deliverables meet the Ground Segment Project needs and requirements
- Works with System Program Director, Program Systems Engineer and the Ground Segment Project Manager to effect the resolution of all critical and potential program problems
- Leads the development and control of flow down requirements as they pertain to the Flight segment from Level 2 to lower levels in accordance with Configuration Management Plan
- Provides continuous risk management assessments, mitigations, and work-around identifications and implementations to the SPD

3.2.1.5.10 Ground Segment Project Manager (GSPM)

The Ground Segment Project Manager (GSPM) reports directly to the SPD. The GOES-R GSPM is responsible for all aspects of the ground segment project development and implementation lifecycle including conformance to GOES-R technical performance, cost, and schedule requirements. The GSPM is responsible for all aspects involved in the design, development, implementation, integration, test, transition of the GOES-R ground segment to safely operate the GOES-R space segment and to produce earth observation products in response to program approved requirements. The GSPM works with other SMT members to oversee the development of the GOES-R architecture and associated technology roadmap. The Ground Segment Project Manager's specific responsibilities include:

- Manages and implements the GOES-R ground segment consistent with program/project plans
- Reports directly to the SPD
- Manages the Ground Segment Project budget, including allocated reserve
- Controls and assesses all project activities consistent with the program/project plans
- Works with the Program Systems Engineer and the Flight Project Manager to confirm contractor deliverables meet the Ground Segment Project needs and requirements
- Works with System Program Director, Program Systems Engineer and Flight Project Manager to resolve all critical and potential program problems.

- Leads the development and control of flow down requirements as they pertain to the Flight segment from Level 2 to lower levels in accordance with Configuration Management Plan
- Provides continuous risk management assessments, mitigations, and work-around identifications and implementations to the SPD

3.2.1.5.11 GOES-R Legal Counsel

The DOC GOES-R legal counsel team consists of one DOC OGC Contract Law Division (CLD) staff attorney who serves as the primary point of contact for all legal matters arising from the GOES-R acquisitions and contracts administration, and also of two other CLD attorneys that support or supervise the line attorney. Members of the DOC GOES-R legal counsel team are full members of the GOES-R program.

The DOC GOES-R legal counsel provides legal, contractual, and law-related technical advice and support to the GOES-R system program director. Such support necessarily extends to matters pertaining to all aspects of the program and its projects. Because complete information is a prerequisite to rendering sound and effective legal advice, the DOC GOES-R line attorney must enjoy access to program and project-related information that is pertinent to all counsel activities. That information includes, but is not limited to financial, cost, schedule, technical, programmatic and other relevant business information pertaining to the GOES-R program, Ground Segment Project, and Flight project. The DOC GOES-R legal team will coordinate with appropriate NASA officials to access GOES-R information that is the exclusive property of NASA. The DOC GOES-R legal team also will have access to and interaction with program and project staff and attendance at meetings pertinent to legal counsel's activities. Cooperation with the GOES-R legal team is essential for successful program execution and should be treated as such by all program and project staff.

3.2.2 Stakeholders

Stakeholders are organizations who contribute to the GOES-R program's mission success. Stakeholders participate in GOES-R development and operations, as specified in lower-level agreements. The interface with each stakeholder is briefly described in the subsections that follow.

Stakeholders are also identified in the GOES-R CONOPS document Section 4.3 User Description.

3.2.2.1 National Weather Service (NWS) Stakeholders

The National Weather Service (NWS) uses GOES data for critical functions including forecasting and providing intensity estimates of hurricanes, identifying and tracking severe weather, issuing watches and warnings for severe weather and winter weather, analyzing forest fires (and resultant smoke), assimilating GOES data into numerical weather prediction models, and monitoring space weather. GOES uses data from NWS Data Collection Platforms (DCPs) and numerical weather prediction models for the creation of higher order GOES-R products.

3.2.2.1.1 NWS Network Control Facility (NCF)

GOES-R will provide satellite imagery and products to the NWS Network Control Facility (NCF) in Silver Spring, MD, for use in NWS facilities. The NCF combines GOES-R data with radar, numerical weather prediction, in situ, text products and forecasts, and delivers them to the NWS Weather Forecast Offices and River Forecast Centers for use in the forecast and warning process.

3.2.2.1.2 National Centers for Environmental Prediction (NCEP)

GOES-R data and products will be delivered to NCEP and used for aviation weather, climatological analysis, environmental modeling, hydrometeorological forecasting, ocean prediction, space environment monitoring, storm prediction, and tropical weather forecasting.

3.2.2.1.3 National Weather Service Telecommunications Gateway (NWSTG)

The NWSTG acts as a switching station, receiving GOES products and delivering the data to the international community. Surface and other in situ data are routed from field sites back to NWSTG for use in GOES product processing.

3.2.2.1.4 Emergency Managers Weather Information Network (EMWIN)

NWS will send EMWIN data to GOES-R for relay and dissemination.

3.2.2.2 NESDIS Stakeholders

NESDIS components that contribute to the mission of GOES-R include; the Office of Satellite Data Processing and Distribution (OSDPD), the Office of Satellite Operations (OSO), Office of Satellite Development (OSD), STAR and Data Centers.

3.2.2.2.1 Office of Satellite Data Processing and Distribution (OSDPD)

The OSDPD will provide the following functions for GOES-R:

- Participates in GOES-R ground segment reviews for design, development, implementation, integration, testing, and transition to operations.
- Manages and operates GOES-R for product generation and distribution once operational.
- Generates and provides augmented products and other services to OSDPD users.
- Coordinates with the GOES-R direct broadcast community to communicate changes in broadcast services.
- Sends low-rate information transmission (LRIT) data to GOES-R for rebroadcast to LRIT user community.
- Brokers requests for instrument scanning mode changes between the requestor and GOES-R satellite operations.
- Provides 24/7 user help desk for GOES-R ground segment product generation and distribution services to operational users.

3.2.2.2.2 Office of Satellite Operations (OSO)

OSO will provide the following functions for GOES-R:

- Participate in the development and review of requirements and specification documents in advance of the source selection activity.
- Participate in the source selection activity for the ground segment.
- Participate in the GOES-R ground segment reviews for design, development, implementation, integration, testing and transition to operations.
- Manage and operate the GOES-R mission management and enterprise management system.
- Manage and operate the functions at the ground acquisition site, WCDAS.

- Perform engineering management, trending, and analysis for the GOES-R spacecraft.
- Manage the GOES-R backup facility and its operation.
- Participate in procedures and plan reviews
- Participate in space and ground design reviews
- Member of the Source Selection Team for ground
- Approval on Mission Ops Products:
 - Routine Ops Procedures
 - Contingency Ops Procedures
 - PLT test reviews
 - SOE's
 - scripts, etc.
- Participate in training and mission simulations, Ground System integration and testing.
- Membership on PLT teams as sub-system engineers.
- Participate in development operations transition plans and training operational crews.

3.2.2.2.3 Office of Satellite Development (OSD)

OSD will support the GPO in sustaining engineering, maintenance, and technology refresh of GOES-R Ground Segment assets. OSD will also support the definition, design, and implementation of new systems into the GOES-R environment. The OSD Ground Systems Division will be responsible for long-term refresh and sustainment activities required for the ground system. OSD will provide technical support to the Program Systems Engineering Team.

3.2.2.2.4 Satellite Applications and Research (STAR)

The center for Satellite Applications and Research (STAR), formerly Office of Research and Applications (ORA) is the home of the Algorithm Working Group (AWG). The AWG will develop scientific algorithms for each GOES-R product and supply proxy data for simulating system inputs and outputs. The AWG will also assist the contractor during calibration and validation activities. All AWG products will be delivered first to the Ground Segment Project Manager (GSPM) for evaluation. The GSPM will then provide the materials to the GS prime contractor as "Government Furnished Information (GFI)". The algorithm development process is outlined in the Algorithm Development Management Plan for Ground Segment Product Generation

3.2.2.2.5 Data Centers

There are two NESDIS data centers that archive GOES-R data:

- National Climatic Data Center (NCDC), one node of CLASS: GOES-R will provide data to NCDC for long term archive
- National Geophysical Data Center (NGDC), one node of CLASS: GOES-R will provide data to NGDC for long term archive

4 MANAGEMENT APPROACH

4.1 Acquisition Management

4.1.1 Source Selection Evaluation Board Process

NOAA and NASA roles and responsibilities for source selection are documented in the MOU. The ground segment source selection processes will follow the Federal Acquisition Regulation (FAR), and

NOAA acquisition policies. The space segment source selection process will follow the FAR and the NASA FAR supplement.

For space segment procurements, NOAA will participate in NASA acquisition and contract execution activities as identified in the approved acquisition strategy, including, at a minimum: The NESDIS AA will attend any Source Evaluation Board (SEB) briefings to the NASA Source Selection Official (SSO) concerning this acquisition or the source selection thereof.

The NASA space procurement strategy and source selection approach will be reviewed and approved at the NASA Headquarters-Level Procurement Strategy Meeting. NASA procurement authority has been delegated to the Goddard Space Flight Center. GSFC and GPO will review and approve the RFP package.

The NOAA ground procurement strategy and source selection approach will be reviewed and approved by NOAA and NOAA NITRB, GPO, AGO and DOC.

Approval for release of each RFP will follow the Gateway and Entrance Review process outlined in section 4.4.

NASA will provide the Source Selection Official (SSO) for the space procurements and NOAA will provide the SSO for the ground procurements. Both the Space and Ground segment Source Evaluation Boards (SEB) will have NOAA and NASA personnel. Throughout the NASA source selection process, the NESDIS AA will participate in SSO briefings.

The NESDIS AA will be afforded a reasonable opportunity to provide comments, ask questions and express concerns orally and/or in writing to the SSO to consider prior to the SSO's selection. In all cases, a written NESDIS assessment will be provided.

4.2 Contracts Management

When acquiring goods and services in support of the GOES-R program, all program office and project office personnel will utilize the FAR, respective agency supplemental (DOC, NASA) acquisition regulations, as well as respective NOAA and NASA acquisition policies and procedures. Contracting Officer's Technical Representatives (COTR) will be specifically designated by a NOAA or NASA Contracting Officer in accordance with agency training requirements. COTRs will coordinate appropriate contracting activities with the NOAA or NASA contracting officer in accordance with applicable regulations. The following table shows contracts management controls.

| Control Objective/Risk | Management Control | Documentation Source |
|--|---|---|
| Ensure acquisition plans represent sound business approach to acquiring goods and services | Acquisition plans above values designated in the respective DOC, NOAA and NASA policies and procedures are reviewed by senior acquisition officials. NOAA Acquisitions must be reviewed by the DOC Acquisition Review Board and Commerce IT Review Board (CITRB) as required. | FAR, CAR, NASA FAR Supplement, Commerce Acquisition Manual, NOAA Acquisition Handbook, local NOAA/NASA policies |
| Ensure prospective solicitations and contracts comply with FAR, and applicable NOAA and NASA regulations | Prospective NOAA contracts are reviewed by NOAA AGO review panel and DOC Office of General Counsel. For Flight Project contracts managed by Goddard, the current version of the Goddard Procedural Requirements (GPR) 5100.1 will be followed. | Commerce Acquisition Manual, NOAA Acquisition Handbook Goddard Directive Management System |
| Ensure communication between the Program Office and Project Office | Assignment of GOES-R Program Office Contracting Officer – Project Contracting Officers are required to provide a brief summary of status to Program Office Contracting Officer bi-monthly and communicate contractual issues and actions that may have a significant effect on cost/schedule as they occur. | Management Control Plan |

Figure 7 Contracts Management Controls

4.2.1 Performance Management

NOAA and NASA roles and responsibilities for Award Fee determination are documented in the MOU. The projects will develop an award fee plan for each acquisition, and coordinate such with NOAA and NASA as applicable. The GOES-R program office will develop a process to jointly evaluate applicable aspects of the flight and ground segment contracts.

Contractor performance will be assessed on a periodic basis and will consider management, cost, schedule and technical performance.

The award fee process will be implemented according to the respective Performance Evaluation Plans (PEPs) for each implementation contract. The SPD will concur with the Award Fee Plan for flight and Ground Segment Projects, NESDIS may concur as well to both projects' Award Fee plans. For major elements, spacecraft contract and ground contract, the GOES-R System Program Director (SPD) will chair the Award Fee Performance Evaluation Boards (PEBs). The PEBs are responsible for evaluating contractor performance, based upon the approved PEP. Depending on the contract, the PEB Chairman will make fee recommendations to the appropriate Fee Determination Officials (FDOs). For NOAA, the FDO will be the NESDIS AA. For NASA, the FDO will be the GSFC Director of Flight Projects. For the spacecraft contract, prior to a final fee decision, the NASA FDO will provide rationale for the fee determination to the NESDIS Assistant Administrator (AA). The NESDIS AA will be given reasonable opportunity to provide a written or verbal assessment on the intended award fee decision to the FDO prior to the award fee decision. For instruments, the SPD will be given reasonable opportunity to provide a written or verbal assessment on the intended award fee decision to the FDO prior to the award fee decision. In all cases, a written NESDIS assessment will be provided.

Contracting Officer will provide the award fee ratings for each GOES-R contract to the program office after each contract's rating period. The GPO will prepare a summary of contract performance evaluations and submit it to NESDIS twice a year. The report will include summary ratings for each PEB held during that period, along with a running trend of ratings for each contract and a summary of significant activities to aid in the illustration of the ratings. NOAA, DOC and NASA will treat such summaries as

procurement sensitive information and require its employees to take reasonable precaution in maintaining the confidential status of such summaries and any related information.

The GOES-R Program Office Contracting Officer will ensure that the Performance Evaluation Plans (Award Fee Plan) for the spacecraft and ground contracts have provisions for the evaluation of effective systems integration at the program level.

The Flight Project Manager, or his designee, is the PEB Chairman for the GOES-R instrument contracts.

On an annual basis, the NESDIS AA and NASA counterpart will conduct a joint review of the effectiveness of the award fee determination process for the GOES-R program. Findings and recommendations will be reported to the DUS and to DOC.

4.3 Technical Authority

The technical authority (TA) process outlined in NPR 7120.5D is explicitly adapted herein to suit the unique inter-agency structure of the GOES-R Program. The GOES-R Technical Authority Model applies with equal force to both the Flight Project and the Ground Segment Project. The GOES-R Technical Authority Model establishes a system of checks and balances to ensure that technical decisions having significant impact on the GOES-R Program are not arbitrarily made. The technical authority process allows the designated TA to elevate a technical disagreements having significant impact on the GOES-R Program or Projects to the appropriate level of technical oversight. The GOES-R Technical Authority Model should not be construed to deprive the SPD or the Project Managers of their ultimate responsibility for the respective Program or Project success in conformance with governing requirements.

Infrequent circumstances may arise when a Technical Authority or the Program/Project Manager may disagree on a proposed programmatic or technical action and judge that the issue rises to a level of significance that the next higher level of management should be involved. In such circumstances:

- a. The Program/Project Manager (or Chair of the controlling board) has the authority to make a decision while resolution is attempted at the next higher level of Programmatic and Technical Authority.
- b. Resolution should occur prior to implementation whenever possible. However, the Program/Project Manager may proceed at risk in parallel with pursuit of resolution if they deem it in the best interest of the program/project. In the event that the Project Manager determines that proceeding with a proposed course of action is in the best interest of the program although the TA dispute has not been resolved, the Project Manager shall inform the Program Manager of such rationale and seek the specific authorization of the SPD before proceeding.
- c. Resolution should be attempted at successively higher levels of Programmatic Authority and Technical Authority until resolved.

There are three distinct types of technical authority-- Engineering technical authority, Safety and Mission Assurance (SMA) technical authority and Science technical authority. These technical authorities are separate entities, focused on different aspects of requirements as described in this document.

4.3.1 Engineering Technical Authority (ETA)

For the GOES-R Program, engineering technical authority is exercised by the Program Systems Engineer. For the Flight Project, the TA is the Project Systems Engineer. For the Ground Segment Project, the TA is the Operations Systems Engineer.

Oversight of the Technical Authority process for the flight project is by the Applied Engineering and Technology Directorate (AETD) Branch and Division management. Additional technical oversight for flight is provided via the NOAA program office system engineering team, and any other individual that may be designated by the DUS. For the Ground Segment Project, oversight will be a joint effort between

NESDIS OSD and NASA AETD. The Project level ETAs are responsible for coordination with the Program TA.

The GSFC Director of Applied Engineering and Technology and NESDIS Deputy Assistant Administrator for Systems (DAAS) will provide a forum to hear appeals of the Program Level TA.

4.3.2 Safety and Mission Assurance Technical Authority (SMATA)

For the GOES-R Program, mission assurance technical authority is exercised by the Program Mission Assurance Manager. For the Projects, the SMATA is the Project Mission Assurance Manager.

Oversight of the Technical Authority process for both projects will be provided by the GSFC Office of Systems Safety and Mission Assurance (OSSMA). Additional mission assurance technical oversight for both projects is provided via the NOAA program office system engineering team, and any other individual that may be designated by the DUS. The Project level TAs are responsible for coordination with the Program TA.

The GSFC Director of Office of Systems Safety and Mission Assurance and NESDIS Deputy Assistant Administrator for Systems (DAAS) will provide a forum to hear appeals of the Program Level SMATA.

4.3.3 Science Technical Authority

For the GOES-R Program and projects, science technical authority is exercised by the Program Scientist.

Technical oversight will be NESDIS with support from the NOAA Observing Council (NOSC).

The NOSC (chaired by the NESDIS and National Weather Service AAs) will provide a forum to hear appeals of the Program Scientist.

4.3.4 Technical Authority Appeal Paths

If the issue is not resolved in the above forums, respective program appeal authorities, will brief the NESDIS AA (NOAA) and the GSFC Deputy Director regarding the facts, details, and impacts of the technical disagreement between the PSE or Mission Assurance and the SPD. The NESDIS AA and the GSFC Deputy Director will meet to resolve the issue.

If no resolution is achieved at this level, the NESDIS AA and GSFC Deputy Director will brief the NOAA Deputy Under Secretary (DUS), NASA Chief Engineer (for flight project), and NASA Chief Safety and Mission Assurance Officer (for mission assurance) regarding the facts, details and impacts of the technical disagreement.

The NOAA DUS has ultimate authority to resolve the disagreement.

GOES-R Technical Authority Appeal Process

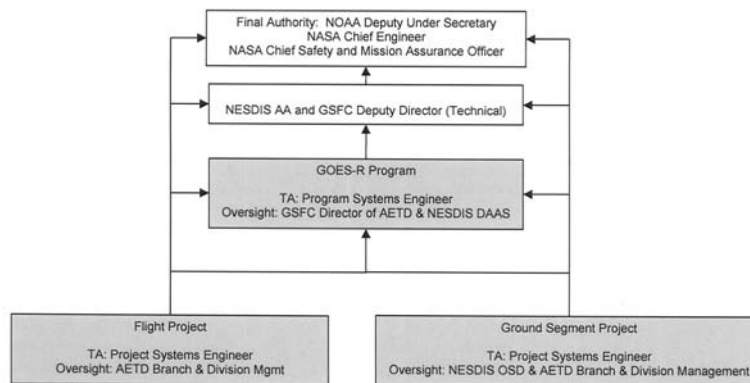


Figure 8: GOES-R Technical Authority Appeal Process

4.4 Lifecycle Assessment Reviews

The GOES-R program will execute a series of reviews that assess health and status of the program and projects throughout the life of the program and provide approval to proceed to the next phase. Most current version of System Milestones are described in the System Review Plan (SRP) (P417-R-PLN-0052). Figure 8 outlines those reviews along with accompanying program and project milestones.

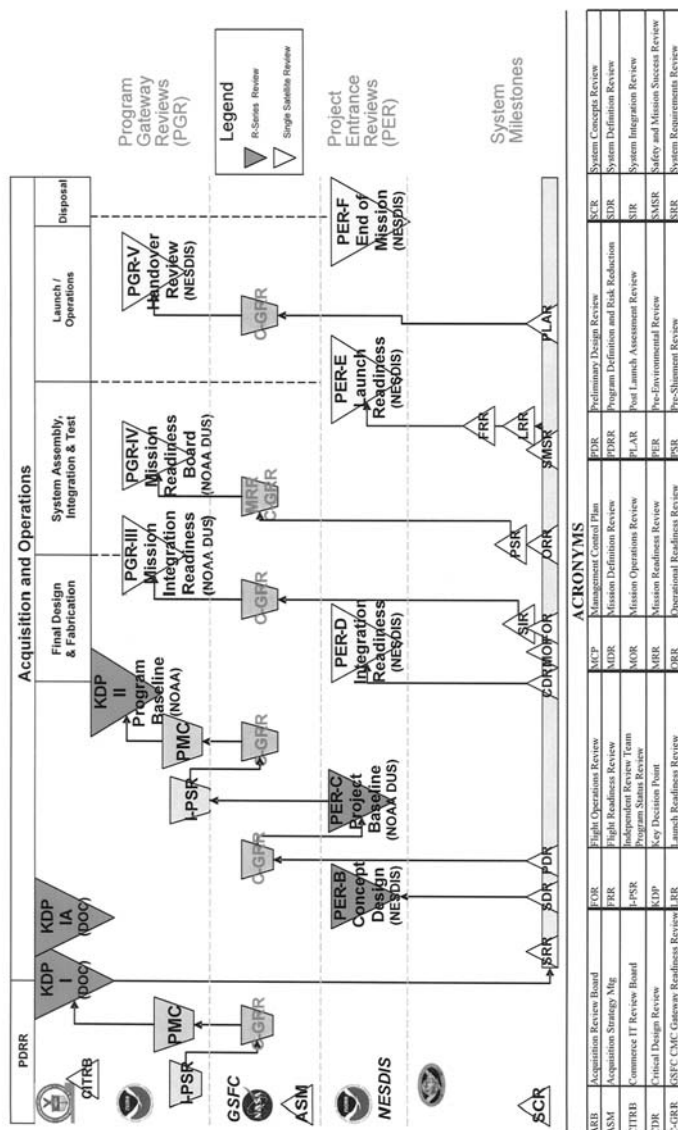


Figure 9: GOES-R Assessment Reviews and Milestones

4.4.1 Key Decision Points

There are three Key Decision Points remaining for the GOES R program, KDP I (equivalent to DAO KDP C/D), KDP-IA and KDP II. The Secretary of Commerce is the designated Milestone Decision Authority for Department of Commerce Milestone Decisions, and is the approval authority for KDP-I and IA. The Secretary may delegate the authority to the NOAA Administrator (Under Secretary for Oceans and Atmosphere). The NOAA Administrator is the approval authority for KDP-II.

- KDP I (DAO KDP C/D): Authority to proceed to implementation (acquisition and operations) phase. For GOES-R, upon receipt of procurement authority, this allows program to begin the source selection processes for the spacecraft and ground systems.
- KDP IA: Approval to Exercise Options: At this review, NOAA will request authority to exercise contract options on the spacecraft contract for additional spacecraft and related ground system contract options. KDP IA must occur in sufficient time to permit properly-phased adjustments to the NOAA and DOC budget submittals.
- KDP II: Program Baseline Review: Budget and Schedule baselines are established for DOC and congressional oversight purposes. This is the baseline to which NOAA will hold the GOES-R program accountable.

4.4.2 Program Gateway Reviews

GOES R program will face a series of readiness reviews and Gateway Reviews to determine readiness for KDPs and to transition between major lifecycle phases. The NOAA PMC, chaired by the Deputy Under Secretary for Oceans and Atmosphere is the decision forum for the Gateway Reviews. Each of these reviews will be preceded by a GSFC CMC readiness review, the results of which will be presented as an advisory assessment to the NOAA PMC prior to the Gateway Review decision.

With the exception of Program Gateway V, NOAA DUS is the decision authority.

- KDP I Readiness. The program will certify readiness that program concept and mission level requirements are defined, budget and schedule are appropriate for the scope, and program/project plans and documents are of sufficient maturity to proceed to acquisition and operations phase.
- KDP II Readiness. The program will certify readiness for program baseline and KDP II. Occurs after the mission level Preliminary Design Review.
- Program Gateway Review III: Mission Integration Readiness: The Program will certify that the projects are prepared to be integrated into an end to end GOES-R system. This transition is uniquely a "soft gate," in which the program may initiate integration work immediately, absent a notice of discontinuance by the NOAA DUS.
- Program Gateway Review IV: Mission Readiness Review: The program is prepared to solicit Kennedy Space Center led Flight Readiness and Launch Readiness Reviews in preparation for satellite launch and ground system operation.
- Program Gateway Review V: Handover Readiness: Program certifies readiness to transition observatory to the flight operations team. The decision authority for this gateway is the NESDIS AA.

4.4.3 Project Entrance Reviews

GOES R projects will face Entrance Reviews to transition to the next major phases in their acquisitions. The Project Entrance Reviews are briefly described below along with supporting milestones. The NESDIS AA is decision authority except as noted below

- Entrance Review B: Concept Design: marks the completion of the Segment Concept development phase and the entry into Project Baseline Phase.
 - Supporting milestones: Concept Review, Requirements Review
- Entrance Review C: Project Baseline: marks the completion of Project Baseline and successful project PDR completion. Project Entrance Review-C also marks the entry into the Final Design and Fabrication Phase for each satellite. NOAA DUS is decision authority.
 - Supporting milestones: Preliminary Design Review
- Entrance Review D: Integration Readiness: marks successful completion of project System Integration Review, completion of Final Design and Fabrication phase and commencement of System Assembly Integration and Test phase. This transition is uniquely a "soft gate," in which the project may initiate integration work immediately, absent a notice of discontinuance by the NESDIS AA.
 - Supporting Milestones: Critical Design Review,
- Entrance Review E: Launch Readiness: signals completion of project level flight, safety and mission success and launch readiness reviews. Project Entrance Review-E marks the beginning of the Launch and Operations phase.
 - Supporting Reviews: Pre-Environmental/Pre test review, Flight Operations Review, Flight Readiness Review, Mission Operations Review, Safety and Mission Assurance Review, Mission Readiness Review
- Entrance Review F: End of Mission: signals completion of operational use of the system and beginning of the disposal phase.

Decision Authorities for each assessment review are summarized in the table below:

| Decision Point / Decision Authority | KDP I | Entrance Review B | Entrance Review C | KDP IA | KDP II | Entrance Review D | Gateway Review III | Gateway Review IV | Entrance Review E | Gateway Review V | Entrance Review F |
|-------------------------------------|-------|-------------------|-------------------|--------|---------|-------------------|--------------------|-------------------|-------------------|------------------|-------------------|
| | DOC | NESDIS AA | NOAA DUS | DOC | NOAA US | NESDIS AA | NOAA DUS | NOAA DUS | NESDIS AA (DAAS) | NESDIS AA | NESDIS AA |

Figure 10: Assessment Reviews and their Decision Authorities

4.4.4 Acquisition Reviews

Procurement activities will occur parallel to and independently of the KDP process. Program must ensure that an adequate procurement strategy is in place prior to KDP I and that final RFPs are not released until after KDP I. It is the program's intent to schedule acquisition strategy briefings with KDP readiness.

Project RFP packages may begin their detailed review cycles prior to the Ground Acquisition Review Board and Flight Acquisition Strategy Briefing. However, projects must ensure that requirements of the strategy reviews are incorporated into the procurements prior to release.

Acquisition Strategy briefings must address:

- Lessons learned from draft RFP
- Risk
- Alternatives studied
- Contract structure
- Award Fee strategy

- Evaluation structure

4.4.5 Lifecycle Assessment and Acquisition Review Processes

The key actions required in advance of each KDP are described in this section.

4.4.5.1 KDP I and RFP release

Before KDP-I, several key actions must occur and technical decisions must be made in order to preserve program schedule for KDP I and RFP release. These include:

- NASA Procurement Strategy Meeting (DOC and NOAA invited)
- Flight draft RFP package review, GSFC and GPO
- NOAA IT Review Board
- Flight draft RFP release
- Ground draft RFP package review, GPO, NOAA AGO
- Ground draft RFP release, AGO decision authority
- Commerce IT Review Board for ground
- IRT review
- Program documents delivered to NESDIS
- GSFC CMC KDP readiness reviews for Flight and Ground
- GSFC CMC advisory assessment to NOAA PMC outlining project readiness for KDP I
- NOAA PMC KDP Readiness Review
- Readiness brief to US
- Flight acquisition strategy brief to NOAA
- Ground Acquisition Review Board
- Flight RFP package review, GSFC
- Ground RFP package review, NOAA
- KDP Readiness Brief to NOAA Under Secretary
- KDP Readiness Brief to DOC (unless delegated to NOAA Under Secretary)

KDP I Briefing Content

Readiness for KDP requires an appropriate level of maturity of system concept and requirements, budget and schedule as well as program procedures and processes. In order for the program to demonstrate readiness, KDP briefings must address:

- System Concept
- System Requirements (Level 1)
 - Requirements Flow to projects
 - System Changes from KDP B to KDP I
- Management Structure and Organization
- Results of independent review
- Total Life Cycle Budget with fiscal year phasing
 - Program Office Estimate to ICE reconciliation

4.4.5.2 KDP-II

KDP II Key actions

- Complete required independent reviews
- GSFC CMC Readiness Review
- NOAA PMC Review
- DUS assessment of readiness to US
- KDP Readiness Brief to NOAA Under Secretary
- KDP Readiness Brief to DOC (unless delegated to NOAA Under Secretary)

KDP II Briefing content:

- System Concept
- System Requirements (Level 1)
 - Requirements Flow to projects
 - System Changes from KDP I to KDP II
- Management Structure and Organization
- Results of independent review
- Total Life Cycle Budget with fiscal year phasing
 - Program Office Estimate to ICE reconciliation

4.4.5.3 Program Gateway Review III

Complete required independent reviews
 GSFC CMC Readiness Review
 NOAA PMC action for closure
 DUS action determination

4.4.5.4 Program Gateway Review IV

Complete required independent reviews
 GSFC CMC Readiness Review
 NOAA Special PMC Review
 DUS determination of readiness

4.4.5.5 Program Gateway Review V

Complete handover reviews
 NESDIS DAAS Briefing
 NESDIS AA Briefing
 NESDIS AA determination of readiness

4.4.5.6 Project Entrance Review B

Project complete Project Concept and Definition Review
 SRB chairs present summary results to GSFC Deputy Director and NESDIS AA
 Project present results to CMC and PMC at next monthly status review
 Proceed to project baseline phase

4.4.5.7 Project Entrance Review C

Complete Project Preliminary Design Review
 Baseline readiness review with GSFC CMC
 Baseline readiness confirmation with NOAA PMC
 DUS determines baseline

4.4.5.8 Project Entrance Review D

Complete project integration readiness review
 SRB presents summary results to GSFC Deputy Director and NESDIS AA
 Project presents results to CMC and PMC at next monthly status review
 Proceed to integration and test

4.4.5.9 Project Entrance Review E

Complete Launch Readiness and Flight Readiness Reviews

4.4.5.10 Project Entrance Review F

Complete end of mission reviews
 NESDIS DAAS Briefing
 NESDIS AA Briefing
 NESDIS AA determination of readiness

4.4.6 Product Maturity for Gateway Reviews

KDP I Product Maturity

The following documentation shall be considered in the KDP I (DAO KDP C/D) decision to proceed to the Acquisition and Operations Phase. NOAA will certify to the DOC Procurement Executive that all of the documents have been delivered and approved by the appropriate NOAA official.

- Level I requirements document – DUS approved
- Concept of Operations – SPD approved
- Acquisition Strategy Flight – NASA Procurement approved (briefed to DOC)
- Ground Acquisition Plan/Strategy – NOAA approved
- IT Security checklist – NOAA CIO approved
- Technical Readiness Level assessment – SPD approved
- Test and Evaluation Concept – SPD approved
- Risk Management Plan – SPD approved
- Systems Engineering Management Plan – SPD approved
- Management Control Plan – NESDIS AA/GSFC Center Director approved
- Staffing Plan – SPD approved
- Independent Review Team report
- Mission Assurance Requirements – SPD, GSFC Code 300 approved
- Mission Requirements Document – SPD approved
- Initial Integrated Master Schedule – SPD approved
- OMB 300 (includes the acquisition strategy and baseline budget) – NOAA CFO/NOAA CIO approved

The product maturity matrix for each Program/Project Gateway Review (KDP) is outlined in Appendix C, current at the time of MCP signature. Updates to the document matrix will be found in the GOES-R System Review Plan (P417-R-PLN-0052)

4.5 Independent Review

The purpose of the Integrated Independent Reviews (IIRs) is to add value and reduce risk through the infusion of expert knowledge that is independent of the subject product development activity. The IIR Teams' roles are advisory to the convening authorities and do not have authority over any Program

content. These reviews provide expert assessment of the technical and programmatic approach, risk posture, and progress against the program baseline.

GOES-R Systems Review Plan (SRP) –P417-R-PLN-0052, establishes a plan for conducting a comprehensive set of Integrated Independent Reviews (IIRs) at all levels of the GOES-R Program at critical project milestones. The SRP identifies two primary review bodies—the NOAA Independent Review Team and the Standing Review Board. The specific roles of each are covered in subsequent subsections. The Program and Projects have specified milestones in each phase which require the convening of the Standing Review Board to assess completion.

Each IIR assesses the results of activity to date, including recommendations from a robust set of engineering peer reviews, to systematically evaluate technical and programmatic status using applicable objectives and success criteria for the particular milestone, thereby providing independent findings and recommendations to the GOES-R Program as well as to NASA and NOAA management.

A review team's role is advisory to the Program and the convening authorities and does not have authority over any Program content. When appropriate, it may offer recommendations to improve performance and/or reduce risk. Its outputs are briefed to the GOES-R Program prior to being reported to GSFC CMC and NESDIS.

The GOES-R Projects will fully support the IIRs by providing required documentation and participation. They will keep track of the review milestones on their master schedules. In the event that the time between a milestone review and the next milestone review exceeds twelve (12) months an interim review may be called at the discretion of the GOES-R Program Office or the Standing Review Board co-chairs.

In addition to critical milestone reviews, there is a series of three Joint Readiness Reviews: Mission, Flight, and Launch. In addition to these, there will be Safety and Mission Success and Initial Operational Capability Readiness Reviews. Covered in detail in the SRP, these reviews will be supported by the SRB, GSFC Deputy Director, and NESDIS AA.

4.5.1 Standing Review Board (SRB)

A GOES-R Standing Review Board is chartered on behalf of the NOAA Program Management Council (PMC) and the GSFC Center Management Council (CMC). The DUS (NOAA Administrator's Designee) and the Associate Administrator, NASA have authority to determine the scope and the chairmanship of the SRB. The NESDIS AA and GSFC Deputy Center Director approve the membership of the SRB.

The GOES-R SRB will be comprised of experts in both NASA and NOAA systems that are fully independent of the GOES-R Program Office. The SRB is to provide expert technical review of the both segment and end-to-end mission system. Through the planned series of milestone reviews IIRs, the SRB will evaluate the adequacy of the planning, design, and implementation and associated processes to safely and successfully accomplish the mission requirements. The SRB will also assess GOES-R Series programmatic performance and ability to deliver on commitments as baselined by the GOES-R Program Office.

The two co-chairs, accountable to the NOAA PMC, conduct the reviews and report completion of milestone review assessments IIRs to the PMC and GSFC CMC.

4.5.2 NOAA Independent Review Team (IRT)

NOAA will convene an independent life-cycle review after the internal GOES-R Program review is conducted. NOAA will appoint an Independent Review Team (IRT) comprised of senior satellite, ground, and operations acquisition experts to provide an assessment of the technical and programmatic approach, risk posture, and progress against the Program baseline. The IRT will report their findings to the DUS, NESDIS, GSFC CMC and the GOES-R SPD. DOC may request an IRT debrief if desired. The Chairperson will be selected by the Deputy Under Secretary for Oceans and Atmosphere, unless specifically delegated. The scope of review and membership will be coordinated between NOAA and NASA. The Review may not be convened without DUS prior approval. The DUS will also approve the scope and membership of the review in consultation with the NASA Center Director. IRT assessments will be known as IRT Program Status Reviews (I-PSR). I-PSRs will occur after system SCR, before KDP I (formerly known as KDP-C/D), and at NOAA's discretion (up to annually) to assess program status and readiness.

4.6 Risk Management Plan

Risk is characterized by the combination of the probability or likelihood that the program will experience an event and the consequences, impact, or severity of the event, were it to occur. Risk Management (RM) is a continuous, iterative, and proactive process to manage risk and achieve mission success. The process involves identifying, analyzing, planning, tracking, controlling, documenting, and communicating risks effectively. RM begins in the end-to-end Systems Architecture Definition phase and continues through the operations and disposal phase with the disposition and tracking of existing residual and new risks.

The GOES-R SPD will take a proactive approach to managing risk as documented in the GOES-R Risk Management Plan (P417-R-PLN-0081). The GOES-R Program and Projects will adhere to the same Risk Management Plan. The GOES-R RM process will be implemented by the GOES-R SPD and will include the establishment of a Risk Management Board (RMB) chaired by the SPD. Membership of the board is the SMT with the addition of project system engineers. The Project Managers will establish and chair project level risk boards which will be coordinated with the program level board.

The GOES-R Series program/projects will utilize RM as a decision-making tool to ensure safety and to enable programmatic success. Decisions will be made based on an orderly risk management effort that includes the identification, assessment, mitigation, and disposition of risks throughout the program's life cycle. Applying the RM process also ensures that risk is communicated clearly and consistently to NOAA and NASA management councils.

4.7 CONOPS (Flight and Ground Operations Plans)

The Concept of Operations for the GOES-R program is described in detail in the GOES-R CONOPS document P417-R-CONOPS-0008.

4.8 Requirements Baseline

GOES-R Requirements levels are summarized below:

Overall, System and Segment requirements have been separated into two categories – programmatic and technical (Level II/Level IIA and Level III/Level IIIA). This ensures that both mission performance and program/project control and implementation requirements managed comprehensively. The following describes the requirements architecture and interactions among its elements:

Agency Objectives & Goals

Goals and objectives are provided by NOAA executive management and are documented in the NOAA Consolidated Observational Requirements List (CORL). The CORL is traceable to agency objectives and goals with specific including the following factors: required characteristics of the system (i.e., reliability, performance, maintainability); number of and types of users of the system, and cost/budget estimates, and system need/availability date.

Level I Requirements

Mission requirements are derived from the CORL, validated by NOAA Observing System Council (NOSC), and are documented in the GOES-R Level I Requirement Document. The Level I requirements are managed by the GPO and controlled by the NOSC and DUS.

Level II Requirements

Program Control (Level II) Requirements are provided by NOAA to the GPO and are documented in the GOES-R MCP. Level II requirements provide the mission statement, program cost requirements including cost cap, cost management, and scope reduction and also identify budget, schedule, and operational constraints and margins.

System (Level IIA) Requirements are provided by the GPO to the Flight and Ground Segment Projects and are documented in the Mission Requirements Document (MRD) and System Interface Requirements Documents (IRDs). The MRD, flowing down from the Level I requirements, contains high-level requirements for the Space and Ground Segment. Level IIA documents are managed and controlled by the GPO CCB.

Level III Requirements

Project Control (Level III) Requirements are provided by the GPO to the GOES-R Flight Project and GOES-R Ground Segment Project and are documented in the GOES-R Project Plans. Level III requirements are managed and controlled by the project CCBs.

Segment/Components (Level IIIA) Requirements define the subsystems that meet the system (Level II) requirements and the interactions between those subsystems. Examples of Level IIIA documents are Inter-Segment Interface Requirements Document (IRD); Segment Functional and Performance Specifications (F&PS) for the flight and ground segments; and Mission Assurance Requirements Documents for each instrument. Level III requirements are managed and controlled by the Flight and Ground Segment Project CCBs. If a Class 1 change (form, fit, function, cost or schedule) violates a Level II requirement, the Flight and/or Ground Segment Project CCB will elevate the change for GPO CCB review, concurrence and direction.

4.9 Work Breakdown Schedule (WBS) Baseline

The following figure shows an example of the WBS baseline. The MCP provides a foundation for all planning and execution activities.

| WBS Number | Cost Element |
|------------|----------------|
| 1 | Total Program |
| 1.1 | Flight Project |
| 1.1.1 | Spacecraft #1 |
| 1.1.2 | Spacecraft #2 |
| 1.1.5 | ABI |
| 1.1.6 | SUVI |
| 1.1.7 | EXIS |
| 1.1.8 | SEISS |

| | |
|--------|-----------------------------|
| 1.1.9 | GLM |
| 1.1.10 | Launch Services |
| 1.1.11 | Flight Project Management |
| 1.2 | Ground Project |
| 1.2.1 | Acquisition & Operations |
| 1.2.2 | Antenna |
| 1.2.3 | COMM Links |
| 1.2.4 | Facility Upgrades |
| 1.2.5 | IV&V |
| 1.2.6 | NWS |
| 1.2.7 | CLASS |
| 1.2.8 | OSDPD |
| 1.2.9 | Algorithm Development |
| 1.2.10 | Transition to Operations |
| 1.2.11 | Ground Project Management |
| 1.3 | Program Systems Engineering |
| 1.4 | Program Office |
| 1.5 | PDRR |

Figure 11: Work Breakdown Schedule

4.10 Schedule Baseline

The Initial GOES-R Program Master schedule is shown in the following figure.

The Baselined Program Master Schedule will be established at KDP II.

4.11 Resource Baseline

The GOES-R Budget comes from NOAA. A budget strategy, including full cost accounting for NASA GSFC Center Maintenance and Operations (CM&O), has been submitted for FY09 as described in the NOAA/NASA Memorandum of Understanding and was approved by DOC. NOAA utilizes a Planning Programming Budgeting and Execution System to budget and allocate its funding. GOES-R shall submit its budget yearly for incorporation into the overall NESDIS and NOAA budgets. The initial resource baseline will be established at KDP-C/D (KDP-I) and finalized at KDP II. The process used yearly to establish the GOES-R budget for subsequent years is outlined in the Program Control Plans (Section 5) under Financial Systems (Section 5.1).

4.12 Communications Plan

Communications for the GOES-R program will be coordinated through Program Control.

4.12.1 Legislative Affairs

GOES-R receives any congressional actions through NOAA and the NESDIS Headquarters. All Legislative affairs will be conducted in accordance with established NESDIS policy as described in the MOU section 6 A 10.

4.12.2 Public Affairs

NASA and NOAA will coordinate public affairs and will conduct efforts in accordance with existing NESDIS and NASA policies and the MOU.

5 PROGRAM CONTROL PLANS

This section addresses Program Control functions called out in the MOU section 6B6. The GOES-R program and projects are committed to establishing and implementing standard processes and procedures to create uniformity across the program and projects.

5.1 Financial Systems

GOES-R Financial Management will be conducted as part of the larger NOAA Planning, Programming, Budgeting and Execution System (PPBES). The PPBES links NOAA's strategic vision with programmatic detail, budget development, and annual operating plans. A major decision-making process, the PPBES permits the Line Offices, Goal Team Leads, and programs to do joint planning and link directly to NOAA's Programming, Budgeting and Execution phases. Thus, PPBES permits harmonization of strategy, planning, programming, and budgeting functions. The GOES-R program will follow all NOAA guidance including the procedures outlined in the NOAA PPBES, NOAA Administrative Order (NAO), the Business Operations Manual (BOM), and budget guidance memorandums from the NOAA Chief Financial Officer (CFO).

5.1.1 Planning

The Planning Phase of PPBES is a 6-month process that begins each March and culminates in an update to the NOAA Strategic Plan, development of an Annual Guidance Memorandum (AGM) to guide the subsequent Programming, Budgeting and Execution phases, and Goal Assessments. Specific details of

the planning process are provided each year from the NOAA Program Planning and Integration Office in its Planning Guidance Memorandum to the programs.

5.1.2 Programming

The Programming phase of the PPBES process provides the fiscal and programmatic linkage between NOAA's strategic plan and its budget. The Office of Strategic Planning (OSP) is responsible for the programming phase of the PPBES process. It aids the GOES-R program office in translating the high level outcomes contained in the NOAA Strategic Plan into clear and understandable program objectives. OSP provides guidance for each year's programming phase in its yearly Programming Phase Overview. The Program Office uses this guidance as it builds its budget for the upcoming cycle.

5.1.3 Budgeting

Budget submissions will occur at least annually to support the GOES-R Program budget formulation and spend plans process.

The GOES-R Program Office will issue annual budget and program guidance (the Annual GOES-R Budget Call) to the Flight and Ground Segment Projects in November of each year to update the projects on the current program of record, to identify any changes in program configuration, to solicit an update to the currently approved funding baseline, and to prescribe the appropriate reporting format. The Flight and Ground Segment Projects will respond with their preliminary submissions in January of the following year and final submissions in March.

The GOES-R Program Office/Program Control and the projects will engage in annual budget discussions in order to support NOAA budget preparation prior to the annual Commerce budgeting process. The Annual Budget and Program Guidance Letter to the Projects will provide the necessary guidance and information to the Project for the development of their budget responses. This guidance and information will consist of:

- Approved Instruments
- Description of the scope of the work being performed by the Project
- Programmatic direction regarding ongoing and future contracts and the exercising of options
- Schedule constraints and launch readiness dates (LRDs)
- Identifies Fiscal Years being considered in the Department of Commerce's submission to the Office of Management and Budget (OMB) and Congress
- Funding constraints and yearly phasing – by fiscal year
- Adjustments to prior years funding
- General instructions for providing a response

The Annual Budget and Program Guidance letter will request a quotation from the Flight and Ground Segment Projects in the format as directed by the GOES-R annual budget and program guidance. The Projects will develop their responses based upon the instructions and guidance provided and knowledge of their contract funding / costing needs, manpower support requirements, and institutional support. The Projects will make every attempt to stay within the funding guidelines. If an over-guidance response is necessary, the Project(s) will document the rationale and provide the documentation within their response to the Program. The Projects will provide an initial submission to the Program in the January timeframe. With the initial submission, the Projects and the Program will engage in discussions so that the Projects' response is fully understood and any changes, if required, can be developed prior to the final submission. The Flight project will ensure that the GSFC Center Director has reviewed the NASA budget submission prior to its final submission to the Program in the March timeframe of each year. The Program Control and the Project Managers will ensure that open dialogue as the GOES-R team assembles, submits and

defends its combined budget. This includes defending program level decisions made to advisory and oversight panels such as the NOAA PMC and the GSFC CMC.

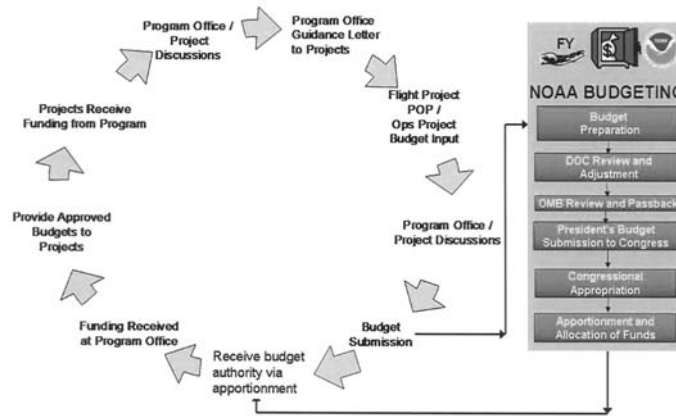


Figure 13- Program Budget Formulation and Review Process Flow and NOAA Budgeting Process

5.1.4 Budget Execution and Review

Program Control manages the GOES-R budget execution and review process by initiating, reviewing, or approving a variety of financial documents such as procurement requests and funds transfer requests.

GOES-R Program Control manages the program office budget execution and review processes using financial management policies and procedures per DAO 203-1. In addition, Program Control supports program office planning meetings, contract formulation activities, and contract administration in concert with the Contracting officers. This shall include submission of monthly budget obligation and execution plans and status to the NOAA Budget Office and an annual advanced acquisition plan to the NOAA Acquisition and Grants Office.

Obligation of funds is subject to approved allocations being provided by NESDIS headquarters. Once funds have been provided by NESDIS, the authority for the approval and use of funds resides with the System Program Director (SPD).

Responsibility for the execution of the approved budget resides with the Project leads after coordination from financial execution manager. These responsibilities include the timely identification of funding requirements and coordination with GOES-R Program Control. The GOES-R Program office will provide NESDIS headquarters and NOAA Acquisition and Grants Office (AGO) a plan listing NOAA acquisitions each fiscal year. NESDIS will determine if any individual obligations of NOAA funds require headquarters approval in the acquisition system, the Commerce Standard Acquisition and Reporting System (CSTARS) or equivalent.

GOES-R Program Control reports budget execution status in accordance with monthly obligation plans and monthly earned value reports at the NOAA Program Management Council (PMC). In preparation for the PMC, Program Control analyzes contract cost reports and validates budget requirements. To the maximum extent possible, Program Control must ensure that the funding available for each contract is sufficient to meet all program requirements for all fiscal years.

5.1.4.1 NASA Full Cost Reimbursables

The GOES-R NOAA-NASA MOU outlines the NASA full cost reimbursables in section 7.

5.1.4.2 Procedures for Funding NASA Total Value of MOU

The GOES-R NOAA-NASA MOU outlines the procedures for funding NASA total value in section 7.

5.2 Performance Measurement Systems

The Program Control division, led by the Budget Officer, has responsibility for monitoring the performance measurement systems described in the following subsections

5.2.1 Earned Value Management System (EVMS)

Earned Value Management (EVM) is a project management process that effectively integrates the project's scope of work with schedule and cost elements for optimum project planning and control. The Office of Management and Budget (OMB) requires that federal agencies use EVM for major asset acquisitions, which include major information technology (IT) systems or projects. In addition, OMB requires that EVM must meet the criteria as defined in the American National Standards Institute/Electronic Industries Alliance (ANSI/EIA) Standard 748-2002, *Earned Value Management Systems*, which was revised January 2002.

The contractor(s) will be required to perform the EVM task order technical effort for all major contracts with a value of \$20 million or greater using an ANSI/EIA-748A compliant earned value management system that correlates cost and schedule performance with technical progress. The Contract Data Requirement List (CDRL) includes the Contract Work Breakdown Structure (CWBS) Index and Dictionary, Integrated Baseline review, Integrated Master Schedule and Contract Performance Report. For contracts of \$50 million or greater, a copy of the contractor's ANSI-748A certification and their EVM plan will be submitted with the proposal. In the event that the contractor(s) does not currently have a validated ANSI-748A compliant EVMS, a compliance mitigation action plan and timetable must be submitted with the proposal. The Government must approve the compliance plan and timetable within a period of time soon after final award. In addition, it may be required at the Government's discretion, that appropriate deliverables and checkpoints will be added to the project schedule to ensure eventual compliance certification during the project period of performance.

Contractors with contract values of \$20 million or greater must ensure that all funds provided to its subcontractors comply with the intent of the Project Management Reporting requirements and report their data accurately and in time for inclusion in each of the Project Management Reporting deliverables. It is the contractor's responsibility to perform EVM oversight and review of its primary subcontractors.

Contract Work Breakdown Structure (CWBS)

Upon contract award, the contractor(s) should provide a CWBS that is consistent with ANSI/EIA-748A guidelines. The CWBS should reflect the project scope minus any government activities and costs. The CWBS should then be presented to the Government Project Manager, who will review and identify needed government resources and direct and indirect costs.

Integrated Master Schedule (IMS)

Within sixty days of contract award or letter task order issuance, the contractor(s) shall deliver the preliminary baseline and project schedule. The IMS project schedule shall be in strict compliance with the CWBS. It is critical that all tasks supporting a single deliverable or work product, regardless of the owner/supplier of each task, are organized together and roll up to a single CWBS element and summary level task in the project schedule. The IMS should be aligned with the CWBS and reconciled with the Contract Performance Report. The IMS should contain schedule risk analysis and reflect contract milestones and technical requirements. The master schedule and lower level schedules must provide vertical and horizontal traceability.

Contract Performance Report (CPR)

The contractor(s) shall prepare and submit a monthly Contract Performance Report (CPR). The CPR shall be in strict compliance with the CWBS. It is critical that all tasks supporting a single deliverable or work product, regardless of the owner/supplier of each task, are organized together and roll up to a single CWBS element and summary level task in the project schedule. Contract Performance Reports should consist of all the following 5 formats.

Format 1 - Work Breakdown Structure

Format 2 – Organizational Categories

Format 3 – Baseline

Format 4 – Staffing

Format 5 – Explanation and Problem Analysis

The contractor(s) shall include all budget amounts whether allocated or not in the reported EVM data and load such data into all required formats of the CPR to ensure its validity before transmitting it to the central GOES-R Program Portal Repository. Government point of contacts (POCs) will be responsible for reporting data and their analysis to the NOAA Program Manager or designee on a monthly basis. At minimum, CPR data must be reported at Work Breakdown Structure (WBS) level three, and if requested by the Government at any point in time, down to the lowest level of where EVM data is being collected (typically the work package level or the level to where actual costs are being charged to).

The contractor(s) shall only adjust cost performance data; Budgeted Cost of Work Scheduled (BCWS), Budgeted Cost of Work Performed (BCWP) and Actual Cost of Work Performed (ACWP) from prior months with written direction from the Government Project Manager or designee. Baseline adjustments for errors, accounting adjustments or approved re-baseline actions shall be recorded in the current reporting month. This applies only to definitized baselines using the existing EV Tool.

The GOES-R Program will use the current month and cumulative BCWS, BCWP and ACWP to calculate the current month and cumulative Cost and Schedule Variances (CV and SV). In addition, GOES-R will use the Cost and Schedule Performance Indexes (CPI and SPI) as primary measures of major system component cost and schedule efficiency. Variances and performance indices; CV, SV, CPI and SPI are defined as:

SV = BCWP - BCWS

CV = BCWP - ACWP

CPI = BCWP / ACWP

SPI = BCWP / BCWS

A CPI or SPI of 1.00 indicates 100% performance for budget and schedule. CPI/SPI greater than 1.00 indicates performance that is ahead of schedule or below cost where as a CPI/SPI less than 1.00 indicates performance behind schedule or above cost.

| Index | Green | Yellow | Red |
|-------|----------|------------------|-----------|
| CPI | CPI>0.95 | 0.95> CPI > 0.90 | CPI< 0.90 |
| SPI | SPI>0.95 | 0.95> SPI > 0.90 | SPI< 0.90 |

Figure 14: EVM Indices Thresholds

Any index change resulting in a "red" assessment must be reported to the Program Office immediately, whereas an index change resulting in a "yellow" assessment will be reported at the next month's review. This applies to both the current month and the cumulative indices. EVM indices will be reported at the monthly status review to the GSFC Center Management Council (CMC) and NOAA Program Management Council (PMC). The program office shall work with the Projects to determine corrective action required. Any major component index which falls into the red zone requires immediate notification of the Program Office. The color coded index system will only be reported internally to the program where as any variances outside of the 10 % threshold will be reported externally to NESDIS, NOAA, and the Department level as required.

Integrated Baseline Review (IBR)

An IBR is a joint assessment conducted by the Government Program Manager (PM) and the contractor(s) to verify the realism and accuracy of the Performance Measurement Baseline (PMB). This involves verifying the technical content of the baseline and assessing the realism and accuracy of the related resources (performance budget and Integrated Master Schedule (IMS)). The IBR is unlike the Validation Review (VR) that focuses on EVMS compliance with ANSI/EIA-748A. Instead the IBR focuses on assessing the realism of the baseline.

The contractor(s) and Government shall support the formal IBR as early as practicable and should be initiated no later than 180 calendar days after contract award/Authority to Proceed (ATP), the exercise of significant contract options and the incorporation of major modifications or as otherwise agreed upon. In addition, the Government will request to conduct a Pre-IBR sixty days prior to the formal IBR date.

The IBR should not be considered as a one-time event or single point review. IBRs are also performed at the discretion of the PM or when major events occur within the life of a program. These events may be a significant shift in content and/or time-phasing of the PMB or a major milestone. An IBR should also be conducted whenever an Over Target Baseline (OTB) or Over Target Schedule (OTS) is implemented.

The IBR should prepare risk evaluation criteria in technical, schedule, cost, resource and management processes. Technical risk is the ability of the project's technical plan to achieve the objectives of the scope of work. Schedule risk is the adequacy of the time allocated for performing the defined tasks to successfully achieve the project schedule objectives. Cost risk is the ability of the PMB to successfully execute the project and attain cost objectives, recognizing the relationships between budget, resources, funding, schedule, and scope of work. Resource risk is the timely availability of personnel, facilities, and equipment to perform the defined tasks needed to execute the program successfully. Management processes risk is the degree to which the management processes provide effective and integrated technical/schedule/cost planning and baseline change control.

The Government and contractor(s) will begin discussing the coverage of the IBR as soon as possible after contract award. The IBR focuses on assessing the baseline realism at the lowest level and other baseline related risk evaluations as necessary. Sixty days prior to the IBR (in conjunction with the Pre-IBR), the contractor(s) shall be required to provide all supporting and preparatory documentation to the

Government for their review. The importance of the Pre-IBR and submittal of documentation is to provide the Government with ample time to review all data related to the IBR and allow the Government time to formulate questions related to what will be presented. In addition, it allows both contractor(s) and Government to construct the IBR teams and provide any IBR training necessary. This documentation shall include, but not limited to; Basis of Estimates (BOEs), WBS Dictionary, Work Authorization Documents (WADs), Responsibility Assignment Matrix (RAM), Control Account Plan (CAP) (which includes the baselined schedule and all things associated with it such as time phased costs, the Resource Breakdown Structure (RBS) per tasks, detailed breakdown of WADs, basis of EV status and reporting etc...), CPR to date and a Risk and Impact Analysis. The WBS level at which the Government requires the contractor(s) to present its data will be the lowest level that the baselined schedule is resourced and where actual costs are collected. During the IBR, the Government will jointly assess the adequacy of the above documentation with the contractor(s).

It is sometimes necessary to perform re-planning actions that are within the scope of the authorized contract that will result in improvement in the quality of the program management information being generated by the earned value system. However, the master project schedule and the time-phased performance measurement baselines may be changed only with the approval of the Government Project Manager or designee. The request for either internal (contractor(s) controlled) or Government-approved re-planning must be accompanied by the Program Control Log indicating reason for requesting the changes.

Government Oversight and Assistance

EVM specialists will be matrixed from the Program Office to the Projects to ensure a consistent approach to earned value. The Program Office will also provide support as well as the detailed review and analysis of the entire GOES-R Earned Value Management System process including: the critique of the entire project's CWBS and Project Schedule, the assistance and guidance to conduct and perform the required IBR sessions with all appropriate parties, assist NOAA with all baseline reporting and control functions, as well as continuing the ongoing synthesis and development of NOAA's EVM policy, procedures and requirements. In addition, projects shall provide detailed EVM assessments to the program as part of monthly GOES-R Program Management Reviews (PMRs) and summary assessments will be included in NASA Center Management Council and NOAA Program Management Council (PMC) monthly reports and presentations. NESDIS Headquarters will also conduct additional EV monitoring and oversight by accessing and reviewing source EV data and providing an independent review and feedback to the Program Office and NESDIS leadership on any anomalies or concerns. The NESDIS Headquarters EV staffs are located in the NESDIS OCFO Program Planning and Analysis Division. Questions regarding anomalies or concerns identified through NESDIS Headquarters monitoring will be promptly and sufficiently addressed by the Program Office. NESDIS Headquarters will elevate significant issues to NOAA as appropriate.

Additional Government Oversight includes the following:

EVM System Surveillance (system IAW ANSI/EIA-STD-748) compliance

Contractor Performance Measurement Data includes schedule, earned value, cost performance, Budget at Completion, and Latest Revised Estimate.

Acquisition Program Baseline (APB)

Thresholds and objectives for cost, schedule and performance

Deviation reports required if breach has or will occur

APB for major program reported in Selected Acquisition Report (SAR)

SAR annually and quarterly

Unit Cost Report

Cost breaches triggered by 15% growth in current or 30% growth in original Program Acquisition Unit (PAUC) or Average Procurement Unit Cost (APUC)

NOAA Reporting

In addition to the monthly PMRs, status reports and presentations, the GOES-R GPO is required to submit quarterly EVM Reports and annual Operational Analyses Reports to NOAA. The project performance reports are to include an integrated performance curve graph that depicts the following cumulative variances:

- BCWS or Planned Value (PV)
- ACWP or Actual Cost (AC)
- BCWP or Earned Value (EV)

Project performance reports will also include the following cumulative EVMS data:

- Budget at Completion (BAC)
- CV
- CPI
- Estimate at Completion, adjusted for the current CPI; (EAC1)
- Variance at Completion, adjusted for the current CPI; (VAC1)
- Estimate to Complete, adjusted for the current CPI; (ETC1)
- SV
- SPI
- Cost/Schedule Index (CSI)
- Estimate at Completion, adjusted for both CPI & SPI (EAC2)
- Variance at Completion, adjusted for both CPI & SPI
- Estimate to Complete, adjusted for both CPI & SPI
- Expected Completion Date, based on the current SPI
- Level of Effort
- Cost Performance Index Chart
- Cost/Schedule Variance Trends Chart
- Estimate at Completion (EAC) Chart
- Use of Management Reserve (MR) PMB Plot
- Use of MR Cost variance Chart
- MR EAC Chart
- Over Target Baseline PMB EAC Chart
- Effect of Over Target Baseline on CV Chart
- Six Period Summary
- Executive Summary

Along with the quantitative data listed above, the project performance report shall include a discussion of any cost or schedule variances exceeding 10% (a CPI, SPI or CSI less than 0.90 or greater than 1.10). This discussion will explain the cause(s) of the variance and whether or not the project still expects to achieve its performance goals. The report will also discuss the corrective actions that will be taken to

correct the variances, the risk associated with the actions and how close the planned actions will bring the investment to the original baseline and explain any anticipated need for baseline changes, if any.

Performance reports must be submitted, in either WordPerfect or Microsoft Word, in the required format. The reports are due by April 15, July 15, October 15 and January 15 of each year and are to reflect performance through the end of the previous month.

Annual Operational Analyses, separate from those included in the Operational IT Plan, will focus on four performance criteria:

- Financial performance
- Customer results
- Business and strategic results
- Innovation

Operational Analyses are due annually by February 15 and are to focus on each investment's operational state as of December 31 of the previous year.

5.2.2 Contingency, Schedule Margin and Baseline Controls

5.2.2.1 Contingency

GOES-R project managers and Program Systems Engineering will request a budget that includes contingency funding using the budget execution process outlined in section 5.1.3. The SPD will approve the project budget, including contingency level. Once allocated, the project manager and PSE have the authority to reallocate and apply contingency as appropriate across project elements.

The GOES-R Program should maintain a budget reserve level of 10% through A&O phase. Flight Project should maintain a budget reserve level of 20% on unliened cost to go or higher through the last spacecraft delivery. At the time of delivery of the final spacecraft to the delivery to the launch site, flight projects should have a budget reserves level of 10% or higher. Ground Segment Project should maintain 30% or higher through FOC for operations. Deviations from this level of budget reserves shall require concurrence of the SPD, CMC and NOAA.

The Project Manager has the authority to approve an over target baseline within the budget, milestone and Level II performance parameters called out in this plan. Project Managers will inform the SPD prior to any such rebaselining activities. In the event that the contingency is projected to reach 10% during A&O, the program may remove that authority until such time that healthy contingency is restored.

At monthly status reviews, project managers shall present their budget reserves status relative to approved levels. If the budget reserves fall below the agreed-to levels, the presentations shall include justification for the shortfall and a mitigation strategy. Project Managers must maintain contingency of 20% unliened cost to go.

5.2.2.2 Schedule Margin and Baseline Control

5.2.2.2.1 Schedule Margin

Schedule margin guidelines are specified for the Flight Project from Goddard Interim Directive (GID 7120.1 schedule margins and budget reserves to be used in planning flight projects and in tracking their performance).

Schedule margin guidelines for the Ground Segment Project are:

- From ATP to segment factory Integration & Test (I&T): One month per year
- From segment factory I & T through launch minus six months: two months per year
- From launch minus six months to launch minus one week: One and a half months total
- From launch to Operational Readiness Review : One month total

Schedule margins less than those specified may be appropriate in some cases. There may be circumstances where schedule margins greater than those specified will be required. Any deviations between the actual and recommended schedule margins shall be agreed upon between the SPD and the respective project managers and require concurrence of the CMC and NESDIS.

At monthly status reviews, project managers shall present their schedule margin status relative to the approved margins. If the schedule margin falls below the agreed-to levels, the presentations shall include explanations as to the reasons for the shortfall as well as a description of any activities initiated to mitigate the trend.

5.2.2.2.2 Schedule Baseline Control

The GOES-R Program and Projects will develop, maintain, and execute integrated master schedules and institute schedule management processes that:

- Provide a controlled schedule baseline, encompassing all elements of the program/project WBS
- Provide regular schedule performance measurement against the baseline, and current forecast-to-complete
- Provide hierarchical traceability from the detailed schedules to the highest level milestones which are controlled by the GPO
- Identify critical path for management and control
- Contain all critical milestones for internal and external activities
- Provide schedule integration and traceability based on an end-to-end logic network format that relates all tasks and milestone dependencies from the project start to completion
- Identify and control schedule reserve based on project risk and report monthly.

Project Managers may augment the Critical Milestones (CM) that encompass the schedule baseline with additional milestones in the Program Master Schedule (MS) or Project Master Schedule (PMS) which highlight key events within project elements. These supporting milestones could include such events as: payload or spacecraft design reviews and deliveries, achievement of Technology Readiness Levels (TRL), or finalization of memorandums of understanding.

The schedule baseline will be documented and controlled in the Master Schedule. The initial Program and Project milestone schedules have been established. Milestones appearing on the Program Master Schedule will be baselined and controlled as noted in the table below:

| Milestone Type | Key Milestones | Critical Milestones | Program Milestones | Project Milestones |
|---------------------------|--|--|--|---|
| Rebaseline Approval Level | DUS | NESDIS | GOES-R SPD | Project Manager |
| Notification Level | DOC | DUS | NESDIS | SPD |
| Baseline Date | KDP I (DOC KDP C/D) | KDP II | KDP II | Initial Baseline Review |
| | KDP II Satellite ship Ground Block Delivery #1 Mission Readiness Review Launch Readiness Date IOC – capable of delivering cloud and water vapor imagery FOC – capable of delivering cloud and water vapor imagery from both east and west stations | System SDR System PDR System CDR System Integration Readiness Flight Storage Readiness | Initial ground System Delivery Instrument Delivery Mission Ops Readiness Flight Ops Readiness Interface Milestones Spacecraft and Ground Contract Award Ground Block Deliveries #2, #3, #4 | Instrument design reviews Spacecraft bus design review milestones Ground segment design review milestones Instrument Contract Award Spacecraft and Ground RFP release dates |

Figure 15: Description of Milestones in the GOES-R Program

Milestones are baselined as noted in the table above. Baselined Program Master Schedule and Project Master Schedules will be maintained under formal configuration control. Schedules change, and the table above summarizes approval levels needed to change dates for program and project milestones.

Projects may develop an internal schedule replan. An internal schedule replan is defined as a restructuring of the Level III schedule where all project requirements and scope remain the same, Program Level milestones are unaffected, schedule reserves are not reduced and the cost of the "to go" effort remains within project operating plan guidelines.

If a baseline identified in the Program Master Schedule is no longer achievable a schedule "rebaseline" can be requested and approved at the levels defined below. If an individual milestone is projected to slip 3 months or greater from the baseline dates established at IBR, notification of the appropriate level is required. Individual milestones delays with the potential to affect the program critical path will be reported regardless of the length of the schedule slip.

System integration is defined as the integration of flight and ground systems for observatory level end to end testing. Interface milestones are outlined in the Program Master Schedule.

5.2.3 Programmatic Thresholds

The GOES-R Risk Management Plan outlines specific thresholds for cost, schedule, and technical risk reporting.

Thresholds for the cost impact for a particular segment are based upon projected percentage overrun for that segment in combination with the availability of prudent cost reserves. Total cost risk is determined by a combination of impact and probability of occurrence.

At the project level, GOES-R follows the Goddard Space Flight Center guidelines for healthy contingency (20% contingency on unliened cost-to-go). This metric is tracked monthly by the program office. Similarly, schedule risk is based on the critical path and schedule contingency health.

Risk thresholds are designed to communicate cost and schedule risk and mitigations far in advance of impacting budget and schedule control thresholds outlined in the Level 1 Requirements.

5.2.4 Technical Thresholds

The Program Systems Engineering Lead will identify system level metrics to monitor and track. Each Project Systems Engineering Lead is responsible for identifying and managing the mission resources allocated for their respective system and subsystem segment. Each Project Systems Engineering Lead and Program Systems Engineering Lead will identify resources that need to be monitored.

The Program Systems Engineering Lead defines acceptable resource margins and establishes a margin management philosophy based on various stages of the mission lifecycle. As the system architecture matures, the precision of the resource estimates will improve, as will the method of estimating the resources requirement. Resource margins shall be met in accordance with GSFC-STD-1000. Both the Flight Project and Ground Segment Project will track technical resource margins at their level and report margin status to the program.

5.3 Oversight and Reporting

The major reporting bodies for GOES-R are summarized in the figure below:

| Type of Reporting | Dates Scheduled | Reviewer |
|--|--|---|
| Senior Management Team (SMT) Weekly | Weekly | SPD or designee |
| GOES-R Personnel Management Group | Monthly | DSPD |
| GOES-R Engineering Review Board | As required | PSE or designee |
| GOES-R Monthly Program Review | Monthly | SPD or designee |
| NOAA Program Management Council (PMC) | Monthly | DUS/NOAA PMC |
| NASA GSFC Monthly Status Review (MSR) | Monthly | Deputy Center Director / GSFC Center Management Council (CMC) |
| NASA GSFC Pre-MSR | Monthly | GSFC Director of Flight Projects |
| DOC Quarterly Program Review | Quarterly | DOC CFO/ASA |
| NOAA and NASA Administrator meeting to assess Program status and progress | Yearly or as necessary | NOAA Administrator NASA Administrator |
| NOAA/NESDIS Independent Review Team | As required | DUS/NESDIS designated |
| Standing Review Board | As required | NESDIS/GSFC designated |
| KDP-I Readiness Review | Prior to Spacecraft RFP release | NOAA PMC |
| CITRB | Prior to Ground Segment Procurement release | CITRB members |
| NITRB | Prior to ground segment procurement release | NOAA CIO Council |
| NESDIS Weekly Program Tag Up | Weekly | NESDIS DAAS |
| Program Monthly Status Report | Monthly | OMB |
| GSFC/NESDIS Tag Up | Monthly | NESDIS AA, GSFC Deputy Center Director, Technical |
| NESDIS Monthly Status | Monthly | NESDIS AA |
| Project Monthly Status Review | Monthly | Project Manager, SPD attends |
| Review of Award Fee Effectiveness | Annual | NOAA/NASA Findings reported to DOC |

Figure 16: Summary of GOES-R Meetings

5.3.1 NOAA/NASA Administrators Meeting

MOU section 6A1 identifies a requirement for the Administrators of NOAA and NASA to meet at least annually and on an as needed basis to assess the status and progress of the GOES-R program. The Office of the NOAA Administrator will prepare guidance for NESDIS and the program office to identify meeting time, place, and areas of interest.

5.3.2 Commerce Department Level Reporting

GOES-R will report to the Department of Commerce:

- DOC Quarterly Review
- Program Monthly Status Reports (provided to OMB)
- Annual NOAA budget review

A description of each method is summarized below.

5.3.2.1 DOC Quarterly Review

Quarterly, the SPD will brief the DOC Chief Financial Officer/Assistant Secretary for Administration (ASA/CFO) on the progress of the GOES-R program.

5.3.2.2 Program Monthly Status Reports

Each month GOES-R reports status to the Office of Management and Budget through NOAA and DOC. These reports follow the format provided by OMB.

5.3.2.3 Annual NOAA Budget Review

Annually, GOES-R participates in the annual NOAA budget review which is incorporated into the DOC budget submission.

GOES-R will provide acquisition reviews as directed by the Department of Commerce.

5.3.3 NOAA Level Reporting

NESDIS AA provides a:

- Weekly summary of GOES R program activities to the NOAA DUS
- Monthly summary of GOES R program activities to the NOAA US
- Weekly "items of interest" summary for discussion between DUS/US and ASA/CFO/Deputy Secretary DOC

In addition, NOAA has two oversight councils that periodically review the GOES-R program:

- Program Management Council (PMC)
- NOAA Information Technology Review Board (NITRB)

A description of each council is included below.

5.3.3.1 Program Management Council (PMC)

The NOAA Program Management Council, chaired by the DUS, is the *program oversight* body for the GOES-R program. Program/Acquisition oversight responsibilities include, but are not limited to:

- Oversees NOAA acquisition policies and practices to ensure implementation and compliance with related Departmental and OMB policies
- Ensures the overall quality, responsiveness, and effectiveness of the major system acquisition process, including approving the readiness of individual system acquisitions to proceed for Secretarial review and action

The SPD, Flight Project and Ground Segment Project Managers brief the PMC.

5.3.3.2 NOAA IT Review Board (NITRB)

The NOAA IT Review Board conducts a technical evaluation of IT budget submission proposals for programs within NOAA, in support of the annual budget process managed by the NOAA CFO. NITRB approval is required before submission to the CITRB for Delegation of Procurement Authority (DPA)

5.3.4 NESDIS Reporting Requirements

NESDIS DAAS reviews the status of GOES R each week with the SPD.

NESDIS CFO has access to project and program financial data, including EVM for review and assessment. NESDIS CFO will provide regular audits of GOES-R financial health and review monthly financial data.

Weekly Status reports from GOES R SPD are provided to NESDIS AA, DAA, and DAAS

Each month, prior to PMC, the NESDIS AA and GSFC Deputy Director, Technical discuss NOAA program/project status and develop plans for mitigating any risks or issues identified.

5.3.5 NASA Reporting Requirements

The GSFC Deputy Director chairs the GSFC Center Management Council (CMC) to conduct Monthly Status Reviews (MSRs) to assess the status of each of the programs, projects and instruments assigned to the Center. GOES-R Program and Projects will report to the CMC. Reports include; preparing and presenting the MSR briefings, as well as highlighting significant items of progress, issues, risks, metrics, and trends. These briefings include identification and closure of open issues and options for resolving variances in baseline cost, schedule, and technical metrics. MSR process is described in GPR 1060.2C - Management Review and reporting of Programs and Projects.

NOAA will have a seat on the CMC. Typically, DAAS and/or Director OSD attend.

A Pre-MSR is prepared with the same material for presentation to the GSFC Flight Programs and Projects Directorate (Code 400). SPD/DSPD attends these pre-briefs. Associated material is presented in more detail to the GPO as part of the Monthly Program Review (noted above).

Project Managers provide Weekly Status Reports to Flight Programs and Projects Directorate.

5.3.6 GOES-R Series Program Office (GPO)

The GOES-R Series Program Office (GPO) is responsible for technology and programmatic planning, systems engineering, pre-acquisition, acquisition development, Operations and Maintenance (O&M), decommissioning, and disposal of the GOES-R system. The GPO oversight functions include:

Functional Tag Ups - Weekly program tag ups will occur for each GOES-R functional group and senior staff. The tag up is designed to be a concise and informal forum to communicate activities and issues for the week.

Senior Management Team (SMT) Weekly - The SMT is a weekly status review and decision-making meeting. The SMT covers five main topic areas:

- o Program Status
- o CCB decisions
- o Risk items
- o Budget Review
- o Ad hoc topics

The SMT enables program-wide communication and coordination. Program Control facilitates the SMT, recording the minutes and tracks actions. SPD or DSPD chairs this meeting.

Personnel Management Group – Program Control, SPD/DPSD, and NOAA Human Resources meet at least monthly to discuss status of current or planned personnel actions

Monthly Program Review (MPR) - Each GOES-R functional group (i.e. project or division activity) is responsible for presenting the status of their activities at the GOES-R Monthly Program Review (MPR). Major papers, briefs, acquisitions, developments and operational activities are reviewed monthly. The information to be represented includes schedule data, cost data, earned value information, risks and issues and technical program

Project Status Reviews – SPD or delegate attends the monthly project status review, a detailed discussion of project activities and issues.

Weekly Status Reports – project managers provide weekly activity reports to SPD

5.4 Calendar

The GPO and the GOES Program office have implemented MS Outlook as the primary tool for scheduling meetings and conferences. This tool has been installed on the desktop of all GOES-R personnel and is accessible via the web site portal. Additionally, the Project and Systems Engineering calendars are published and posted daily in MS Outlook to facilitate collaborative scheduling with personal schedules as well as provide announcements.

5.5 Property

The Property Management process complies with federal regulations and appropriate agency property and logistics management directives and instructions. NOAA Property Management is conducted in accordance with the NESDIS Interagency and Other Special Agreements Manual, Appendix on Control of Government Owned Property. The NASA Property Management process complies with federal regulations and NASA property and logistics management directives and instructions. This section provides details called out in the MOU section 9, Control of Government Owned Property.

5.5.1 Control of Government Owned Property Process Description

This section documents the areas of property administration that will be accomplished by GSFC property managers and GOES-R/NESDIS property managers.

This direction addresses all equipment that was purchased and/or provided by GOES-R/NESDIS for a contractor (Government-Furnished Equipment (GFE)). It also addresses all property purchased by a contractor at the direction of GSFC (Contractor Acquired Property (CAP)) that is retained as government-owned equipment by GOES-R/NESDIS.

5.5.1.1 GSFC Responsibilities

The GSFC responsibilities for the GOES-R Program include the following:

- Manage property at GSFC that is purchased with GOES-R funding for use by NASA or its support contractors in accordance with all applicable Federal Acquisition Regulations (FAR) and the NASA FAR Supplement (NFS)
- Provide an annual inventory of all property at GSFC that is purchased with GOES-R funding for use by NASA or its support contractors. The inventory should include all mandatory element fields required to maintain the NOAA Property system. These fields are:
 - The Federal Supply Class
 - Property Identification Number
 - Manufacturer and model number
 - How it's acquired (e.g., constructed, purchased, transferred)
 - From whom acquired
 - Acquisition cost
 - Acquisition date
 - Physical location.
 - Identify whether it is GFE or CAP
 - Optional fields include:
 - Model name
 - Source document number (purchase order, contract)
 - Serial number
- Ensure that all applicable proper property clauses from the FAR and NFS are incorporated into any NASA GOES-R contract.
- Ensure that each NASA GOES-R contractor provides the annual NASA Form 1018, Financial Reporting of NASA Property in the Custody of Contractors and that a copy is provided to the NESDIS Program Office.
- Provide a list of any such property to the GOES-R Program Property Manager prior to any disposition of such property

5.5.1.2 GOES-R/NESDIS Responsibilities:

The NESDIS responsibilities for the GOES-R Program include the following:

Notify GSFC property management organization of any property on the Inventory Schedule list of which they may want to take possession and provide shipping instructions.

GOES-R/NESDIS may take possession of their property at any time under any circumstance, except that NASA shall have the opportunity to transfer data from computers prior to such action.

- Inform GSFC property management organization of any NOAA regulatory changes that may have an impact on property controls
- Include the following mandatory internal data before inventory reports are sent to the NOAA Regional Property Manager for review: CBS ACCS, Property Accountability Officer, Property Custodial area, and Property Custodian
- Record all property related to this project in the NOAA Personal Property System
- Retain copies of all NOAA contract close out documents

- Retain copies of the Inventory Report to the GOES-R/NESDIS for all NOAA Government-Furnished Equipment and all NOAA Contractor-Acquired Property purchased with GOES-R/NESDIS funds
- Ensure that proper disposal procedures are followed in accordance with the FAR

5.6 Waiver Approval Authority

Waivers to the GOES-R MCP may be granted with the approval of both the NESDIS AA and the GSFC Center Director. In case the NESDIS AA and GSFC Director disagree on waiver approval, the request may be elevated to the Deputy Under Secretary for Oceans and Atmosphere.

6 SYSTEMS ENGINEERING MANAGEMENT

The GOES-R Program Systems Engineering Management Plan (SEMP) P417-R-PLN-0025 defines the technical approach to managing and executing mission systems engineering throughout the life cycle of the GOES-R program. This represents the full end-to-end system – from capture of energy irradiating on the space borne instruments to final product distribution. In addition to the Program SEMP, the Flight Project and Ground Segment Project have developed SEMP's to cover their respective Systems Engineering segment responsibilities.

The GOES-R systems engineering team is staffed with both NASA and NOAA personnel with institutional system engineering oversight provided by the Applied Engineering and Technology Directorate, GSFC. As NESDIS builds its own competencies and capabilities for systems engineering, this oversight will transition to NESDIS.

The GOES-R End-to-End System will become a seamless integration of the Space Segment and the Ground Segment, which will generate and distribute products to the end users and to the NOAA archive and retrieval system, CLASS. GOES-R is a system which is being provided by multiple contractors. Most interfaces between the major subsystems as well as with the Users are bi-directional and interactive. The system must ensure that these sub-systems work together while meeting the stringent performance and reliability requirements. The Program Systems Engineering Office (PSEO) has been established to ensure these interfaces are properly designed and implemented. Further, a series of "end-to-end" tests will be conducted as the system is integrated to ensure that all operational and contingency modes perform and meet the Mission Requirements. Actual flight and operational ground system hardware and software will be used for much of this testing. Independent analysis of the designs and relevant special tests will be performed when functional and performance testing is not feasible. System level testing activities will extend through the launch and checkout of the first satellite to ensure the system operates reliably and as efficiently as possible.

6.1 Requirements Management

The NOAA Executive Panel and NOAA Executive Council have delegated approval authority to the Deputy Under Secretary for the user requirements or Level I requirements, which are the basis for the GOES-R series system acquisition.

The NOAA Observing System Council is the program requirements validation body. The NOSC, along with the NOAA PMC are the advisory bodies to the Under Secretary for NOAA's Earth observation and environmental observation-related data management (end-to-end collection, processing, storage, archiving, accessing, and disseminating) activities.

The GOES-R Requirements Management Process is the process by which user requirements for environmental data from geostationary satellites and ground processing systems are generated. The requirements are translated into more detailed system specifications and are assessed for impacts.

6.1.1 Requirements Hierarchy

The GPO has designated four levels of requirements. The figure below provides the hierarchy and examples of the four levels of requirement documents.

| Requirement Level | Baseline Document | Document Custodian & Control Process | Reviewing Body | Approving Body |
|---|---|---------------------------------------|--------------------------------|--------------------------------------|
| NOAA Observing Systems Architecture (NOSA) | Consolidated Observational Requirements List (CORL) | NOAA Observing Systems Council (NOSC) | NOSC | NOAA Executive Council (NEC) |
| Level I | GOES-R Level I Requirements Documents | Final: GOES-R Program Office (GPO) | NOSC, NOAA PMC, NESDIS AA/DAA | NOAA DUS |
| Level II | GOES-R Management Control Plan | GPO | NESDIS AA/DAA NASA/GSFC PMC | NESDIS AA, NASA/GSFC Center Director |
| Level IIIa | Mission Requirements Document | GPO | GPO GORWG | GOES-R SPD |
| Level III | GOES-R Project Plans | GOES-R Projects | GPO | GOES-R SPD |
| Level IIIa | Project Level Interface Documents and Functional Specifications | GOES-R Projects | GPO | GOES-R Project Managers |

Figure 17 – GOES-R Requirements Documents Hierarchy

All GOES-R requirements are derived from the NOAA Consolidated Observation Requirements List (CORL), which documents and prioritizes observational requirements across all NOAA Programs. The NOAA Observing Systems Council coordinates annual updates of the CORL and performs two functions:

- Allocation of user identified observing requirements to the appropriate NOAA observing system program office
- Verification that the observing systems are consistent with NOAA's existing and planned Observing Systems Architecture

GOES-R Level I Requirements, documented in the GOES-R LIRD (P417-R-LIRD-0137) are the user/science requirements that are allocated to the GOES-R program.

The Level I requirements serve as the supervisory documents for the GOES-R program. All subsequent documents flow down from the Level I documents.

At Level II, the MCP outlines management processes required to execute programmatic responsibilities. Requirements from the MCP are used to create and execute project plans at Level III. The Program level technical Mission Requirements Document (MRD P417-R-MRD-0070) translates Level I requirements into Level IIa requirements used to acquire the GOES-R Series System. The MRD is the primary requirements document for the system PDRR and A&O contracts.

At Level III, The MRD is used to create Level IIIa requirements, which are subsystem and interface level requirements documents. They are maintained and controlled by the Flight and Ground Segment Projects. Level IIIa requirements documents become contractual documents provided to development contractors for the GOES-R system.

At Level IV, Level IIIa requirements are used to create Level IV requirements by the development contractors. Level IV requirements become the contractor's system and subsystem specifications for the design, development, and testing of the GOES-R systems and subsystems.

7 DOCUMENT AND CONFIGURATION MANAGEMENT

7.1 Configuration Management (CM)

The Configuration Management (CM) process is the disciplined approach used to control the baseline by imposing requirements for configuration identification, change control, status accounting, and audits. Program/Project documentation will be controlled under CM; however, requirements are particularly important. The requirements are contractually binding to all development contractors and their sub contractors, and they serve as the foundation upon which the contractors will design and build GOES-R. CM Process for the GOES-R Program is outlined in P-417-R-PLN-0035.

The basic objectives of the GOES-R CM program are:

- Implements and maintains a CM system covering all of GOES-R Series
- The GOES-R ISSO shall be a mandatory voting member of the CCB.
- Establishes GOES-R baselines through all phases of the GOES-R Program
- Manages GOES-R configurations and program data
- Establishes configuration identification and control of all GOES-R baseline items
- Establishes a method of configuration status accounting for all approved changes to GOES-R Series baselines
- Establishes procedures and conditions for performing configuration audits
- Establishes an GPO Configuration Control Board (CCB)
- Coordinates GOES-R GPO CM activities with the Flight Project, Operation Project and the implementation contractor's CM functions

The change process is composed of three main components; the Engineering Review Board (ERB), the Configuration Control Board (CCB), and the Program Configuration Control Board (PCCB).

Configuration Control Board (CCB): The Configuration Control Board will review and consider the CCR and all analysis associated with it. CCB members will make a recommendation to the SPD or Project Managers, who are responsible for final disposition. If a CCR is approved, Contracts staff will be notified for their review for contractual implications.

The Program CCB (PCCB): The PCCB is chaired by the System Program Director (SPD), will control Level II requirements, changes which affect both Projects, changes that effect external interfaces, and any other that it deems necessary. The Deputy SPD is the designated alternate chairman. The Project Managers (PM) will chair the project CCB and control Level III (and below) changes. The deputy PMs are the designated alternate chairman.

The GOES Documentation Library is the official point of receipt, storage and distribution for all project documentation associated with the GOES Program. All documentation is cataloged, controlled, and retained in a database management system. The library collection encompasses all types of media and employs various distribution methods. The NASA Work Instruction 415-WI-1410.1.IC (or its follow on) establishes the procedures for cataloging, controlling and disbursing GOES-R documentation.

8 MISSION ASSURANCE

The GOES-R Mission Assurance Plan (MAP), 417-R-MAP-0080 is the GOES-R Mission Assurance governing document. This MAP describes the GOES-R Program Office (GPO) responsibilities and the planned government role in end-to-end Mission Assurance for the GOES-R System. The Projects will flow the MAP requirements for each contract.

9 SPECIALTY PLANS

GOES-R has specialty plans for the following areas:

- Environmental Management Plan
- Export Control Plan
- IT Management

A description of each is listed below.

9.1 Environmental Management Plan

The Program and Projects will follow guidelines of GSFC Standard Environmental Plan as disseminated by GSFC Code 250 and relevant NOAA regulations. Flight Project procedures will be determined by NASA, Ground Segment Project procedures will be established by NOAA. The GOES-R Environmental Management Plan will be prepared in cooperation with the GSFC Safety and Environmental Division. Facilities to be addressed will be the necessary upgrades to the Wallops Command and Data Acquisition Station (CDAS), the NOAA Satellite Operations Facility (NSOF) upgrades, and construction activities at the Backup Site. Environmental impacts will be considered in project planning during the preliminary design efforts and be updated throughout the lifecycle.

9.2 Export Control

Export control will be in accordance with the provisions of the International Traffic in Arms Regulations (ITAR) 22 CFR 120-130.

9.3 IT Management

Program Office IT Management infrastructure will be managed at GSFC according to NOAA rules, subject to GSFC audit if required.

The GOES-R Information System Security Officer (ISSO) will implement an IT Security Program that ensures adequate protection of the GOES-R mission, data, and components. The IT Security program shall comply with Federal, Department of Commerce, NOAA and NASA policy, as well as requirements documented in NIST guidance. IT Security Risk to the system will be continually analyzed through design, development, and implementation to identify and correct system vulnerabilities. The GOES-R ISSO will work with the ISSOs from the operational elements to ensure that the system meets security requirements for fielding in those elements operational environments. Prior to operations, the GOES-R ISSO is responsible for performing security functions to include providing security sign-off of changes after the system is placed under configuration control, managing accounts, monitoring system usage, and ensuring software patch levels are maintained. The GOES-R Program Office shall provide IT Security documentation compatible with NIST Guidance to support Security Certification and Accreditation.

Ground segment related IT management at NSOF and Wallops and Backup site will be performed in accordance with DOC/NOAA and site specific regulations and processes. Specific requirements, guidelines and standards include:

- DOC IT Security Program Policy and Minimum Implementation Standards
- NIST SP 800-18, Revision 1, Guide for Developing Security Plans for Information Technology Systems.
- NIST SP 800-28 Guidelines on Active Content and Mobile Code
- NIST SP 800-30, Risk Management Guide for Information Technology Systems
- NIST SP 800-34, Contingency Planning Guide for Information Technology Systems
- NIST SP 800-37, Guide for the Security Certification and Accreditation of Federal Information Systems
- NIST SP 800-42, Guideline on Network Security Testing
- NIST SP 800-47, Security Guide for Interconnecting Information Technology Systems
- NIST SP 800-53, and -53 Revision 1, Recommended Security Controls for Federal Information Systems
- NIST SP 800-53A, Guide for Assessing Security Controls in Federal Information Systems
- NIST SP 800-60, Guide for Mapping Types of Information and Information Systems to Security Categories
- NIST SP 800-64, Security Consideration in the Information System Development Life Cycle
- NIST SP 800-94, Guide to Intrusion Detection and Prevention Systems

Other guidance utilized:

- OMB A-130, Appendix III, Security of Federal Automated Information Resources
- Federal Information Security Management Act of 2002
- OMB M06-16, Protection of Sensitive Agency Information
- Federal Information Processing Standard (FIPS) 200, Minimum Security Requirements for Federal Information and Information Systems
- FIPS 199, Standard for Security Categorization of Federal Information and Information Systems
- NOAA Administrative Order 212-13, Information Technology Security Policy
- NOAA IT Security Manual, NOAA 212-1300 through 1305

10 FACILITIES MANAGEMENT

For efficiency, the GOES-R Program intends to maximize collocation of personnel within the program and with GOES NOP and POES programs. Office space is allocated to each project/division based on current staffing requirements. Each project/division is responsible for assigning and managing office space within its allocated area, with approval from the DSPD. Each year, as a minimum, Program Control will assess space requirements and allocations with projects. This assessment will be reviewed by the SMT. Any significant changes in overall GOES-R space requirements will be managed via the GSFC space management board process.

10.1 Co-located GOES-R Program and Project GSFC Offices

The GOES-R Program and Ground Segment Project staff includes government and contractor personnel collocated on multiple floors within Building 6 at GSFC which share common resources such as power, water, telecommunications, computer support and other resources. The facilities are owned and operated by NASA and provided based upon a MOU agreement between NOAA and NASA, a copy of which can be found in Appendix B of this document.

10.2 NOAA Satellite Operations Facility (NSOF) Spaces

Space for up to 30 GOES-R Program/Ops Project staff members (government and contractors) will be required at NSOF during the A&O Phase of the GS implementation. This is to ensure that proper oversight and management can be provided through this phase.

10.3 Wallops Ground Facility

For Wallops, space for up to 10 GOES-R Program/Ops Project staff members (government/contractors) will be required during the A&O Phase of the GS implementation.

10.4 Back-up ground facility

At the Back-up Ground Facility up to 20 GOES-R Program/Ops Project staff members (government/contractors) will require office space during the A&O Phase of the GS implementation. The staff member requirement depends on the level of back up functionality approved for the facility. Operational spaces will be required to house back-up ground systems. Facilities for the Back-up Ground Facility will be acquired in accordance with the CFR 41 Chap 101 Public Contracts and Property Management, and relevant NOAA regulations.


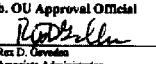
APPENDIX A: ACRONYMS

| | | | |
|--------|---|-------|--|
| A&O | Acquisition and Operations | GORD | Geostationary Operations Requirements Document |
| AA | Archive and Access | GORWG | GOES Operational Requirements Working Group |
| AA | Assistant Administrator (NOAA Organization) | GRB | Global Re-Broadcast |
| AA | Associate Administrator (NASA Organization) | GPO | GOES-R Program Office |
| ABI | Advanced Baseline Imager | GS | Ground Segment |
| ACS | Attitude Control System | GSPM | Ground Segment Project Manager |
| AGO | Acquisition & Grants Office | GSFC | Goddard Space Flight Center |
| ARB | Acquisition Review Board | HES | Hyperspectral Environmental Suite |
| ATC | Assurance Technology Corporation | IBR | Integrated Baseline Review |
| AWC | Aviation Weather Center | IIR | Integrated Independent Review |
| AWG | Algorithm Working Group | I/F | Interface |
| BSS | Boeing Satellite Systems | IMC | Image Motion Compensation |
| BW | Bandwidth | IRAD | Independent Research and Development |
| CARD | Cost Analysis Requirements Document | IRD | Interface Requirements Document |
| CBE | Contractor Best Estimate | IRT | Independent Review Team |
| CCB | Configuration Control Board | IT | Information Technology |
| CDRL | Contract Deliverables Requirements List | ITU | International Telecommunication Union |
| CITRB | Commerce Information Technology Review Board | ITT | ITT Industries |
| CLASS | Consolidated Large Array Stewardship System | JOFOC | Justification for Other than Full and Open Competition |
| CMC | Center Management Center | JCSDA | Joint Center for Satellite Data Assimilation |
| CONOPS | Concept of Operations | KDP | Key Decision Point |
| DOC | Department of Commerce | LCC | Life Cycle Cost |
| DOD | Department of Defense | LIRD | Level I Requirements Document |
| DRS | DRS Technologies | LM | Lockheed Martin |
| ECRB | Engineering Change Review Board | LMATC | Lockheed Martin Advanced Technologies Center |
| EM | Enterprise Management | LRR | Launch Readiness Review |
| EUVS | Extreme Ultra Violet Sensor | LW | Longwave |
| EVM | Earned Value Management | LWIR | Longwave Infrared |
| EXIS | EUVS/XRS Irradiance Sensor | LRD | Launch Readiness Date |
| FPA | Focal Plane Assembly | MAP | Mission Assurance Plan |
| F&PS | Functional and Performance Specification | MAR | Mission Assurance Requirements |
| FPM | Flight Project Manager | MEO | Medium Earth Orbit |
| FRR | Flight Readiness Review | MM | Mission Management |
| GAO | Government Accountability Office | MOU | Memorandum of Understanding |
| GEO | Geostationary Earth Orbit | MRD | Mission Requirements Document |
| GFE | Government Furnished Equipment | MRR | Mission Readiness Review |
| GFI | Government Furnished Information | NASA | National Aeronautics and Space Administration |
| GLM | Geostationary Lightning Mapper | NEC | NOAA Executive Council |
| GIRD | General Interface Requirements Document | NEP | NOAA Executive Panel |
| GOES | Geostationary Operational Environmental Satellite | | |

| | | | |
|--------|---|-------|--|
| NESDIS | National Environmental Satellite and Data Information Service | PTM | Prototype Model |
| NCDC | National Climate Data Center | RF | Radio Frequency |
| NDE | NPOESS Data Exploitation | RFA | Request for Action |
| NGDC | National Geophysical Data Center | RFP | Request for Proposal |
| NGC | Northrop Grumman Corp. | RVS | Raytheon Vision Systems |
| NITRB | NESDIS Information Technology Review Board | S/C | Spacecraft |
| NOAA | National Oceanic and Atmospheric Administration | SEB | Source Evaluation Board |
| NPOESS | National Polar-Orbiting Environmental Satellite System | SCR | System Critical Review |
| NPG | NASA Procedures & Guidelines | SEC | Space Environment Center |
| NPP | NPOESS Preparatory Project | SEISS | Space Environment In-Situ Suite |
| NSOF | NOAA Satellite Operations Facility | SEMP | Systems Engineering Management Plan |
| NTIA | National Telecommunications and Information Administration | SETA | System Engineering and Technical Assistance |
| NWS | National Weather Service | SDR | System Definition Review |
| OCIO | Office of the Chief Information Officer | SIS | Solar Imaging Suite |
| O&S | Operations and Support | SPD | System Program Director |
| OPS | Operations | SRB | Standing Review Board |
| O&S | Operations and Support | SRP | System Review Plan |
| OSD | Office of Satellite Development | SSO | Source Selection Official |
| OSDPD | Office of Satellite Data Processing & Distribution | STAR | SaTellite Applications Research |
| OSO | Office of Satellite Operations | SUVI | Solar Ultra Violet Imager |
| PD | Product Distribution | SVU | SAP Version Update |
| PDR | Preliminary Design Review | S/W | Software |
| PEB | Performance Evaluation Board | TA | Technical Authority |
| PEB | Power Electronics Box | TIM | Technical Interface Meeting |
| PDRR | Program Definition and Risk Reduction | TRD | Technical Requirements Document |
| PG | Product Generation | UET | User Education and Training |
| PMC | Program Management Council | UIID | Unique Instrument Interface Document |
| PMR | Program Management Review | UNH | University New Hampshire |
| POP | Program Operating Plan | VNIR | Visible Near Infra-Red |
| PORD | Performance Operations Requirements Document | VIS | Visible |
| | | XRS | X-Ray Sensor |
| | | WCDAS | Wallops Command and Data Acquisition Station |
| | | WWB | World Weather Building |

APPENDIX B: GOES-R MEMORANDUM OF UNDERSTANDING

Agreement
NOAA/NASA Support of the GOES-R Program
Page 1 of 2

| DEPARTMENT OF COMMERCE INTERAGENCY AND OTHER SPECIAL AGREEMENTS | |
|---|--|
| 1a. AGREEMENT NUMBER | 1b. AMENDMENT NUMBER (if applicable) |
| 2. PARTIES TO THE AGREEMENT | |
| a. NAME OF OPERATING UNIT AND OFFICE (Name of administrative contact, including address, telephone and FAX numbers and e-mail.) ALC: 13146004 DUNS: 784569085 U.S. Department of Commerce, National Oceanic and Atmospheric Administration National Environmental Satellite, Data, and Information Service 1335 East-West Highway Silver Spring, MD 20910-3283 Admin POC: Lisa Hurt email: Lisa.hurt@noaa.gov Phone: 301-713-0088 x165 Fax: 301-713-3599 <input checked="" type="checkbox"/> Requesting OU <input type="checkbox"/> Servicing OU | b. NAME OF OPERATING UNIT AND OFFICE (Name of administrative contact, including address, telephone and FAX Numbers, and e-mail.) ALC: 80000002 DUNS: 042273664 National Aeronautics and Space Administration Goddard Space Flight Center 8800 Greenbelt Road Greenbelt, MD 20771 Admin POC: Steven J. Dobrosielski email: Steven.J.Dobrosielski@nasa.gov Phone: 301-286-7931 Fax: 301-286-9777 <input type="checkbox"/> Requesting OU <input checked="" type="checkbox"/> Servicing OU |
| 3. PROJECT TITLE OR PURPOSE GOES-R Program Support | 4. GOODS AND SERVICES BEING EXCHANGED (The description of goods and services being exchanged and delivery requirements are included in the attached terms and conditions.) |
| 5. LEGAL AUTHORITY National Aeronautics and Space Act of 1958, codified at 42 USC section 2473(c)(5) and (6). See Section 2 of the attached terms and conditions. | 6. ANTICIPATED PERIOD OF AGREEMENT START DATE: See last date of signature in Block 8 COMPLETION DATE: See Section 15 |
| 7. FUNDING | |
| a. Estimated Total Cost See Section 7 | b. Funds Citation/Cost Center See Section 7 Frequency of Distribution: See Section 7 (quarterly, monthly, etc.) |
| c. Cost Allocation <input type="checkbox"/> 100% reimbursed by requesting Operating Unit <input checked="" type="checkbox"/> Other: Explain: See Section 7 | |
| d. Funds Availability/Budget Approval: See Section 7 | |
| 8. EXECUTION OF THE AGREEMENT | |
| a. OU Approval Official  John J. Kelly Brig. Gen., USAF (Ret.) Deputy Under Secretary for Oceans and Atmosphere | b. OU Approval Official  Rex D. Gervasio Associate Administrator National Aeronautics and Space Administration |
| Date: 6/16/07 | Date: 06.12.07 |

**MEMORANDUM OF UNDERSTANDING BETWEEN
THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
AND
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
REGARDING THE
GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE, SERIES R**

1. PURPOSE

The U.S. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Environmental Satellite, Data, and Information Service (NESDIS), and the National Aeronautics and Space Administration (NASA) are committed to successful planning, acquisition, and operation of the Geostationary Operational Environmental Satellite Series R (GOES-R) program. The purpose of this agreement is to define a relationship between the parties that results in the successful planning, implementation, and management of the GOES-R program. This agreement, in and of itself, does not obligate or transfer funds.

2. AUTHORITY

NOAA and NASA have authority to enter into this agreement pursuant to section 203(c)(5) and (6) of the National Aeronautics and Space Act of 1958, codified as 42 USC section 2473(c)(5) and (6). These sections authorize the provision of services, equipment, personnel, and facilities by either agency as necessary to meet the objectives of the agreement, on such terms as may be deemed appropriate. In addition, NOAA has programmatic authority for the activities described herein pursuant to 15 USC section 313 and 49 USC section 44720.

3. BACKGROUND

NOAA operates a system of environmental satellites in geostationary orbits known as GOES. These satellites provide continuous monitoring from the same longitude, allowing the tracking and detection of environmental phenomena that cannot be achieved using polar-orbiting satellites, which provide global coverage that geostationary satellites cannot. GOES spacecraft provide critical atmospheric, oceanic, climatic, solar, and space data images in near real-time and support weather forecasting, climatologic analysis and prediction, ecosystems management, and safe and efficient public and private transportation.

For GOES-R, NOAA will continue to have overall responsibility and accountability for the program. Both NOAA and NASA will acquire elements of the system under the auspices of an integrated NOAA/NASA program office, led by NOAA and located at the Goddard Space Flight Center (GSFC). The GOES-R program must have dedicated, collocated program management, systems engineering, and scientific support for which NOAA will provide reimbursement funding to NASA. This agreement is necessary to define the scope of support including the level of reimbursable, dedicated services that will be provided from NASA to NOAA.

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4. SCOPE

The activities to be undertaken pursuant to this agreement include all support required to ensure the GOES-R system meets program requirements and schedule milestones. The GOES-R program includes the Program Office, the Flight Project, and the Operations Project. The Program Office includes all program management, acquisition strategy management, program level Systems Engineering and Integration, scientific, technical, and administrative support. The Flight Project includes the instruments, spacecraft, launch services, satellite integration, and on-orbit satellite initialization and checkout. The Operations Project includes the mission management, data calibration, product generation, product distribution, archive and access, user interface, and operations support.

Nothing contained in this agreement shall be interpreted in a manner that is inconsistent with or contrary to the purpose or intent of any Act of Congress establishing, affecting, or relating to the agreement or any applicable Federal or state law.

5. GOVERNING DOCUMENTS

Applicable Documents: The implementation and execution of this agreement shall be in accordance with the requirements of the GOES-R Management Control Plan (MCP). The MCP will be drafted by the GOES-R Program Office and approved by NESDIS and GSFC within 90 days of the signing of this agreement. Authority to extend the 90-day period is jointly delegated to the Assistant Administrator, NOAA Satellite and Information Service (NESDIS AA) and to the NASA Chief Engineer; such authority will be exercised jointly by the NESDIS AA and NASA Chief Engineer.

Guidance Documents: Guidance for processes for this program will be derived from the NASA Procedural Requirements (NPR) 7120.5D as provided in the MCP. Although NPR 7120.5D and other NASA technical oversight processes are referenced throughout this MOU, all references to any such technical oversight processes or other processes throughout this MOU are specifically defined by the MCP and the express understanding of the parties hereto that the NESDIS, NOAA or DOC (as appropriate) will play an oversight role, or other specific roles as outlined in the MCP, in the application of those NASA processes to the GOES-R program. The GOES-R Flight Project will be managed in accordance with NPR 7120.5D, as specifically implemented by the MCP as needed and agreed to by both parties.

6. SPECIFIC DUTIES AND RESPONSIBILITIES

NOAA (NOAA includes DOC, NOAA and NESDIS throughout this MOU, unless specified otherwise) and NASA shall each provide sufficient personnel to support their program/project functions as specified in the approved MCP.

Consistent with Section 5 and standard NOAA and NASA practices, the parties agree to the following:

- A. NOAA and NASA shared responsibilities include:

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1. NOAA and NASA Administrators will meet at least annually and on an as needed basis to assess the status and progress of the program.
2. NESDIS and GSFC shall ensure the GOES-R MCP is completed and signed within 90 days of the signing of this agreement, unless extended in accordance with Paragraph 5.
3. NOAA and NASA will support an integrated program/projects approach with co-located program and project offices.
4. Systems Engineering and Integration (SE&I) will be a government led activity residing within the Program Office. The Program Systems Engineer (PSE) position will initially be staffed by NASA but NOAA will maintain significant involvement in the SE&I function. The parties to this MOU understand that the goal is to eventually transition the PSE position for SE&I from a NASA employee to a NOAA staffed employee.
5. NOAA and NASA will jointly establish a Standing Review Board in accordance with NPR 7120.5D.
 - a. Standing Review Board shall be co-chaired by NOAA and NASA
 - b. Standing Review Board purpose and membership will be coordinated between NOAA and NASA.
6. The Joint Mission Readiness Review.
7. The Joint Flight and Launch Readiness Reviews.
8. The program and projects will be executed in accordance with applicable NASA/GSFC and NOAA/DOC technical standards and practices as outlined in the MCP.
9. Management, reporting, and oversight of activities will be accomplished through both DOC/NOAA and NASA processes.
 - a. NOAA's Program Management Council (PMC) oversees the GOES-R Program, including the Flight and Operations Projects.
 - b. NASA's GSFC Center Management Council (CMC) oversees the activities, products, and performance of the GOES-R Flight Project and provides advice to NOAA regarding the activities, products, and performance of the GOES-R Operations Project.
10. Coordination of all GOES-R legislative actions, including congressional testimony and questions for the record; public affairs releases and educational; training; or other releases to industry or the public. NOAA retains lead agency status for all legislative efforts. NASA agrees to provide assistance to NOAA as requested.
11. NOAA and NASA agree to form a collaborative GOES-R Program contracting partnership to ensure effective and efficient support for all GOES-R Program and Project contract actions. NOAA and NASA Contracting Officers will retain full agency authorities and continue agency reporting responsibilities while operating in partnership with each other. The partnership intends to collaborate through the sharing of contracting staff resources for NOAA and NASA contracts, establish action approval levels for Program review, and operate within appropriate current or future NOAA/NASA processes, policies, and procedures.
12. For Program and Project Office operations the NESDIS and GSFC Chief Information Officers (CIOs) shall agree on procedures for any information technology (IT) issues affecting NOAA hardware, software, connectivity, or the

security of NOAA information. Procedures shall be in accordance with DOC and NASA policies, federal law, and other federal guidance.

- B. NOAA is ultimately responsible and accountable for overall success of the GOES-R program. Specific responsibilities include:
1. Decision authority for Key Decision Points as described in MCP. (Currently DOC)
 2. Decision authority for mission readiness, flight readiness and launch readiness.
 3. Decision authority for overall acquisition strategy. (DOC)
 4. Procurement, management, and execution of the Operations Project.
 5. Staffing for the senior leadership of GOES-R. NOAA designated key positions include:
 - a. System Program Director (SPD)
 - b. Deputy SPD
 - c. Program Control Lead
 - d. Operations Project Contracting Officer
 - e. Program Scientist
 - f. Deputy Flight Project Manager
 - g. Operations Project Manager.
 6. Perform program control functions as described in the MCP.
 7. Participate in the program systems engineering function and assume lead for this function in any transition from NASA to NOAA.
 8. Lead Program budget development for fiscal year and life cycle in accordance with DOC/NOAA processes based upon inputs from the projects and utilizing the processes described in the MCP.
 9. Participate in NASA acquisition and contract execution activities as identified in the approved acquisition strategy, including, at a minimum: The NESDIS AA will attend any Source Evaluation Board (SEB) briefings to the NASA Source Selection Official (SSO) concerning this acquisition or the source selection thereof.
 10. For award fee contracts, the GOES-R SPD will chair the Performance Evaluation Boards (PEB) for the spacecraft and major ground contracts and make recommendations to both the NOAA Fee Determination Official (FDO) and the NASA FDO in award fee determinations.
 11. Determine, in consultation with NASA, the composition and procedures for any Failure Review Board or Mishap Investigation Board for ground failures or mishaps at the major assembly level or any on-orbit failure that impacts Level I performance requirements. Flight Project Failure Review Boards or Mishap Investigation Boards shall be conducted in accordance with NASA procedures.
 12. Provide all briefs and interactions with the Executive and Legislative branches on GOES-R unless specifically delegated to NASA or specifically requested from NASA.
 13. Lead all international agreements and other partnership agreements external to NOAA/NASA relating to GOES-R.
 14. Develop and control the Level I requirements, Mission Requirements Document (MRD), and Concept of Operations (CONOPS).
 15. Develop and control the Program Plan and approval of the Project plans.

C. NASA responsibilities include:

1. Procurement, management, and execution of the Flight Project.
2. Staffing GOES-R senior leadership positions including:
 - a. Assistant SPD
 - b. Flight Project Manager
 - c. Deputy Operations Project Manager
 - d. Program Mission Assurance Lead
 - e. Program Systems Engineering Lead
 - f. Flight Project Contracting Officer
3. Provide project budget requirements to the program.
4. Provide standard NASA technical oversight resources pursuant to the MCP.
5. NASA GSFC is responsible for Program and Project mission assurance management and infrastructure.
6. As specifically described in the MCP and provided as in Section 5 to this MOU, NASA GSFC is responsible for the Technical Authority process including leading technical reviews associated with the Technical Authority process.
7. As part of the SSO source selection briefing(s), the NESDIS AA will be afforded the opportunity to provide comments, and raise questions or concerns for the SSO to consider prior to selection.
8. For major elements of flight project award fee contracts, the NASA FDO shall brief NESDIS AA on decision and rationale.

7. COSTS

a. All activities under or pursuant to this agreement are subject to the availability of appropriated funds, and no provision herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 USC 1341.

b. Using the process and limitations set forth herein, NASA shall be reimbursed its actual, allowable and allocable direct and indirect costs for labor, contracted support services as well as facility and IT support for all Federal and support contractor personnel assigned to the GOES-R program and working at the GSFC facility. NASA has changed its approach to calculating full cost. It has eliminated separate rates for pools (IT, Facilities, Center G&A) and combined them into a larger Center Management and Operations overhead structure. For purposes of this agreement, reference to separate pools is maintained to provide traceability to the pre-negotiated agreement from March 2005. The parties agree to the following:

A. GSFC TECHNICAL MANAGEMENT:

1. FY07: Facilities and IT costs applicable to GSFC Tech Management are waived. Center G&A is applicable.
2. FY08: Facilities and IT costs applicable to GSFC Tech Management are applicable and shall be consistent with a separately negotiated NOAA/GSFC use permit.

B. NOAA GOES-R HOUSING:

1. FY07: Facilities and IT costs are applicable. Center G&A is waived.

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2. FY08: Facilities and IT costs are applicable and shall be consistent with a separately negotiated NOAA/GSFC use permit. Center G&A is waived.

C. NASA CORPORATE G&A:

1. NASA corporate G&A payments do not apply to this agreement

D. FY09 AND BEYOND

1. Funding for indirect support will be calculated to reflect the market value of services provided. The pricing applied will not result in reimbursable revenue that is in excess of the full cost of providing the work. Calculation of the market value will be consistent with guidance included in NASA Financial Management Regulations (FMR) Volume 16.

Criteria specified in this agreement for calculation of indirect costs are applicable only to the GOES-R Program Support agreement. Any agreements for new work beyond the GOES-R series will be separately developed consistent with NASA policy for reimbursable activities.

Funding from NOAA for the total estimated value of this agreement is not presently available and is subject to receipt of sufficient annual appropriations and quarterly apportionments. Funding for this agreement will be documented in the Level I requirements document which will be finalized as a part of the Department of Commerce KDP-C/D process. When funding becomes available, NOAA will issue an order in accordance with the following paragraph. Accordingly, the parties agree that NOAA is not obligated to transfer funding to cover the full value of this agreement, nor is NASA obligated to perform services that exceed the cumulative amount of funds actually transferred through orders issued against this agreement. Details of these procedures and the associated documents will be explained in the MCP.

NOAA will issue orders for products and services according to standard NOAA procedures. The detailed procedures will be described in the MCP. NOAA and NASA will agree upon the type and extent of work required consistent with the acquisition strategy and other management control plans; the cumulative amount of funds obligated and made available; and the estimated period of performance covered by the funding. Detailed procedures and requirements concerning NASA billing and NOAA reimbursements shall be in accordance with standard NOAA and NASA operating procedures.

8. REPORTING REQUIREMENTS

Timely and comprehensive financial, programmatic, and technical reporting to NOAA and NASA management is essential to ensure mission success. Both parties commit to complete transparency on all aspects of the GOES-R program.

At a minimum, the projects shall provide the following regarding their GOES-R activities to the SPD:

- A. Monthly status review reports.

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- B. Monthly Contract Cost Performance Reports, including Earned Value Management data, for all contracts executed in support of GOES-R except as agreed to by the SPD.
- C. Quarterly Contract Cost Funds Status Reports for all contracts executed in support of GOES-R except as agreed to by the SPD.
- D. Monthly Contract Action Reports for all contracts. Specific content shall be coordinated with the SPD.
- E. Additional technical and programmatic data as requested by the SPD on an *ad hoc* basis.

At a minimum, the program and projects shall provide the following regarding their GOES-R activities:

- A. Monthly Status Reviews to NOAA PMC. Specific content shall be coordinated with the SPD.
- B. Quarterly Status Reviews to DOC.
- C. Monthly Status Reviews to GSFC CMC and, if requested, to the appropriate NASA HQ PMC.
- D. Reports as required to fulfill information resource investment management and information security requirements.

The format and content for these Status Reviews from the program and projects shall be coordinated by the SPD, with GSFC Monthly Status Review (MSR) reporting meeting at least the minimum reporting requirements of the GSFC CMC.

DOC, NOAA, and NASA management shall be invited to participate in each others' management reviews of GOES-R activities.

9. CONTROL OF GOVERNMENT OWNED PROPERTY

NOAA requires identification and tracking of all property acquired using its funds as described in the MCP.

10. RELEASE OF TECHNICAL AND PUBLIC INFORMATION INCLUDING DATA ACCESS AND UTILIZATION

All scientific and technical data developed or otherwise obtained or produced shall be shared between the parties to this agreement. All contracts and agreements entered into by each party shall ensure there is no restriction on the sharing of data between NOAA and NASA. It is the responsibility of the party producing the data to ensure that any restrictive markings associated with third party access to data or information is included with such data/information when provided to the other party. Support contractors having properly executed a non-disclosure agreement and having no conflict of interest shall also be entitled to view such data/information subject to the discretion of the party managing the contract.

Each party is responsible for complying with the terms of restrictive markings that may be placed on data or information. To the extent that data or information is properly released, appropriate

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credit shall be given to NOAA and NASA as may be specifically directed in the approval for public release.

11. LIABILITY

Each party agrees to assume liability for its own risks associated with activities undertaken in this agreement.

12. BUILDING OPERATIONS, MAINTENANCE, AND PROTECTION

GSFC managers shall allocate sufficient work space, including class A office space, at NASA's GSFC facility, in accordance with the GSFC-NOAA use permit, for all GOES-R program office badged government and on-site support contractor personnel. NOAA will reimburse NASA for any product or service considered in excess of those normally provided for GSFC programs of similar scope and cost. As a minimum, support will include:

- A. Facility management, security protection including badges for on-site personnel, and maintenance of the premises occupied by the GOES-R Program Office.
- B. Access to all GSFC common-use areas including library, health unit, fitness unit, cafeteria, and parking and use of the GSFC motor pool and other transportation services in accordance with normal GSFC regulations. Certain areas, such as the health and fitness units and the motor pool, are restricted to civil servant use only.
- C. IT systems support and maintenance for all personal computers and other equipment at a priority level commensurate to other GSFC programs of equivalent magnitude.
- D. Facility maintenance and unscheduled repair services in accordance with GSFC regulations.

NOAA agrees that all GOES-R permanent program office personnel will comply with all GSFC facility regulations, security procedures, safety and environmental regulations, and training requirements.

13. RESOLUTION OF DISAGREEMENTS

Nothing in this agreement is intended to conflict with current DOC or NASA directives. If the terms of this agreement are inconsistent with existing directives of either of the offices entering into this agreement, those portions of this agreement which are determined to be inconsistent shall be invalid, but the remaining terms and conditions not affected by the inconsistency shall remain in full force and effect. At the first opportunity for review of this agreement, all necessary changes will be accomplished either by an amendment to this agreement or by entering into a new agreement, whichever is deemed expedient to the interests of both parties. Should disagreement arise about the interpretation of the provisions of this agreement or amendments and/or revisions thereto that cannot be resolved at the operating level, the area(s) of disagreement shall be stated in writing by each party and presented to the other party for consideration. If an agreement on interpretation is not reached within thirty (30) days, the parties shall forward the written presentation of the disagreement to respective higher officials for appropriate resolution. Disagreements concerning programmatic issues that cannot be resolved by the GOES-R SPD shall

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be documented in writing and elevated to the NESDIS Assistant Administrator and the GSFC Director for resolution. Failing resolution at that level, the issue shall be elevated to the signatory positions to this agreement and successively higher positions as necessary for final resolution.

14. DURATION OF AGREEMENT

This agreement will become effective when signed by all parties and will remain in effect throughout the life of the GOES-R program.

The NESDIS Assistant Administrator and the GSFC Director will review the agreement annually to determine if it should be revised, renewed, or canceled. This review can be combined with the preparation of annual project spend plans. Proposed revisions to the succeeding year's agreement shall be provided to the other party one month prior to the end of the fiscal year.

15. AMENDMENT AND TERMINATION

Amendments to this agreement shall be in writing and are subject to the mutual agreement of the parties.

This agreement may be terminated at any time by either party; the terminating party must provide advanced written notice to the other party three hundred and sixty-five (365) calendar days prior to termination. In the event of termination of this agreement by NOAA, NOAA shall reimburse NASA for costs associated with this termination, including the termination costs for terminating contracts entered into by NASA pursuant to this agreement and costs necessary for the orderly closeout of activities under this agreement. In the event of termination of this agreement by NASA, NASA shall bear the costs associated with this termination, including the termination costs for terminating contracts entered into by NASA and NOAA pursuant to this agreement and any costs necessary for the orderly closeout of activities under this agreement.

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APPENDIX C: PRODUCT MATURITY FOR GATEWAY REVIEWS

The product maturity matrix for each KDP / Program Gateway / Project Entrance Review is shown below:

| Gate | KDP I | Project Entrance B | Project Entrance C | KDP II | Project Entrance D | Program Gateway III | Program Gateway IV | Project Entrance E | Program Gateway V | Project Entrance F |
|--------------------------------------|-------|--------------------|--------------------|------------------|-------------------------------|-------------------------------|-------------------------|-----------------------------|--------------------|--------------------|
| | | Segment Concept | Project Baseline | Program Baseline | Project Integration Readiness | Mission Integration Readiness | Mission Readiness Board | Launch/Operations Readiness | Handover Readiness | Disposal Readiness |
| Document | | | | | | | | | | |
| CONOPS | P | F | U | U | U | U | U | U | | |
| TRL Assessment | P | | U | F | U | | | | | |
| Continuity of Operations | D | | P | | | | U | F | | |
| Configuration Mgt Plan | F | | | | | | | | | |
| Risk Mgt. Plan | F | | | | | | | | | |
| IT Security Checklist | P | | | F | | U | | | | |
| Systems Engineering Mgt. Plan | F | | | | | | | | | |
| Level 1 Requirements | F | | U | U | | | | | | |
| Integrated Master Schedule | P | P | F | U | | | | | | |
| Software Management Plan | | P | F | | | | | | | |
| Staffing Plan | P | | F | U | | | | | | |
| Facility Plan | P | | F | U | | U | | | | |
| NASA/NOAA MOU | F | | | | | | | | | |
| Mission Assurance Plan | P | | F | | | | | | | |
| Mission Requirements Document | F | | U | U | U | | | | | |
| Mission Level Interface Requirements | P | | F | U | | | | | | |
| Test, Cal/Val Mgt Plan | D | | P | P | F | U | | | | |
| Verification and Validation Report | | | | | | | U | F | | |
| CARD | P | | F | U | | | | | | |
| Program / Project Estimates | P | | F | U | | | | | | |
| Independent Cost Estimate | F | | U | U | | | | | | |

| | | | | | | | | | | |
|------------------------------------|---|---|---|---|---|--|---|---|---|---|
| Management Control Plan | F | | | U | | | | | | |
| Project Plans | P | | F | | | | | | | |
| Integrated Independent Review Plan | F | | | | | | | | | |
| Document Tree | F | | | U | | | | | | |
| Acquisition Plans | F | | | | | | | | | |
| OMB Exhibit 300 | U | | U | U | U | | U | U | | |
| WBS | F | | | | | | | | | |
| Export control plan | | P | F | U | | | | | | |
| Environmental Mgt. Plan | P | | F | U | | | | | | |
| Segment Level Requirements | P | P | F | | | | | | | |
| Data Management Plan | D | | P | F | | | | | | |
| Mission Ops Plan | | | P | | F | | | | | |
| Pre-launch Safety Package | | | P | | F | | U | U | U | |
| Operations Handbook | | | | | P | | U | F | U | |
| Orbital Debris Assessment | | I | P | | F | | | | | |
| Disposal Plan | | | | | P | | | | P | F |
| As-Built documentation | | | | | | | U | F | | |
| D-Draft | | | | | | | | | | |
| P - Preliminary | | | | | | | | | | |
| F - Final | | | | | | | | | | |
| U- update | | | | | | | | | | |

APPENDIX D: GOES HISTORY

Over the past four decades, environmental stewardship agencies have stated a need for near continuous, timely, high quality observations of the Earth and its environment. As an example, for rapidly changing severe storms (such as hurricanes and storms that produce flash floods, tornadoes or hail), frequent observations of weather phenomena that produce and guide such storms are essential to provide adequate tracking and warning.

The successful development and operation of the spin scan cloud camera on ATS-1 and of a similar camera on ATS-3 (launched in 1967) led to the decision to proceed with an operational system for meteorology. NASA developed the new spacecraft system and built two prototypes, called Synchronous Meteorological Satellites, SMS-1 and SMS-2. They were launched in May 1974 and February 1975. Three identical versions funded by NOAA, GOES-1, -2, and -3, were launched in October 1975, June 1977, and June 1978. The primary sensor on all five satellites was the Visible Infrared Spin Scan Radiometer (VISSR).

GOES-4-7 introduced an improved VISSR, the VISSR Atmospheric Sounder (VAS), which gathered the standard VISSR image data and also took measurements of the atmosphere, enabling meteorologists to acquire temperature and moisture data profiles. GOES-7, launched in 1987, was the last spinner-type geosynchronous satellite. It inaugurated the use of geosynchronous satellites for international search and rescue efforts.

Five satellites, GOES-1 through GOES-M, were ordered in the GOES-I series. The design of the GOES-I series represented a major step forward from previous GOES satellites due to the use of separate imagers and sounders with much higher temporal and spatial resolution, more channels and more precise measurements. The GOES I-M satellites incorporate the use of a 3-axis stabilized spacecraft bus allowing continuous observations.

Three additional satellites, GOES-N, -O, and -P (designated the GOES-N series), have been procured subsequent to the GOES-I series. While operating essentially the same set of instruments, the major difference between the GOES-I series and GOES-N series is in the area of navigation and the inclusion of the Solar X-Ray Imager on all satellites (versus only the GOES-M satellite on the previous series). The GOES-I series uses an earth reference system while GOES-N series employs a stellar inertial system.

The GOES-R series of satellites is the newest generation of NOAA's geosynchronous environmental satellites. The GOES-R series represents another major step in providing remotely sensed environmental data. In addition to temporal and spatial improvements, GOES-R instrumentation will provide significant advances in the quality and quantity of remotely sensed environmental data.

GOES-R Series ERA

The National Environmental Satellite, Data, and Information Service (NESDIS) is preparing for the procurement of the GOES-R series. This new series advances the instrument technology of GOES satellites by several decades and introduces new space and ground technology. These technological advances will improve our Nation's ability to monitor and forecast weather, environmental and space phenomena. It will provide a greater than three-fold increase in the types of products produced. GOES-R will expand the nation's capability to acquire, process and disseminate to central processing centers and direct users, environmental data on an extensive spatial range (global, regional, and local) within a variety of time scales (minutes to days). Examples of these include global imagery; cloud and precipitation parameters; atmospheric profiles of temperature, moisture, wind, aerosols and ozone; surface conditions concerning ice, snow, and vegetation; ocean parameters of sea temperature, color and state; solar and in-situ space environment conditions. This data is critically needed for:

- Severe storm watches and warnings
- Tropical cyclones
- Hydrologic forecasts
- Forecasts of the ocean structures
- Solar and space environment forecasts
- Aviation and marine forecasts
- Forecasts of ice conditions
- Seasonal and inter-annual climate forecasts
- Architecture studies for monitoring of climate variability
- Assessment of long-term global environmental change
- Environmental air quality monitoring and emergency response
- Detection and analysis of fires and volcanic eruptions

The GOES-R series acquisition includes five different environmental instrument suites, spacecraft and launch services, ground systems, and the end-to-end systems integration to support GOES-R design, fabrication, testing, launch, and operations.

Instrument development was initiated early for all five instruments for formulation of design and risk mitigation/ reduction activities. These instruments are: (1) Advanced Baseline Imager (ABI); (2) Hyperspectral Environmental Suite (HES); (3) Solar Imaging Suite (SIS); (4) Space Environmental In-Situ Suite (SEISS); (5) Geostationary Lightning Mapper (GLM) and (6) Magnetometer (MAG). Instrument efforts began in 2001 with the award, by NASA for NOAA, of three firm fixed price (FFP) PDRR contracts for the ABI. FFP PDRR contracts for the HES and SIS were awarded in FY04, SEISS was awarded in FY05, and GLM was awarded in FY06. A cost plus contract for ABI A&O contract was awarded by GSFC in FY04. HES development was discontinued in 2006.

The GOES-R program completed the Program Definition and Risk Reduction (PDRR) phase with three developer contractor teams completing a series of studies to refine system requirements and architectural design. In December 2006, NOAA decided to split the procurement (Acquisition and Operations (A&O) phase) into Space and Ground segment contracts, led by the NASA Flight Project and NOAA Ground Segment Project respectively. The A&O contract awards are expected in 2008, with a first launch readiness expected in December 2014.