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THE NATIONAL POLAR-ORBITING OPERATIONAL ENVIRONMENTAL SATELLITE SYSTEM: OVER BUDGET AND BEHIND SCHEDULE, OPTIONS TO MOVE FORWARD

HEARING

BEFORE THE

SUBCOMMITTEE ON DISASTER PREVENTION AND PREDICTION

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

MARCH 30, 2006

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ONE HUNDRED NINTH CONGRESS

SECOND SESSION

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THE NATIONAL POLAR–ORBITING OPERATIONAL ENVIRONMENTAL SATELLITE SYSTEM: OVER BUDGET AND BEHIND SCHEDULE, OPTIONS TO MOVE FORWARD

THURSDAY, MARCH 30, 2006

U.S. SENATE,
SUBCOMMITTEE ON DISASTER PREVENTION AND PREDICTION,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met, pursuant to notice, at 11:15 a.m. in room SD–562, Dirksen Senate Office Building, Hon. Jim DeMint, Chairman of the Subcommittee, presiding.

STATEMENT OF HON. JIM DEMINT, U.S. SENATOR FROM SOUTH CAROLINA

Senator DEMINT. Good morning. I want to thank the witnesses and everyone who's here.

I'm Jim DeMint. And I think, like most Americans, and probably most Members of Congress, I have never heard of the National Polar-orbiting Operational Environmental Satellite System until I started working with this committee. But, clearly, the more I learn about it, the more important I realize that it is. It will provide a better forecast for our coastal communities for hurricanes and other weather events, and, because of the collaboration with the military, could provide crucial information to warfighters with new environmental awareness.

But, unfortunately, as all of you know, the reason we're here today, is that the program is at least 25 percent over budget, 3.5 million over the initial cost estimates at this point. We're months behind schedule. And, perhaps most importantly, in the middle of this delay, a satellite failure could lead to a 3-year gap in weather observations. So, what do we tell our coastal communities when, and if, this happens? And what do we tell soldiers, if we don't have a complete picture of the battlefield.

I came to Washington to fight excessive spending while ensuring essential services were provided. Weather prediction is a crucial government service, but cost overruns like this one reaffirm my conviction that Washington doesn't have sufficient respect for the Federal taxpayer.

It's my understanding, at this point, NOAA has refused to discuss how they'll handle the cost growth. And it appears that the delay is being blamed on the military Nunn-McCurdy process. Actually, it's getting very confusing and cloudy to me as to exactly

where we are. If NOAA doesn't come up with a plan that doesn't put the taxpayer on the hook for even more errors and delays, you know, we have some decisions we need to make in this committee.

South Carolina, particularly, has a number of military personnel, and we also have a lot of coastal area vulnerable to hurricanes, so it's an important issue for us. I know it is for Alaska, as well.

Before I introduce our witnesses, I would ask the Chairman if he'd like to make an opening statement.

STATEMENT OF HON. TED STEVENS,
U.S. SENATOR FROM ALASKA

The CHAIRMAN. Well, thank you very much, Senator DeMint. Jim, I thank you for holding this hearing.

And I've got to tell the witnesses, I've got too many conflicts here this morning. I want to stay and listen to part of the discussion. So, I ask you to put my statement in the record. It's not very long.

[The prepared statement of Senator Stevens follows:]

PREPARED STATEMENT OF HON. TED STEVENS, U.S. SENATOR FROM ALASKA

Thanks, Jim, for holding this hearing. I am very concerned about the NPOESS program. Costs have almost doubled and the Government Accountability Office now estimates a total price tag for this project at almost $10 billion.

I am sure all of you know that budgets are tight this year, especially NOAAs, and polar-orbiting satellites are absolutely critical to weather forecasting and monitoring in Alaska. The way I see it now, Alaska is in a lose/lose situation. NOAA's wet programs are also critical to Alaska, and if budgeted money gets redirected from NOAA's wet programs into satellites, we will take the biggest hit.

Both the government and contractors need to work on getting this program on track. I look forward to your testimony.

The CHAIRMAN. But I'm sure you know that Alaska is, sort of, the weather factory, with the prevailing winds we get. What happens up our way is absolutely important to the rest of the world, and particularly to the United States. But this concept, now, it's critical to Alaska. Jim's heard me say it, and everybody's heard me say it too many times—75 percent of our communities can be reached only by air. We're absolutely totally dependent upon weather prediction for safety and survival. So, I really think this is a necessary project for us. But I join Senator DeMint in saying, I don't understand how this price tag of this system has gone up to $10 billion.

So, I look forward to hearing your testimony. I'll have to run when I have to run, but I thank you very much.

Senator DEMINT. Thank you, Mr. Chairman. We will make sure your testimony is part of the record.

And, while other members are not here at this point, we will make it important, because that type of price tag becomes very important to all Members of Congress.

We have one panel appearing before the Subcommittee this morning, including the government agencies responsible for overseeing the program, the program's prime contractor, and the Government Accountability Office.

Appearing for the Air Force is Deputy Under Secretary of the Air Force for Space Programs, Gary Payton. Mr. Payton will discuss the importance of satellite observations to the warfighter as well as summarize the Air Force's work to control the costs on these pro-

grams, and their plan for proceeding after the Nunn-McCurdy review.

Appearing for NOAA is Mr. Greg Withee, Assistant Administrator of NOAA for Satellite and Information Services. He will be discussing the agency's efforts to manage the cost of the program. Mr. Withee will hopefully also discuss how his agency plans to absorb any additional costs of the program that may result out of the Nunn-McCurdy review.

Appearing on behalf of Northrop Grumman, the program's prime contractor, is Mr. David Ryan, Vice President and Program Manager. Mr. Ryan will present an overview of the prime contractor's management of the program, discuss what problems they have encountered in the past, detail what lessons they have learned from previous problems, and measures they have implemented to ensure that they do not experience similar problems in the future.

Finally, appearing for GAO is Mr. David Powner, Director of Information Technology Management Issues at the office. Mr. Powner will provide a review of the office's oversight of the program. Additionally, he will discuss the concerns he has with the measures implemented by the contractor and the government to contain costs and to ensure timely completion of the project. He will also hopefully discuss any concerns he has in the partnership between the two agencies, going forward.

So, we will begin with you, Mr. Withee, and just proceed across the panel. And if we can keep our statements to 5 minutes, I would greatly appreciate it.

Mr. Withee?

STATEMENT OF GREGORY W. WITHEE, ASSISTANT ADMINISTRATOR FOR SATELLITE AND INFORMATION SERVICES, NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

Mr. WITHEE. Thank you. Good morning, Chairman DeMint, Senator Stevens.

I'm Greg Withee, the Assistant Administrator for NOAA's Satellite and Information Service. I appreciate the opportunity to discuss—and it's a mouthful—the NOAA National Polar-orbiting Operational Environmental Satellite System, commonly referred to as NPOESS, with you today. We appreciate the Committee's interest and support of NOAA's programs.

Satellites provide an unparalleled capability to take images and precise measurements of land, sea, and air. Although their payoff is great, developing satellites is an inherently challenging and risky endeavor. Not only is rocket science involved, but its instruments must be sensitive enough to measure very small environmental differences, and yet strong enough to withstand the extreme vibrations of launch and the harsh space environment.

Since the 1960s, the United States has operated two separate environmental polar-orbiting programs, a military system managed by the Air Force, and a civil satellite system managed by NOAA. In 1994, President Clinton directed the merger of these military and civil polar satellite programs.

The program was designed as series—the new program—excuse me—NPOESS, is to be the next generation of polar satellites. The program was designed as a series of 6 satellites, each having up to 13 instruments, several of which represent significant advances over current technology. The new NPOESS sensors will provide higher-quality data to both civilian and military users, and support such missions as improved forecasting and warnings.

NPOESS is a unique program in the Federal Government. It is jointly managed by NOAA, Air Force, and NASA. NOAA is responsible for the operations after launch. The Air Force is responsible for systems acquisition. And NASA provides technology infusion. Direct funding for the program is jointly provided, and equally provided, by NOAA and the Air Force.

The program is overseen by an executive committee, so-called EXCOM, of senior leaders of the three agencies. And an integrated Program Office staffed by the three agencies is responsible for managing the NPOESS program.

In 2002, Northrop Grumman was selected as the NPOESS prime contractor, and they are responsible for the development, production, and operation of the NPOESS program.

NPOESS is a complex environmental satellite program, which has numerous technical, developmental, integration, and management challenges. In the mid-2004, during the initial testing phase, Northrop Grumman encountered significant problems that showed potential design deficiencies and manufacturing-process shortfalls, with the visible—here's another long phrase—visible infrared imager radiometer suite. The short name is VIIRS. It's an instrument on the NPOESS program.

On March 31, 2005, Northrop Grumman communicated to the Program Office that it would not be able to meet the overall NPOESS cost and schedule baselines due to problems encountered with the development of sensors—specifically, this instrument, VIIRS. The early technical challenges, which are typical for complex developmental efforts, have been resolved for most of the sensors. However, this instrument, VIIRS, and another instrument, called the conical microwave imager sounder, CMIS, continued to require close management and oversight, and continued to threaten increases in cost and schedule.

The challenges facing the NPOESS are serious, and the tri-agency team is working to contain cost growth, limit schedule delays, and reduce risk. As a result of an extensive review process, significant changes have been made in the overall management of the NPOESS program.

The Program Office team has been realigned to strengthen its management of the NPOESS acquisition. The government is also in the process of approving a permanent independent management oversight office, which would be led by Brigadier General (select) Sue Mashiko, a proven program director. Colonel Dan Stockton was also approved as a new NPOESS Program Office Director. They're both with me, sitting behind me, today.

Northrop Grumman has assigned a new NPOESS program manager, Dave Ryan, who's testifying today. And Raytheon has brought in a new team for their senior management of the instrument.

DOD is now chairing a Nunn-McCurdy certification process for the NPOESS program, based on the analysis that the program is likely to exceed the 25-percent threshold. NOAA and NASA are active participants in all aspects of this complex certification process, which includes careful examination of program requirements, alternatives, costs, and management.

In conclusion, Mr. Chairman, NOAA and its partners are committed to overcoming the technical and management challenges, and to continue to provide uninterrupted satellite data to support mission-critical activities. And we know, Senator Stevens, how important these satellites are to Alaska.

To fulfill this commitment, NOAA will reevaluate its fiscal and programmatic priorities at the completion of the Nunn-McCurdy process in June. Once these priorities are established, we will work with Congress to ensure we have your support of NOAA's plan for moving forward.

Thank you for the opportunity to speak with you today, and I'm prepared to take any questions you may have.

[The prepared statement of Mr. Withee follows:]

PREPARED STATEMENT OF GREGORY W. WITHEE, ASSISTANT ADMINISTRATOR FOR SATELLITE AND INFORMATION SERVICES, NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

Chairman DeMint, Senator Nelson, and committee members, I appreciate the opportunity to discuss with you the National Polar-orbiting Operational Environmental Satellite System (NPOESS). I am Gregory W. Withee, Assistant Administrator for Satellite and Information Services, within the National Oceanic and Atmospheric Administration's (NOAA's) National Environmental Satellite, Data, and Information Service (NESDIS).

NOAA's Satellite Programs

Satellites provide an unparalleled capability to take images and precise measurements of many aspects of vast areas of the land, sea, and air in very rapid succession. Data obtained from these observing systems are essential to our ability to understand and predict changes in the Earth's environment, and to conserve and manage coastal and marine resources. These data are key enablers to NOAA in meeting its public safety, economic, and environmental mission requirements.

NOAA currently manages two major satellite programs: the Geostationary Operational Environmental Satellite (GOES) and Polar-orbiting Operational Environmental Satellite (POES) programs. GOES satellites provide the kind of continuous monitoring critical to our short-range weather forecasts and increase our ability to monitor and predict extreme weather events, including tropical and severe storms. GOES satellites orbit the Earth in a geosynchronous orbit, which means they orbit the Earth at a speed matching the Earth's rotation. This orbit allows them to provide continuous coverage over the western hemisphere. POES satellites orbit over the poles of the Earth, providing global imagery and atmospheric measurements several times a day. Polar data are used around the world for weather monitoring and prediction and are the foundation for global weather models needed for longer-range forecasts. Data and information products from both the GOES and POES programs have many applications contributing to societal benefits, including disaster prevention, prediction, and monitoring, global vegetation analysis, and climate and ocean research. Both types of satellites also help to save lives by receiving and relaying search and rescue beacon signals to appropriate emergency and search and rescue officials.

What is the National Polar-orbiting Operational Environmental Satellite System (NPOESS)?

Since the early 1960s, the United States has maintained two distinct polar satellite programs, one for military use and one for civilian use. While data from both programs were exchanged, each program operated independently. In 1994, after a multi-year review concluded that civilian and military requirements could be satis-

fied by a single polar satellite program, President Clinton directed the merger of the two programs into one—NPOESS. This program was designed as a series of six satellites, with a maximum of three operating at any given time (one in an early morning orbit, one in a mid morning orbit, and one in an early afternoon orbit). Under the NPOESS program, 13 different instruments will be placed in various configurations depending on the satellite's designated orbit. Several of these sensors represent significant advances when compared to current technology.

The new NPOESS sensors will provide higher quality data, increase our ability to see through clouds, and beam the information back more often than current polar satellites. Satellites provide over 90 percent of the data used in weather forecasting models. The new NPOESS sensors will translate into more sophisticated weather models, which will lead to better forecasts and warnings. NPOESS will also enhance the data and products used for climate and ocean research and operations as well as monitoring space weather.

The program also includes a risk reduction component—the NPOESS Preparatory Project (NPP). The NPP was designed to test several of the new sensors in space and to ensure that the ground control systems work properly before launch of the first operational NPOESS satellite. Additionally, the NPP should allow us time to assimilate the new data sets into the computer weather models and other applications before NOAA needs to use them operationally. Finally, the NPP should ensure continuity of certain climate records as some of the satellites maintained by the National Aeronautics and Space Administration (NASA) reach the end of their end of lives. As planned, NASA acquires and builds the NPP spacecraft, launch vehicle and one of the four sensors. The NPOESS program provides the other three sensors, the ground system, and the data archive capability.

How is NPOESS Managed?

Per a Presidential Decision Directive and the resultant Memorandum of Agreement among DOC, Department of Defense (DOD), and NASA, NPOESS is managed jointly by these three agencies, with direct funding provided by DOC and DOD. At the senior level, this program is overseen by an Executive Committee (EXCOM). On this committee, Vice Admiral Conrad C. Lautenbacher, Jr., Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator represents DOC; Dr. Ronald Sega, Under Secretary of the Air Force, represents DOD; and Dr. Michael Griffin, NASA Administrator, represents NASA. The EXCOM meets several times a year to review progress toward achieving cost, schedule, and performance baselines. The EXCOM also approves program plans, budgets, and policies and ensures agency funding commitments are equitable and sustained.

To assist the EXCOM, a Tri-agency Steering Committee consisting of individuals from the three agencies, meets monthly. This group acts on our behalf as a senior level management review body, recommends actions to the EXCOM, and provides guidance to the Integrated Program Office (IPO). A Senior Users Advisory Group (SUAG), comprised of primary U.S. Government users, operates independently of the IPO and reviews, adjudicates, and recommends NPOESS requirements for agency validation and subsequent Joint Agency Requirements Council (JARC) approval.

The IPO, under the direction of a System Program Director, is responsible for the planning, budgeting, development, acquisition, launch operation and management of the NPOESS program. NPOESS is principally being acquired using DOD acquisition authorities, and the main U.S. Air Force contract is managed by the IPO. In 2002 Northrop Grumman Space Technology (NGST) was selected as the NPOESS prime contractor for spacecraft development, ground systems, sensor integration, and operations. Contracts for some sensors were awarded before the prime contract but were subsequently transitioned to Northrop Grumman.

Recent History of NPOESS

NPOESS likely is the most complex environmental satellite program ever developed. The NPOESS program presents numerous technical, developmental, integration, and management challenges.

The ground system is on budget and on schedule.

Technical challenges have occurred in several of the sensor development efforts. Of the sensors, the two that have experienced the most serious development and manufacturing problems are the Conical Microwave Imager/Sounder (CMIS) and the Visible Infrared Imager Radiometer Suite (VIIRS).

CMIS will provide all-weather sounding and imaging capability to see through the clouds. While work continues on CMIS, it is still in its initial design phase. Early problems included meeting design performance within weight constraints. We believe these technical issues are being resolved. Furthermore, we are incorporating

the lessons learned from the VIIRS experience into our management approach to CMIS.

VIIRS will provide the information used in many of the critical environmental data records and is the key imaging sensor delivering most of the atmospheric cloud and surface information products needed by weather forecasters. In mid-2004 during the initial testing phases, we encountered significant problems that showed potential design deficiencies and manufacturing process shortfalls. In late 2004, a cooling unit on the sensor, which is critical to its operation, failed during testing. These problems prompted a complete review of the sensor design, development, and management. At the time, we believed the cost and schedule delays would be limited to NPP.

On March 31, 2005, however, NGST communicated to the IPO that it would not be able to meet overall NPOESS cost and schedule baselines due to the problems encountered with the development of VIIRS. NGST formally notified the government by letter on May 19, 2005.

Actions the Government Has Taken to Address the Problems

The problems facing NPOESS are serious and we are working to contain cost growth, limit schedule delays, and reduce risk. Significant changes have been made in the overall management of the NPOESS program to improve the effectiveness of both government and contractor oversight.

Since the resignation of the NPOESS System Program Director in September 2005, Brigadier General (select) Sue Mashiko served as interim System Program Director. She has been reviewing the IPO staffing to ensure that it matches the program's needs for management and engineering oversight of the program and NPOESS contractors. Additionally, she developed an Interim Program Plan for FY 2006 which included changing the development cycle of the VIIRS Engineering Data Unit and Flight Unit from concurrent to serial and rebaselined milestones. Funding has been allocated among key development efforts (VIIRS, Conical Scanning Microwave Imager/Sounder, Spacecraft, etc.), in accordance with the new milestones. Colonel Dan Stockton was approved by the EXCOM as permanent System Program Director on March 14, 2006.

The IPO has maintained an on-site presence at the contractor's facilities and at Raytheon (the subcontractor for VIIRS) since the VIIRS problems were discovered. In terms of personnel, NGST has assigned a new NPOESS Program Manager, and Raytheon has brought in a new senior team for sensor management.

The EXCOM initiated two independent reviews of the program, one to look at the problems of VIIRS impacting NPP and another, the Independent Program Assessment (IPA), to examine the overall NPOESS program. These review teams helped us to better understand what has gone wrong with the program and more fully explore the various options for moving forward. The review teams explored reducing sensor requirements, reducing the number of NPOESS satellites and relying on other satellite systems to provide some of the requirements. At the same time, the EXCOM worked with the SUAG to understand how any changes made to capabilities might impact users.

In addition to the independent program reviews, the EXCOM asked the DOD's Cost Analysis and Improvement Group (CAIG) to provide an independent analysis of several IPA cost and schedule estimates. This group is made up of acquisition and technical experts who can help provide further confidence in the cost estimates that are being discussed for both the current NPOESS program and other options.

Nunn-McCurdy Process

In September, reviews and preliminary cost estimates led the Administration to conclude that there was a reasonable expectation that the cost to produce each satellite unit was likely to rise at least 15 percent. This triggered the notification requirement in the Nunn-McCurdy Amendment. Then Acting Secretary of the Air Force, Pete Geren, notified Congress on September 28, that the 15 percent threshold had been breached. Subsequent to that notification, the Administration continued to work to bring the program and cost growth under control.

In accordance with Title 10 U.S.C. § 2433 (Nunn-McCurdy) and based upon information received from the interim NPOESS System Program Director, Secretary of the Air Force Michael Wynne notified Congress on January 11, 2006, that he had reasonable cause to believe the NPOESS Program Acquisition Cost (PAUC) and Acquisition Procurement Unit Cost (APUC) will exceed the 25 percent certification threshold against its Acquisition Program Baseline.

The Under Secretary of Defense for Acquisition, Technology and Logistics (USD (AT&L)) has directed a full Nunn-McCurdy review requiring the NPOESS program

to receive a written certification to be presented to Congress. The certification must answer positively to the following questions:

1. Is the acquisition program essential to national security?
2. Are there no alternatives to such acquisition program which will provide equal or greater military capability at less cost?
3. Are the new estimates of the program acquisition unit cost or procurement unit cost reasonable?
4. Is the management structure for the acquisition program adequate to manage and control the program, acquisition unit cost, and procurement unit cost?

Under the leadership of USD (AT&L), DOD has convened four working groups to address these criteria. NOAA and NASA have accepted the invitation to participate as full partners in all four working groups. All of the previous products and program reviews have been made available to the Nunn-McCurdy working groups for their consideration. NOAA, NASA, and DOD have all made staff available to assist in the expeditious conclusion of this process, which can be no later than June 2006.

Conclusion

NPOESS is a very complex acquisition program that will greatly enhance and increase our Nation's capabilities in weather forecasting and in other important environmental research areas. We are working very hard to overcome the technical and management challenges that have occurred, and we believe that viable options to rationalize the program and move forward exist. Before we make any major decisions, however, we expect to have the information from the ongoing Nunn-McCurdy process no later than June 2006.

Thank you for the opportunity to speak with you today. I am prepared to answer any questions you have.

Senator DEMINT. Thank you, Mr. Withee.

Mr. Payton?

STATEMENT OF HON. GARY E. PAYTON, DEPUTY UNDER SECRETARY OF THE AIR FORCE FOR SPACE PROGRAMS, U.S. AIR FORCE

Mr. PAYTON. Mr. Chairman, Senator Stevens, I'm honored to appear before you today to address the state of the NPOESS program. I'll shorten it.

Since 1994, the program has experienced setbacks, most recently culminating in a Nunn-McCurdy notification to Congress, back on the 11th of January. Per the Nunn-McCurdy statute that governs DOD acquisition programs, when a program director has reasonable cause to believe that the cost of the program has gone up by 25 percent, then a service Secretary must notify Congress, and a certification process must begin.

Mr. Ken Krieg, the Under Secretary of Defense for Acquisition, Technology, and Logistics, is leading an interagency evaluation of NPOESS that will evaluate the program against four questions. And these four questions are in the legislation, the Nunn-McCurdy legislation: Is NPOESS essential to national security? Is there an alternative to the current program that can do as good, or better, job for less, or the same, cost? Are the new cost estimates for the program reasonable? And, finally, is the management structure of the program adequate to control future cost growth?

Mr. Krieg, from the start of the Nunn-McCurdy process, has demanded a very inclusive process. We have integrated product teams that are working against all four of those questions. And NASA and NOAA are full participants in each of those four IPTs to address those four questions.

At each of the interim meetings, reviews that Mr. Krieg has chaired, he has invited Dr. Griffin, from NASA, and Admiral Lautenbacher, from NOAA, to participate alongside him during his interim progress reviews of the IPT work that's been going against those four questions.

On or before the 6th of June, the interagency process will report back to Congress with the results of the Nunn-McCurdy analyses and the answers to those four questions.

I have to emphasize the importance of polar-orbiting weather satellites. Polar-orbiting platforms provide over 90 percent of the raw data that is used in both civil and military digital models that we use to predict the weather. Any gap in coverage has serious consequences for the Department of Defense. We are dedicated to eliminating any gap in continuity. Data continuity is our top priority.

The DOD is responsible for weather forecasting on a global basis, helping our military operations and the intelligence community. We have to predict weather even in areas that are denied to us, where there is unavailable data, or where, even if there is data, it might be inaccurate. We need data on cloud cover, temperature, and water vapor profiles, soil conditions, sea conditions, sea ice coverage, and even the extent of the aurora. All of this has to have the necessary spatial resolution to support our critical military operations.

I appreciate the continued support of Congress and this committee to deliver vital capabilities to our warfighters and to support our global mission. I look forward to working with you as we refine the requirements of this polar-orbiting environmental satellite, and ensure that we have the forecasting and remote sensing capabilities our fighting forces need.

[The prepared statement of Mr. Payton follows:]

PREPARED STATEMENT OF HON. GARY E. PAYTON, DEPUTY UNDER SECRETARY OF THE AIR FORCE FOR SPACE PROGRAMS, U.S. AIR FORCE

Introduction

Mr. Chairman and members of the Committee, I am honored to appear before you today to address the state of the National Polar-Orbiting Operational Environmental Satellite System (NPOESS). In my role of assisting the Under Secretary of the Air Force in his roles of oversight of National Security Space activities and as the Department of Defense (DOD) Executive Agent for Space, I can confidently say that the Air Force is committed to preserving the space capabilities that our commanders, forces, and the Intelligence Community depend on to conduct their missions. I am pleased that this committee shares that commitment, and I'm confident that we will be able to work together to provide space-based solutions to our national security needs.

NPOESS Status

The NPOESS Integrated Program Office (IPO), made up of DOD, Department of Commerce (DOC), and National Aeronautics and Space Administration (NASA) personnel, was formed in December 1994, in response to the President's direction to converge the DOD and DOC polar satellite systems: the Defense Meteorological Satellite Program (DMSP) and the Polar-orbiting Operational Environmental Satellite (POES), respectively. Per the 1995 Memorandum of Agreement that established the agency roles and responsibilities regarding the execution of the NPOESS program, an Executive Committee (EXCOM) was established as the management body that establishes policy guidance, ensures agency staffing, approves the program budget, approves the acquisition program baseline and any changes that occur to that baseline. The ability of our agencies to meet the intent of the Presidential directive rests

heavily on the interagency partnership that exists within the EXCOM structure and its successful management of the NPOESS program.

Since inception in 1994, the program has experienced several setbacks, culminating in the Nunn-McCurdy notification to Congress on 11 January 2006. We notified Congress that the NPOESS cost has grown at least 25 percent. Per the Nunn-McCurdy statute that governs DOD acquisition programs, when the program director has reasonable cause to believe the cost of the program has grown 25 percent or greater, then a service secretary must notify Congress of the cost growth and a certification of the program must take place. The OSD Office of Acquisition, Technology and Logistics headed by Mr. Ken Krieg is leading an interagency evaluation of the NPOESS program that will evaluate the program against the following four questions. Is NPOESS essential to national security? Is there an alternative that will provide capability equal or greater than NPOESS at less cost? Are the new cost estimates of Program Acquisition Unit Cost (PAUC) and Average Procurement Unit Cost (APUC) reasonable? Is the management structure in place adequate to control PAUC and APUC? Mr. Krieg, in consultation with the NPOESS Executive Committee (EXCOM), will report back to Congress no later than 6 June 2006 with the results of the Nunn-McCurdy analysis. As DOD, NOAA and NASA execute this rigorous process we are being extremely thorough in examining how to provide the weather phenomenology of today's low earth polar orbiting satellites and the improved sensing the NPOESS program can offer in the future.

Avoiding Coverage Gaps

I must emphasize the importance of the POES and Geostationary Operational Environmental Satellite (GOES) data to the missions of the Department of Defense and Intelligence Community. The atmospheric sounding and imagery data provided by these systems are critical to the accuracy of the U.S.'s numerical weather prediction models. Polar orbiting platforms provide over 90 percent of the data used in DOC and DOD prediction models, and building a follow-on program like NPOESS is critical for our Nation's weather forecasting capabilities. Any gap in coverage will have strong repercussions; the DOD is dedicated to provide, at a minimum, the current capabilities afforded to us today by the DMSP satellite constellation, albeit these capabilities of yesterday do not fulfill our future needs. As OSD executes the Nunn-McCurdy certification process, the requirements trade space will be thoroughly analyzed to ensure that the current capabilities provided to our operational military users, civil weather forecasters, the Intelligence Community and NASA climate scientist will be carried through to the restructured NPOESS program.

Conclusion

It would be hard to overstate the importance of environmental monitoring and weather prediction to the future of DOD and Intelligence Community weather forecasting. The DOD is responsible for weather forecasting for global military operations and the Intelligence Community, even in areas from which data are unavailable, denied, or purposely inaccurate. Presently, DMSP is the only assured source of data to accomplish that mission. It provides data on cloud cover, temperature and water vapor profiles, soil conditions, sea conditions, sea ice coverage, auroral extent, and provides the necessary spatial resolution to support critical military operations. It has the capability to register and report dust storms, valley fog, snow cover, smoke and volcanic plumes. Polar-orbiting satellites such as DMSP are critical because geostationary data offers lower spatial resolution and cannot cover latitudes higher than 50 degrees. Our current baseline requires the DMSP capabilities plus the ability to collect high-resolution precipitation measurements.

I appreciate the continued support of the Congress and this committee to deliver vital capabilities to our warfighters and to support the Global War on Terrorism. I look forward to working with you as we refine the requirements for our polar-orbiting platforms and ensure that we have the forecasting and remote sensing capabilities we need.

The CHAIRMAN. Mr. Chairman, again, I have to go, I'd like to ask just one question. What's the earliest time the gap could occur?

Mr. PAYTON. Sir, there are several satellites that NOAA and the Air Force have that have not yet been launched. We have the ability to choose which orbits those can go into. And so, depending on which orbit which satellite goes into, it is—it's very difficult to predict when the earliest possible gap might be.

The CHAIRMAN. Let me turn it around, then. The other side of the question is, What's the life of the existing system we rely on today?

Mr. PAYTON. The anticipated mission duration of a DMSP spacecraft is 4 years. Now, we—again, between NOAA and the Air Force, we need to fill three different orbits. And so——

The CHAIRMAN. They're filled now, right?

Mr. PAYTON. Yes, sir. Yes, sir.

The CHAIRMAN. I'm looking for the expiration date of those that are up there now.

Mr. WITHEE. Senator Stevens, if I may address that for NOAA's satellites, we have one remaining satellite on the ground. The satellite that's in that orbit now, nominal lifetime, should last until 2009, which would mean the one on the ground could last until 2013, roughly.

The CHAIRMAN. Thank you.

Thank you, Mr. Chairman.

Senator DEMINT. Thank you, Mr. Chairman.

Mr. Ryan, it seems that they're laying the blame of all this at your feet. So, I'm very interested in your testimony.

STATEMENT OF DAVID L. RYAN,
VICE PRESIDENT/NPOESS PROGRAM DIRECTOR,
NORTHROP GRUMMAN SPACE TECHNOLOGY

Mr. RYAN. Chairman DeMint, thank you for this opportunity to discuss the NPOESS program with you today.

My name is Dave Ryan. I'm the Vice President and NPOESS Program Director for Northrop Grumman Space Technology.

As you just heard from the Deputy Under Secretary of the Air Force for Space Programs, NPOESS will be critical to the safety of our men and women in uniform as they conduct their mission. On the civil side, our Nation is typically hit by ten tropical storms and three to four hurricanes a year. And, as you know, last year it was much, much worse than that, causing great loss of life to the country and well over $100 billion in damages.

When operational, NPOESS will significantly improve both weather forecasting and environmental monitoring, far surpassing any of the capabilities we have today. And it'll play a pivotal role in our ability to predict hurricanes and severe weather, such as tornados and drought. As an example, our analysis shows that for some hurricanes the data from the NPOESS system could actually decrease the probable landfall area of a hurricane by sometimes a factor of two; thus, avoiding unnecessary evacuations. The 5- to 7-day weather forecasts could be as accurate as today's 3-day forecasts, thus greatly helping fishing, farming, forestry, and many other industries. Its advanced systems will be able to tell the difference between frozen and just water-soaked soils in the higher latitudes, which will give us much greater insight into issues like climate-change impacts. Its unique communications architecture will be able to get the data down in just 15 minutes, typically, from when it has been sensed onboard the satellites. This is a five to tenfold improvement over what we have today. This capability will truly be a lifesaving capability once it's on orbit.

Northrop Grumman is the prime contractor for NPOESS, so we are responsible for overall system design, integration, and performance. We're supported by a broad range of the Nation's aerospace industry. Some 70 percent of the program is subcontracted, with approximately 1,400 people supporting the program in 15 States.

The program is currently in the Nunn-McCurdy certification process, as you have heard. And, as the prime contractor, we stand accountable for moving this program forward in a cost-effective manner. We're supporting the multi-agency teams assembled by the Department of Defense to define the optimum path forward. And during this certification, we are actually making very good progress on the development of the system right now. We are currently on budget and ahead of schedule to the 2006 interim plan that has now been put in place.

The current program situation can be traced to four significant causes that have both increased cost and schedule. Number one is sensor development. Design, manufacturing, and quality problems at some of the sensor suppliers has caused more than 80 percent of the growth on the program to date. Some of those sensors also grew in weight and power, which impacted the spacecraft design. And, number three, as these costs increased, they then bumped up against the fiscal year constraints on the program and caused other work to be delayed. And, finally, number four, this past fall we were asked to estimate the program at what's called a high-confidence level, consistent with the Nunn-McCurdy process. In forecasting a high-confidence-level program, additional risk-reduction activities were put in, along with additional schedule.

Northrop Grumman and our contractor team have responded to these issues, and have incorporated the lessons learned over the last couple of years, and a document of these lessons learned has actually been provided to your committee, sir. Now I'll summarize a few of those points.

We've made significant changes on the program organization and staffing. I was brought on to lead the program in October. I have 29 years of experience in this industry and have built and managed over 64 satellites and satellite systems. Similarly, I have a very strong NPOESS leadership team that reports to me, with an average of 28 years of experience each, doing similar kinds of programs. My deputy is the vice president, who, before he took the job on the program, was responsible for all subcontract management at Northrop Grumman Space Technology. And now on the program he's responsible for supplier performance.

Both in our space segment payload and also our leads in the payload area, we have better aligned talents for this critical phase of the program. And we have done very similar organizational changes at some of the subcontractors.

Specifically, we have intervened at the VIIRS subcontractor by placing specialists onsite to resolve significant technical, cost, and schedule issues. We have also placed additional staff at other sensor subcontractors to do the same thing. And they've—consistently have done extensive process and design audits to make sure that those subcontractors are on track. One example is, we worked with the CMIS subcontractor to make sure that we stabilized the weight and power of that sensor. And now, the weight and power has been

stable for well over a year, which has allowed the spacecraft design to move forward efficiently.

We have also performed independent executability reviews, both internally and at our subcontractors, and are applying those findings throughout the program. As a result, the program performance in this plan for 2006 is now on track, and key milestones are being completed on, or ahead of, schedule. The performance at our suppliers has significantly improved. And, specifically, significant technical progress has been made at the VIIRS subcontractor.

Northrop Grumman, sir, takes this responsibility very seriously. Once deployed, NPOESS will save lives and greatly improve natural-disaster prediction. You have my personal commitment, and the commitment of Northrop Grumman, that we will do everything possible to make sure that this important mission is delivered to the Nation.

Thank you.

[The prepared statement of Mr. Ryan follows:]

PREPARED STATEMENT OF DAVID L. RYAN, VICE PRESIDENT/NPOESS PROGRAM DIRECTOR, NORTHROP GRUMMAN SPACE TECHNOLOGY

Chairman DeMint, Ranking Member Nelson and distinguished members of the Committee, thank you for the opportunity to discuss NPOESS, the National Polar-orbiting Operational Environmental Satellite System, with you today. My name is Dave Ryan, and I am Vice President and NPOESS Program Director for Northrop Grumman Space Technology.

As you know, the Nation is typically hit by over 10 tropical storms and 3 or 4 major hurricanes a year. Last year it was much worse-costing the country great loss of life and well over $100 billion.

NPOESS will be the Nation's space-based, low Earth orbiting weather and environmental monitoring system, serving both civilian and military needs in the next decades. The Nation currently obtains over 95 percent of its numerical weather forecasting data from satellite systems, and NPOESS will significantly improve our weather forecasting, far surpassing current capabilities. Weather predictions will typically be available within just 15 minutes of the satellite observation—a five to ten-fold improvement over current comparable systems.

NPOESS will be the system the Nation relies on for measuring atmospheric conditions, ocean waves, and will play a pivotal role in providing more precise advance warning of hurricanes and other adverse weather conditions. NPOESS will empower our armed forces with real-time environmental information essential for their mission success and personal safety. Significantly improved imagery will improve mission planning and weapons deployment. NPOESS will monitor climate and environmental changes and will be the system that we rely on to measure ozone in the atmosphere, the sun's irradiance, and the earth's radiation balance. NPOESS also will monitor space weather—a mission essential for support to commercial and military communications.

Disaster prevention and relief will benefit significantly from NPOESS. The system will provide targeted mapping of fire sources, even at night; more detailed data on floods to help rescue crews and relief planning efforts. NPOESS will carry search and rescue receivers to aid rescue workers in their ability to locate and rescue stranded hikers, hunters, and boaters. And in hurricane season, NPOESS will be able to much more accurately pinpoint the areas of severest weather, track wind direction and speed, and indicate safety zones for hurricane hunter aircraft. Lives and property will be saved, thus reducing the financial impacts of these disasters on the American people and industries such as fishing, farming, coastal commerce, and insurance, just to name a few.

Northrop Grumman is the prime contractor for NPOESS, and we are responsible for overall system design, integration, and for performance of the system. We are supported by a broad range of the Nation's aerospace industry. More than 70 percent of the NPOESS program is subcontracted and a big part of our effort is managing those subcontracts. We and our subcontractors have approximately 1,400 people working on the program in 15 states.

The program is currently in the Nunn-McCurdy certification process, and as prime contractor, we stand accountable for moving the program forward in a cost-effective manner. We are supporting multi-agency teams assembled by the Department of Defense to help define the optimum path forward, and during this certification process, we are also making very good progress on development of the system. We are currently ahead of schedule and on budget to the FY 2006 plan.

Following the outcome of the Nunn-McCurdy process, we expect to receive specific instructions from our customer on how to restructure this very large and complex program. In the meantime, we are working to a detailed 2006 Interim Program Plan that provides a firm foundation for forward progress.

The current program situation can be traced to four causes. (1) After being awarded the contract in August 2002, Northrop Grumman observed hardware design, manufacturing, and quality problems at some of the sensor suppliers. These problems led to significant cost and schedule overruns. Sensor cost growth accounts for approximately 80 percent of the current program cost growth. (2) Some sensors also grew significantly in weight and power. This growth in turn impacted our spacecraft design, and its cost and schedule. (3) In addition to the delays caused by the sensor issues, the program schedule was further lengthened when the increased costs bumped up against fiscal year funding constraints. This caused work to be delayed and further increased forecast cost. (4) Finally, this Fall we were asked to forecast program costs, assuming a high confidence program. Typically in the past, space development programs have forecasted costs at the equally likely probability. In forecasting a high confidence program, additional cost was forecasted to cover unknown problems that might arise in the future.

Northrop Grumman and our contractor team have responded to resolve the underlying issues that led to the requirement for Nunn-McCurdy certification. Northrop Grumman has intervened at the Visible Infrared Imaging Radiometer Suite (VIIRS) subcontractor by placing our specialists onsite to resolve significant technical, cost and schedule problems. We have also placed additional staff at other subcontractors, and have performed extensive audits. For example, we worked with the CMIS subcontractor to stabilize weight and power. This sensor's weight and power have now been stable for over a year, allowing the spacecraft design to move forward efficiently.

Significant changes have also been made in the program organization and staffing. We have a very senior NPOESS leadership team with an average of 28 years experience on similar programs. A Northrop Grumman Vice President, responsible for supplier performance, has been assigned as my deputy. Both our space segment and payload leads have been changed to better align talents with the current phase of the program. We have also performed independent executability reviews both internally and at our subcontractors and are applying the findings of those reviews throughout the program.

Let me give you a specific example from the VIIRS program, a sensor that has experienced significant technical, cost and schedule problems. Northrop Grumman intervened and re-located 10 specialists to be onsite at the subcontractor's facility to proactively assist them through the design and development process. The team has comprehensively reviewed their processes and their detailed design and has implemented corrective action across the subcontractor's engineering, manufacturing, quality, and management disciplines.

This intervention is paying off. The VIIRS subcontractor is currently ahead of the FY 2006 schedule and has recently successfully completed some very important development unit environmental tests. The unit is meeting all of its key performance requirements and passed its vibration testing, a key test for this instrument. The sensor's passive cooling system, which consists of a cryo-radiator and other passive cooling elements, demonstrated better than required performance during recent thermal vacuum testing.

The development unit is now being readied for sensor-level thermal vacuum testing. Success in these thermal vacuum tests will further increase our confidence in this sensor.

Lessons learned from our experience with problematic sensor developments are now being applied across the program and are as follows:

1. The Nation's supply base for sophisticated, operational, environmental sensors is fragile, and prime contractors must understand the capabilities of the supply base and proactively apply their own expertise to support the sensor provider.

2. Dependence on heritage is often overstated and primes must challenge and verify such claims.

3. Northrop Grumman has now instituted the practice of performing subcontractor capability assessments of any development activity transferred to NGST. NGST now also audits the criteria, analysis, products, and action closure of the last major design review of any development subcontract transferred to NGST. If the review process and products are inadequate, the review will be repeated.

4. Northrop Grumman's subcontract management practice is being further strengthened. Managing the development and production of sophisticated, high-reliability hardware at a subcontractor is challenging. In addition to the technical and logistic demands inherent in such hardware, managing through contract language, across corporate cultures and differing corporate motivations, and over geography adds significantly to the challenge. Although the processes employed by NGST's subcontract teams are now very good, they did not prevent or rapidly resolve issues inherent in several of the sensor subcontracts transferred to NGST. NGST had believed the sensor suppliers were capable of solving development issues primarily by themselves and did not immediately intervene when problems arose. Although NGST did provide significant technical assistance both to the subcontractors and to their suppliers, this assistance did not initially address the underlying systemic issues quickly enough. Now a proactive team of experts intervene at the first sign of trouble.

5. The Young Panel's recommendation that space program costs be determined at a high confidence level from the beginning, rather than at a lower "most likely" level should be adopted across the industry, given the risks inherent in new, large development space programs and in the development of new state-of-the-art technologies that comprise these space systems.

As a result, NPOESS has achieved success in many fronts. The ground data-processing segment, terrestrial communications network, and much of the spacecraft design are moving smoothly through development, as are 10 out of the 13 sensors and communication payloads. Of the three sensors that we have had cost and schedule issues with in the past, currently all three are either on or ahead of the 2006 schedule plan. In June of 2005, we successfully completed the System delta Preliminary Design Review. This review confirmed the soundness of the overall technical design and confirmed that the system would achieve the required technical performance.

Northrop Grumman takes our responsibility very seriously as the prime contractor for this critical national asset. Once deployed, NPOESS will save lives and other precious national resources through greatly improved natural disaster prediction. You have my personal commitment and the commitment of Northrop Grumman that we will do everything possible to deliver this important mission to the Nation. Thank you.

Senator DEMINT. Thank you.

Mr. Powner?

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

Mr. POWNER. Chairman DeMint, we appreciate the opportunity to testify on NPOESS, a planned satellite system whose life-cycle costs will now exceed $10 billion.

NPOESS is critical to our Nation's ability to monitor changes in weather and the environment, and will play a key role in disaster prediction by forecasting hurricane direction and intensity.

Over the past several years, NPOESS has experienced significant cost overruns and delays, due, in part, to sensor development problems and poor contractor performance and program management. The future direction for the program is at a standstill, since cost growth exceeded a legislatively mandated threshold that now requires a thorough review by the Department of Defense.

This morning, as requested, I will summarize NPOESS's cost overruns and schedule delays, primary reasons for these problems, current status, proposed management changes, and our recommendations for additional action.

First, cost and schedule. Since 2004, we have seen NPOESS costs rise from about $7 to $10 billion. For the past 2 years, our analysis of contractor data consistently showed these worsening trends. The schedule for the launch of the first satellite has also been delayed further, and a potential gap in coverage continues to grow that now appears to be at least 3 years. We also noted last fall in testimony, Mr. Chairman, that key program risks, particularly the development of critical sensors, could further increase costs and delay schedules.

The reasons for NPOESS's problems are many, but primarily include issues with subcontractor and contractor performance, program management, and executive-level oversight. Expanding on each of these:

The VIIRS sensor development issues were attributed, in part, to the subcontractor's inadequate project management. In addition, the prime contractor was not effectively overseeing subcontractors. Independent reviews revealed that the program management office did not have technical systems engineering support to manage the contractor, and we have also faulted NPOESS executive-level leadership, because of inconsistent oversight that resulted in few decisions.

NPOESS's current status is on hold, pending a decision from the Nunn-McCurdy certification. The certification was legislatively required, because NPOESS overran its cost baseline by 25 percent. DOD has expanded the certification process to include input from NOAA and NASA, given the joint nature of the program.

Currently, this process includes evaluating options for the future of the program. These options include: reducing the number or function of NPOESS satellites, relying on European satellites, increasing costs, delaying planned launch dates, and canceling the program. A decision is expected to be announced in early June. If NPOESS proceeds forward, creating a new baseline and renegotiating contracts could take another year to complete.

As we await the decision of the certification process, development continues on two sensors. In addition, the NPOESS Program Office has initiated several key efforts to improve program management. These include increased staffing to improve contract and subcontractor oversight, increased presence of systems engineers on the development of the sensors, and a restructured Program Office to allow for clear decision-making and improved contractor oversight. These initiatives are steps in the right direction and will have to be effectively implemented if they are ultimately to result in better program performance.

In addition, our other key recommendations are:

One, NOAA and NASA representation in the Nunn-McCurdy process is imperative. Because this is a DOD process and decision, and because requirements differ across agencies, there is great risk that the chosen alternative could sacrifice NOAA and NASA requirements. Both agencies must remain active participants in the decision-making process.

Two, NOAA and DOD need to seriously consider contingency plans, since it is very clear that the Nunn-McCurdy review could result in canceling the program.

Three, if a decision is made to proceed forward with NPOESS, this program needs more frequent and more critical executive-level involvement over the Program Office.

And, four, NPOESS's management team needs to hold contractors accountable, which should include managing performance using financial incentives.

In summary, Mr. Chairman, we look forward to the June decision, so that our Nation's ability to monitor critical weather and environmental data for both civilian safety and key military operations has clear direction. A timely decision is critical, since any deviations from an NPOESS-like approach to fulfill the Nation's environmental data needs will have to occur quickly to avoid wasting taxpayers' dollars.

This concludes my statement, Mr. Chairman. Thank you for your leadership and oversight of this important acquisition.

[The prepared statement of Mr. Powner follows:]

PREPARED STATEMENT OF DAVID A. POWNER, DIRECTOR, INFORMATION TECHNOLOGY MANAGEMENT ISSUES, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

Mr. Chairman and members of the Subcommittee:

We appreciate the opportunity to participate in today's hearing to discuss our work on the planned National Polar-orbiting Operational Environmental Satellite System (NPOESS) program. NPOESS is expected to be a state-of-the-art environment-monitoring satellite system that will replace two existing polar-orbiting environment satellite systems. Polar-orbiting satellites provide data and imagery that are used by weather forecasters, climatologists, and the military to map and monitor changes in weather, climate, the oceans, and the environment. The NPOESS program is considered critical to the United States' ability to maintain the continuity of data required for weather forecasting (including severe weather events such as hurricanes) and global climate monitoring through the year 2020. Three agencies share responsibility for NPOESS: the National Oceanic and Atmospheric Administration (NOAA), the Department of Defense (DOD), and the National Aeronautics and Space Administration (NASA). To manage the program, these agencies established a tri-agency integrated program office. At your request, we will discuss the program's current status and plans, as well as considerations in moving the program forward.

This statement builds on other work we have done on environmental satellite programs over the last several years.[1] An overview of the approach we used to perform this work (our objectives, scope, and methodology) is provided in appendix I.

Results in Brief

The future direction of the NPOESS program—what will be delivered, at what cost, and by when—is currently on hold pending a decision on how to proceed. In recent years, the program has experienced significant cost increases and schedule delays, with cost estimates increasing to about $10 billion and launch delays approaching 3 years. These factors triggered the need for difficult decisions about the program's direction and capabilities. In mid-November 2005, we reported that the NPOESS executive committee expected to make a decision by December 2005 on the direction of the program. We noted the importance of making a decision quickly so that the program could proceed. However, in late November 2005, NPOESS cost growth exceeded a legislatively mandated threshold that requires DOD to certify the program to Congress. This placed any decision about future direction on hold until

[1] GAO, *Polar-orbiting Operational Environmental Satellites: Technical Problems, Cost Increases, and Schedule Delays Trigger Need for Difficult Trade-off Decisions,* GAO–06–249T (Washington, D.C.: Nov. 16, 2005); *Polar-orbiting Environmental Satellites: Information on Program Cost and Schedule Changes,* GAO–04–1054 (Washington, D.C.: Sept. 30, 2004); *Polar-orbiting Environmental Satellites: Project Risks Could Affect Weather Data Needed by Civilian and Military Users,* GAO–03–987T (Washington, D.C.: July 15, 2003); *Polar-orbiting Environmental Satellites: Status, Plans, and Future Data Management Challenges,* GAO–02–684T (Washington, D.C.: July 24, 2002); *National Oceanic and Atmospheric Administration: National Weather Service Modernization and Weather Satellite Program,* GAO/T–AIMD–00–86 (Washington, D.C.: Mar. 29, 2000); and *Weather Satellites: Planning for the Geostationary Satellite Program Needs More Attention,* GAO–AIMD–97–37 (Washington, D.C.: Mar. 13, 1997).

certification takes place in June 2006. In the meantime, the program office has implemented an interim plan to continue work on key sensors and other program elements using Fiscal Year 2006 funding. Following certification, a decision on future direction should be clear. That will require a new program baseline[2] and renegotiated contracts—efforts that could take up to a year.

As NPOESS undergoes the Defense certification process and important decisions are made on how the program is to proceed, there are several important considerations. First, NOAA and NASA representation in the DOD certification process is imperative. It will be important for these agencies to remain active players in the deliberation of options and the final decision on how to move the program forward. Second, continued indecision increases the risk of a gap in satellite coverage. NPOESS is the backup satellite for the final satellite in the predecessor satellite series. If this predecessor satellite were to fail, there could be a significant data gap until NPOESS is launched and operational. Thus, once a program direction is decided, it will be important to move quickly to adjust agency budgets and contracts. Third, continuing oversight of program and executive management is essential to avoid repeating past problems.

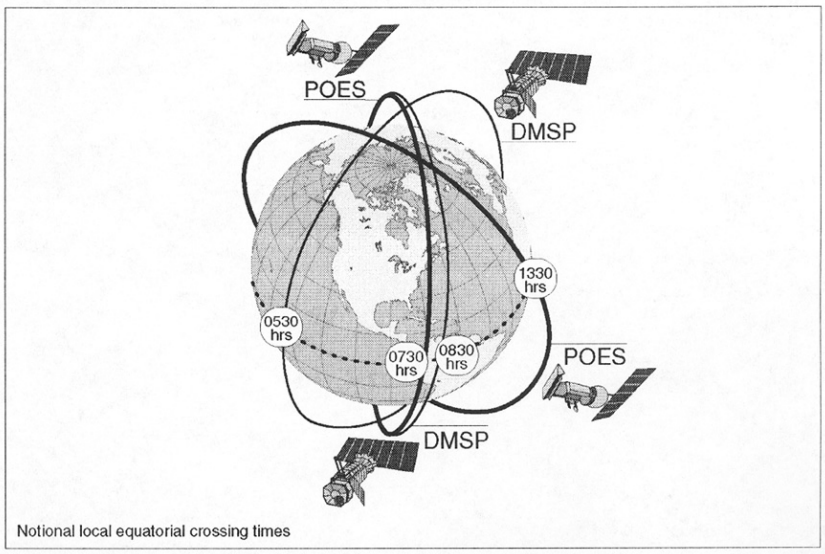
Background

Since the 1960s, the United States has operated two separate operational polar-orbiting meteorological satellite systems: the Polar-orbiting Operational Environmental Satellite (POES) series, managed by the National Oceanic and Atmospheric Administration (NOAA) and the Defense Meteorological Satellite Program (DMSP), managed by the Department of Defense (DOD). The satellites obtain environmental data that are processed to provide graphical weather images and specialized weather products and are the predominant input to numerical weather prediction models. These models are a primary tool for forecasting weather 3 or more days in advance, including forecasting the path and intensity of hurricanes. The models are used to predict the potential impact of severe weather so that communities and emergency managers can help prevent and mitigate their effects. Polar satellites also provide data used to monitor environmental phenomena, such as ozone depletion and drought conditions, as well as data sets that are used by researchers for a variety of studies, such as climate monitoring.

Unlike geostationary satellites, which maintain a fixed position above the earth, polar-orbiting satellites constantly circle the earth in an almost north-south orbit, providing global coverage of conditions that affect the weather and climate. Each satellite makes about 14 orbits a day. As the earth rotates beneath it, each satellite views the entire earth's surface twice a day. Currently, there are two operational POES satellites and two operational DMSP satellites that are positioned so that they can observe the earth in early morning, mid-morning, and early afternoon polar orbits. Together, they ensure that, for any region of the earth, the data provided to users are generally no more than 6 hours old. Figure 1 illustrates the current operational polar satellite configuration. Besides the four operational satellites, six older satellites are in orbit that still collect some data and are available to provide some limited backup to the operational satellites should they degrade or fail. In the future, both NOAA and DOD plan to continue to launch additional POES and DMSP satellites every few years, with final launches scheduled for 2007 and 2011, respectively.

[2] A program baseline is a plan for what will be delivered, when it will be delivered, and at what cost over the life of the program.

Figure 1: Configuration of Operational Polar Satellites



Source: GAO, based on NPOESS Integrated Program Office data.

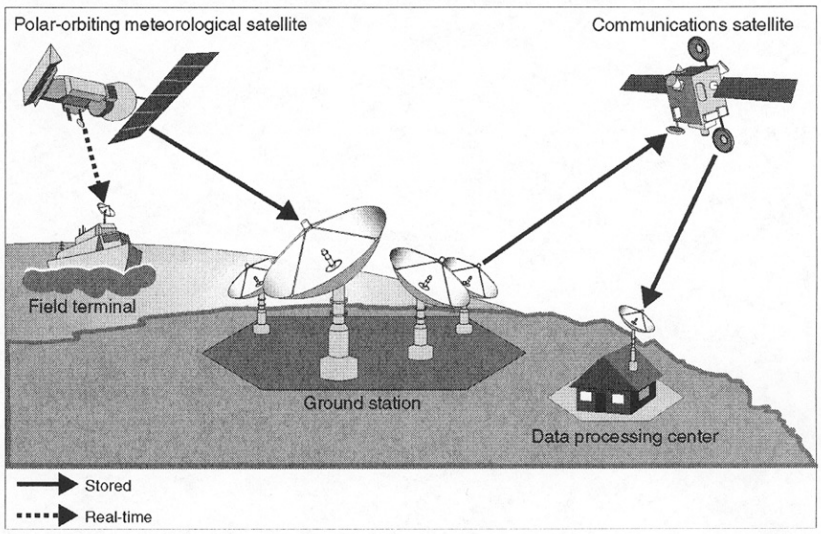
Each of the polar satellites carries a suite of sensors designed to detect environmental data that are either reflected or emitted from the earth, the atmosphere, and space. The satellites store these data and then transmit them to NOAA and Air Force ground stations when the satellites pass overhead. The ground stations then relay the data via communications satellites to the appropriate meteorological centers for processing. The satellites also broadcast a subset of these data in real time to tactical receivers all over the world.

Under a shared processing agreement among four satellite data processing centers—NOAA's National Environmental Satellite Data and Information Service (NESDIS), the Air Force Weather Agency, the Navy's Fleet Numerical Meteorology and Oceanography Center, and the Naval Oceanographic Office—different centers are responsible for producing and distributing, via a shared network, different environmental data sets, specialized weather and oceanographic products, and weather prediction model outputs.[3] Each of the four processing centers is also responsible for distributing the data to its respective users. For the DOD centers, the users include regional meteorology and oceanography centers, as well as meteorology and oceanography staff on military bases. NESDIS forwards the data to NOAA's National Weather Service for distribution and use by government and commercial forecasters. The processing centers also use the Internet to distribute data to the general public. NESDIS is responsible for the long-term archiving of data and derived products from POES and DMSP.

In addition to the infrastructure supporting satellite data processing noted above, properly equipped field terminals that are within a direct line of sight of the satellites can receive real-time data directly from the polar-orbiting satellites. There are an estimated 150 such field terminals operated by U.S. and foreign governments and academia. Field terminals can be taken into areas with little or no data communications infrastructure—such as on a battlefield or a ship—and enable the receipt of weather data directly from the polar-orbiting satellites. These terminals have their own software and processing capability to decode and display a subset of the satellite data to the user. Figure 2 depicts a generic data relay pattern from the polar-orbiting satellites to the data processing centers and field terminals.

[3] These environmental data sets, specialized weather and oceanographic products, and weather prediction model outputs are produced through algorithmic processing. An algorithm is a precise set of procedures that enable a desired end result, such as a measurement of natural phenomena.

Figure 2: Generic Data Relay Pattern for the Polar Meteorological Satellite System



Source: GAO, based on NPOESS Integrated Program Office data.

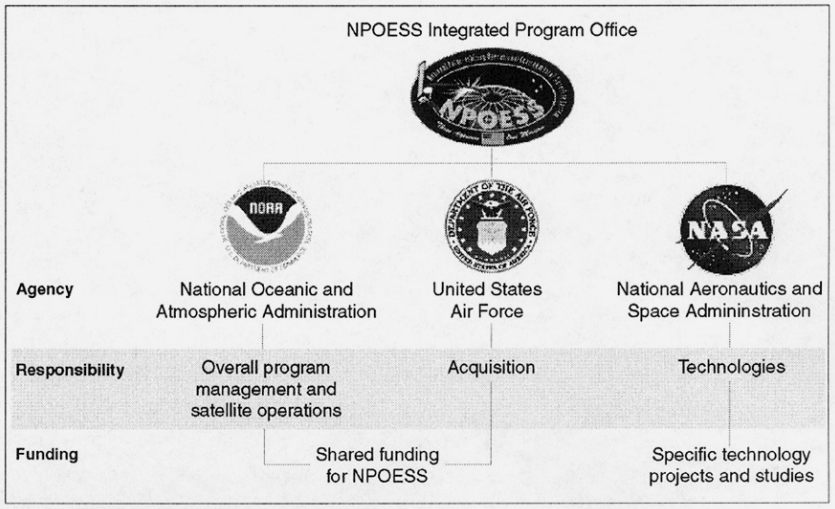
NPOESS Overview

With the expectation that combining the POES and DMSP programs would reduce duplication and result in sizable cost savings, a May 1994 Presidential Decision Directive[4] required NOAA and DOD to converge the two satellite programs into a single satellite program capable of satisfying both civilian and military requirements. The converged program, NPOESS, is considered critical to the United States' ability to maintain the continuity of data required for weather forecasting and global climate monitoring through the year 2020. To manage this program, DOD, NOAA, and NASA formed a tri-agency Integrated Program Office, located within NOAA.

Within the program office, each agency has the lead on certain activities. NOAA has overall program management responsibility for the converged system and for satellite operations; DOD has the lead on the acquisition; and NASA has primary responsibility for facilitating the development and incorporation of new technologies into the converged system. NOAA and DOD share the costs of funding NPOESS, while NASA funds specific technology projects and studies. Figure 3 depicts the organizations that make up the Integrated Program Office and lists their responsibilities.

[4] NSTC–2, May 5, 1994.

Figure 3: Organizations Coordinated by the NPOESS Integrated Program Office



Source: GAO, based on NPOESS Integrated Program Office data.

Current program acquisition plans call for the procurement and launch of six NPOESS satellites over the life of the program, as well as the integration of 13 instruments, consisting of 10 environmental sensors and 3 sub-systems. Together, the sensors are to receive and transmit data on atmospheric, cloud cover, environmental, climate, oceanographic, and solar-geophysical observations. The sub-systems are to support nonenvironmental search and rescue efforts, sensor survivability, and environmental data collection activities.

According to the program office, 7 of the 13 planned NPOESS instruments involve new technology development, whereas 6 others are based on existing technologies. In addition, the program office considers 4 of the sensors involving new technologies critical, because they provide data for key weather products; these sensors are shown in bold in table 1, which lists the planned instruments and the state of technology on each.

Table 1: Expected NPOESS Instruments

Note: Critical sensors in bold.

Instrument name	Description	State of technology
Advanced technology microwave sounder	Measures microwave energy released and scattered by the atmosphere and is to be used with infrared sounding data from NPOESS's cross-track infrared sounder to produce daily global atmospheric temperature, humidity, and pressure profiles.	New
Aerosol polarimetry sensor	Retrieves specific measurements of clouds and aerosols (liquid droplets or solid particles suspended in the atmosphere, such as sea spray, smog, and smoke).	New
Conical-scanned microwave imager/sounder (CMIS)	Collects microwave images and data needed to measure rain rate, ocean surface wind speed and direction, amount of water in the clouds, and soil moisture, as well as temperature and humidity at different atmospheric levels.	New
Cross-track infrared sounder	Collects measurements of the earth's radiation to determine the vertical distribution of temperature, moisture, and pressure in the atmosphere.	New
Data collection system	Collects environmental data from platforms around the world and delivers them to users worldwide.	Existing

Table 1: Expected NPOESS Instruments—Continued

Note: Critical sensors in bold.

Instrument name	Description	State of technology
Earth radiation budget sensor	Measures solar short-wave radiation and long-wave radiation released by the earth back into space on a worldwide scale to enhance long-term climate studies.	Existing
Ozone mapper/profiler suite	Collects data needed to measure the amount and distribution of ozone in the earth's atmosphere.	New
Radar altimeter	Measures variances in sea surface height/topography and ocean surface roughness, which are used to determine sea surface height, significant wave height, and ocean surface wind speed and to provide critical inputs to ocean forecasting and climate prediction models.	Existing
Search and rescue satellite aided tracking system	Detects and locates aviators, mariners, and land-based users in distress.	Existing
Space environmental sensor suite	Collects data to identify, reduce, and predict the effects of space weather on technological systems, including satellites and radio links.	New
Survivability sensor	Monitors for attacks on the satellite and notifies other instruments in case of an attack.	Existing
Total solar irradiance sensor	Monitors and captures total and spectral solar irradiance data.	Existing
Visible/infrared imager radiometer suite (VIIRS)	Collects images and radiometric data used to provide information on the earth's clouds, atmosphere, ocean, and land surfaces.	New

Source: GAO, based on NPOESS Integrated Program Office data.

In addition, the NPOESS Preparatory Project (NPP), which is being developed as a major risk reduction and climate data continuity initiative, is a planned demonstration satellite to be launched several years before the first NPOESS satellite is to be launched. It is planned to host three of the four critical NPOESS sensors (the visible/infrared imager radiometer suite (VIIRS), the cross-track infrared sounder, and the advanced technology microwave sounder), as well as a noncritical sensor (the ozone mapper/profiler suite). NPP will provide the program office and the processing centers an early opportunity to work with the sensors, ground control, and data processing systems. Specifically, this satellite is expected to demonstrate the validity of about half of the NPOESS environmental data records[5] and about 93 percent of its data processing load.

NPOESS Acquisition Strategy

NPOESS is a major system acquisition that consists of three key phases: the concept and technology development phase, which lasted from roughly 1995 to early 1997; the program definition and risk reduction phase, which began in early 1997 and ended in August 2002; and the engineering and manufacturing development and production phase, which began with the award of the development and production contract in August 2002 and will continue through the end of the program. Before the contract was awarded in 2002, the life cycle cost for the program was estimated to be $6.5 billion over the 24-year period from the inception of the program in 1995 through 2018. Shortly after the contract was awarded, the life cycle cost estimate was estimated to be $7 billion.

When the NPOESS development contract was awarded, program officials identified an anticipated schedule and funding stream for the program. The schedule for launching the satellites was driven by a requirement that the satellites be available to back up the final POES and DMSP satellites should anything go wrong during the planned launches of these satellites. In general, program officials anticipate that roughly 1 out of every 10 satellites will fail either during launch or during early operations after launch.

Early program milestones included: (1) launching NPP by May 2006, (2) having the first NPOESS satellite available to back up the final POES satellite launch in March 2008, and (3) having the second NPOESS satellite available to back up the

[5] Environmental data records are weather products derived from sensor data records and temperature data records.

final DMSP satellite launch in October 2009. If the NPOESS satellites were not needed to back up the final predecessor satellites, their anticipated launch dates would have been April 2009 and June 2011, respectively.

NPOESS Has Experienced Continued Cost Increases and Schedule Delays

Over the past several years, the NPOESS program has experienced a series of cost increases and schedule delays. In 2003, we reported that changes in the NPOESS funding stream caused a delay in the program's schedule.[6] Specifically, a DOD program official reported that between 2001 and 2002 the agency experienced delays in launching a DMSP satellite, causing delays in the expected launch dates of another satellite. In late 2002, DOD shifted the expected launch date for the final satellite from 2009 to 2010. As a result, the Department reduced funding for NPOESS by about $65 million between Fiscal Years 2004 and 2007. According to program officials, because NOAA is required to provide the same level of funding that DOD provides, this change triggered a corresponding reduction in funding by NOAA for those years. As a result of the reduced funding, program officials were forced to make difficult decisions about what to focus on first. The program office decided to keep NPP as close to its original schedule as possible, because of its importance to the eventual NPOESS development, and to shift some of the NPOESS deliverables to later years. This shift affected the NPOESS deployment schedule. To plan for this shift, the program office developed a new program cost and schedule baseline.

After this new baseline was completed in 2004, we reported that the program office increased the NPOESS cost estimate from about $7 billion to $8.1 billion, and delayed key milestones, including the planned launch of the first NPOESS satellite—which was delayed by 7 months.[7] The cost increases reflected changes to the NPOESS contract as well as increased program management funds. According to the program office, contract changes included extension of the development schedule, increased sensor costs, and additional funds needed for mitigating risks. Increased program management funds were added for noncontract costs and management reserves.

At that time, we also noted that other factors could further affect the revised cost and schedule estimates. Specifically, the contractor was not meeting expected cost and schedule targets on the new baseline because of technical issues in the development of key sensors, including the critical VIIRS sensor. Based on its performance through May 2004, we estimated that the contractor would most likely overrun its contract at completion in September 2011 by $500 million. In addition, we reported that risks associated with the development of the critical sensors, integrated data processing system, and algorithms, among other things, could contribute to further cost increases and schedule slips.

Most recently, in our November 2005 testimony, we noted that NPOESS schedules, costs, and trends had continued to worsen.[8] We reported that over the past year, NPOESS cost increases and schedule delays demonstrated worsening trends, and that there were continuing problems in the development of a key sensor, resulting in schedule delays and anticipated cost increases. We further noted that contractor data showed that costs and schedules were likely to continue to increase in the future. Our trend analysis at the time showed that the contractor would most likely overrun costs by $1.4 billion, resulting in a life cycle cost of about $9.7 billion, unless critical changes were made. We also noted that program risks, particularly with the development of critical sensors, could further increase NPOESS costs and delay schedules. At the November hearing, program officials confirmed that the program's life cycle cost estimate would likely grow to $10 billion unless critical changes were made to the program. Table 2 provides a summary of recent growth in program cost estimates.

As for schedule changes, in November 2005, we noted that the program office anticipated at least a 10-month delay in the launch of the first satellite (totaling at least a 17-month delay from the time the contract was awarded) and a 6-month delay in the launch of the second satellite. A summary of those schedule changes is shown in table 3. The effect of these delays is evident in the widening gap between when the last POES satellite is expected to launch and when the first NPOESS satellite could be available if needed as a backup. This is significant because if the last POES satellite fails on launch, it will be at least 3 years before the first NPOESS satellite could be launched. During that time, critical weather and

[6] GAO–03–987T.
[7] GAO–04–1054.
[8] GAO–06–249T.

environmental observations would be unavailable—and military and civilian weather products and forecasts could be significantly degraded.

Table 2: Changes in NPOESS Life Cycle Cost Estimates through November 2005

As of	Life cycle cost estimate	Life cycle range
July 2002	$6.5 billion	1995–2018
July 2003	$7.0 billion	1995–2018
September 2004	$8.1 billion	1995–2020
November 2005	$10 billion*	To be determined

Source: GAO analysis, based on Integrated Program Office data.
*Anticipated decisions on program direction are likely to affect this estimate.

Table 3: Changes in NPOESS Schedule Estimates as of November 2005

Milestones	As of August 2002 contract award	As of February 2004 (rebaseline)	As of August 2005	Net change from contract award	Minimum change from rebaseline	Potential data gap
NPP launch	May 2006	October 2006	April 2008	23-month delay	18-month delay	Not applicable
Final POES launch[a]	March 2008	March 2008	December 2007	4-month advance		Not applicable
First NPOESS satellite planned for launch	April 2009	November 2009	September 2010	17-month delay	10-month delay	Not applicable
First NPOESS satellite launch if needed to back up the final POES	March 2008	February 2010[b]	December 2010[c]	33-month delay		3-year data gap if final POES fails on launch
Final DMSP launch[a]	October 2009	May 2010	October 2011	24-month delay		Not applicable
Second NPOESS satellite planned for launch	June 2011	June 2011	December 2011	6-month delay	6-month delay	Not applicable

Source: GAO analysis, based on NPOESS Integrated Program Office data.
[a] POES and DMSP are not part of the NPOESS program. Their launch dates are provided because of their relevance to the NPOESS satellite schedules.
[b] A program official reported that if the first NPOESS satellite is needed to back up the final POES satellite, the contractor will prepare the satellite to be launched in a different orbit with a different suite of sensors. These factors will prevent launch from taking place until February 2010.
[c] If the first NPOESS satellite is needed to back up the final POES satellite, the contractor will prepare the satellite to be launched in a different orbit with a different suite of sensors, adding 3 months to the September 2010 launch date.

Problems involving multiple levels of management—including subcontractor, contractor, program office, and executive leadership—played a role in bringing the NPOESS program to its current state. For example, the VIIRS sensor development issues were attributed, in part, to the subcontractor's inadequate project management. Specifically, after a series of technical problems, internal review teams sent by the prime contractor and the program office found that the subcontractor had deviated from a number of contract, management, and policy directives set out by the main office and that both management and process engineering were inadequate. Neither the contractor nor the program office had recognized the underlying problems in time to fix them. After these issues were identified, the subcontractor's management team was replaced. Further, in January 2005, the NPOESS Executive Committee (EXCOM) called for an independent review of the VIIRS problems. This independent review, delivered in August 2005, reported that the program management office did not have the technical system engineering support it needed to effectively manage the contractor, among other things. We also reported that the involvement of NPOESS executive leadership had wavered from frequent heavy involvement to occasional meetings with few resulting decisions. Specifically, the EXCOM had met 5 times over the preceding 2 years. Most of these meetings did not result in major decisions, but rather triggered further analysis and review.

Sound management is critical to program success. In our reviews of major acquisitions throughout the government, we have reported that key factors determining a project's ability to be delivered on time, within budget, and with promised functionality include sound program management, contractor oversight, risk identification and escalation, and effective and timely executive level oversight.[9] Given the history of large cost increases and the factors that could further affect NPOESS costs and schedules, we reported that continued oversight, strong leadership, and timely decisionmaking are more critical than ever.

NPOESS Status and Plans: Decision on Program's Future Direction on Hold, Interim Efforts Under Way

The future direction of the NPOESS program—what will be delivered, at what cost, and by when—is currently on hold pending a decision on how to proceed. Over the last few years, NPOESS has experienced continued cost increases and schedule delays, requiring difficult decisions about the program's direction and capabilities.

In mid-November 2005, we reported that the NPOESS executive committee expected to make a decision in December 2005 on the direction of the program. This involved deciding among options involving increased costs, delayed schedules, and reduced functionality. We urged the Committee to make a decision quickly so that the program could proceed. However, in late November 2005, NPOESS cost growth exceeded a legislatively mandated threshold that requires the Department of Defense to certify the program to Congress. This placed any decision about the future direction of the program on hold until the certification takes place in June 2006.

In the meantime, the program office has implemented an interim plan to continue work on key sensors and other program elements using Fiscal Year 2006 funding. Following certification, a decision on future direction should be clear. That will require developing a new program baseline and renegotiating contracts—efforts that could take up to a year.

Nunn-McCurdy Process Puts Program Direction on Hold

The Nunn-McCurdy Act[10] requires DOD to take specific actions when a major system acquisition exceeds certain cost thresholds. Key provisions require the Secretary of Defense to notify Congress when a major defense acquisition is expected to overrun its project baseline by 15 percent or more, and to certify the program to Congress when it is expected to overrun its baseline by 25 percent or more. Certification is an assurance that:

- the program is essential to national security;
- there are no alternatives to the program that will provide equal or greater military capability at less cost;
- the new estimates of the program's cost are reasonable; and
- the management structure for the program is adequate to manage and control cost.

In August 2005, the NPOESS program office determined that it could not execute its planned program within the constraints of its current baseline and notified its executive committee. In turn, Congress was notified that the program was expected to overrun its baseline by 15 percent. Subsequently, in late November 2005, it was determined that at completion the final program cost would be greater than 25 percent over its baseline. At the beginning of January 2006, DOD notified Congress that NPOESS was expected to overrun its baseline by more than 25 percent and began the process of certifying the program.

The Nunn-McCurdy Act pertains to Defense acquisitions, but because NPOESS is a joint program, the certification process was expanded to include input from NOAA and NASA. Specifically, the Defense Acquisition Executive, who is responsible for the certification process, invited the NPOESS executive committee members to participate in the process, with principal stakeholders from each NPOESS partner agency serving as intermediaries between the executive committee members and working groups set up to address each of the four certification elements. Additionally, these working groups are made up of DOD, NOAA, and NASA personnel, as well as others (such as representatives of the NPOESS senior user advisory group) as warranted.

As part of the certification process, DOD is evaluating options for the future of the program. These options could include reducing the number or function of

[9] For example, *GAO, High-Risk Series: An Update,* GAO–05–207 (Washington, D.C.: January 2005) and *Major Management Challenges and Program Risks: Department of Transportation,* GAO–03–108 (Washington, D.C.: January 2003).

[10] 10 U.S.C. section 2433, as amended by Pub. Law No. 109–163, Div. A, section 802.

NPOESS satellites, relying on European satellites, increasing costs, delaying planned launch dates, or canceling the program. According to Defense officials, a decision is expected to be announced during the first week of June 2006. However, the completion of the certification process does not end the negotiations on this program. Any major cost changes will need to be worked into the respective agencies' budgets, and any major program changes will need to be worked into a new baseline describing what will be delivered by when and then negotiated with the contractor. According to program office officials, a revised baseline will likely take 6 to 12 months to develop and implement from the time a decision is made.

Program Office Has Interim Efforts Under Way

The NPOESS Integrated Program Office has several initiatives under way—both to improve its management of the program and to keep NPOESS sensor development moving forward—as it waits for completion of the Nunn-McCurdy process. To address concerns about program management that we and others have raised, the program office has:

- increased staffing of cost analysts and earned value management experts to improve contractor and subcontractor oversight;
- increased the presence of system engineers on sensor development initiatives;
- developed a proposal for restructuring the program office and overall satellite program to allow for clearer decision-making authority and more timely decisions; and
- taken steps to improve communications among the program office, tri-agency executives, and contractors.

These initiatives should help improve program management, but they are not yet fully implemented—and will not guarantee success. The proposed management changes still need to be approved, funded, and implemented. Further, NPOESS development is technically challenging. Thus, stringent oversight and risk management will continue to be important throughout the life of the project.

As for continuing sensor development, because any major changes to the program will not be known until the certification process is completed, the program office has implemented an interim plan to continue work on key sensors and other program elements within the Fiscal Year 2006 funding profile. Officials stated that they chose work activities that would be needed regardless of the option chosen for the future direction of the program.

Based on contractor-provided data, our analysis indicates that NPOESS is making mixed progress against the Fiscal Year 2006 interim plan. Between October 2005 and January 2006, the contractor outperformed its program cost and schedule targets and completed some unplanned work. However, the contractor continued to experience cost overruns on the development of its critical sensors—VIIRS and CMIS. The primary cost drivers were the extensive manpower beyond what was planned to resolve technical issues.

The development of VIIRS is of particular importance because it is to be demonstrated on the NPP satellite, which is currently scheduled for launch in April 2008. While CMIS is not part of NPP, its development is important because it is one of four critical sensors providing data for key weather products. Over the past year, work on CMIS was deferred in order to fund efforts to fix VIIRS and to keep NPP on schedule.

In November, we reported that VIIRS was experiencing continued problems dealing with the technical complexity of the ground support equipment. VIIRS also experienced problems with the development of the cryoradiator,[11] excessive vibration of sensor parts, and errors in the sensor's solar calibration. Since November, the program office has taken positive steps to contain these technical risks. In particular, VIIRS now has a baseline plan for serial development of the sensor design, an approach that is intended to minimize rework. The program office also added decision gates to provide management review and approval of progress.

We also reported in November on the problems experienced on CMIS. Specifically, CMIS continued to face technical challenges in the design of the receivers, the sensor structure, and the antenna calibration system. In addition, it experienced system reliability and thermal issues, among other things. Since November, work has been ongoing to simplify the CMIS design. These design changes are intended to reduce the weight of the CMIS structure by moving several subsystems from the in-

[11] The cryoradiator is a key component of the VIIRS sensor. It is intended to cool down components of the sensor.

strument onto the spacecraft. Additionally, the program office reported that the contractor has demonstrated that a complex component of the CMIS receiver is feasible.

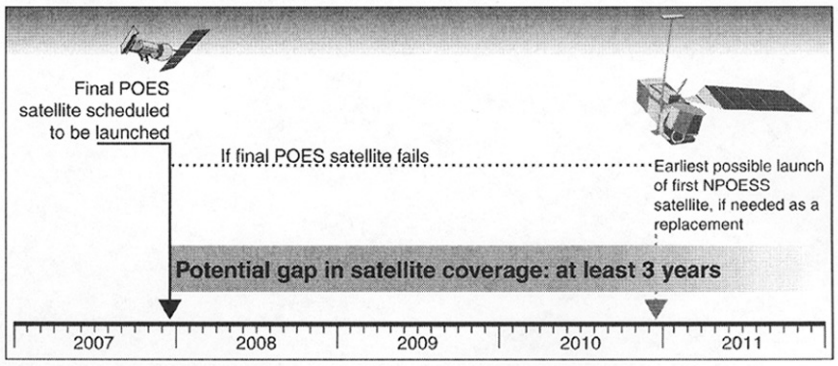
While positive measures have been taken in the development of both of these sensors, the program office continues to consider VIIRS to be a high-risk initiative because of technical challenges that it is facing. VIIRS is fast approaching a critical developmental milestone that will determine the extent of progress made. Specifically, a prototype is expected to begin thermal vacuum testing in summer 2006. This testing will assess the stability of the current sensor design. If the current design fails to meet its performance metrics, VIIRS could be in danger of falling further behind in cost and schedule. Program officials acknowledge that CMIS requires a watchful eye, but note that there is more time available to meet its development requirements. To the program office's credit, however, it is aware of these risks and is using its risk management plans to help mitigate them.

Considerations in Moving the NPOESS Program Forward

As NPOESS undergoes the Nunn-McCurdy certification process and important decisions are made on how the program is to proceed, there are several important considerations.

- *NOAA and NASA representation in the DOD Nunn-McCurdy certification process is imperative.* As a joint program, NPOESS is expected to fulfill many military, civilian, and research requirements for environmental data. Thus, it is important that all agency partners have a voice in the DOD proceedings. As noted earlier, DOD has included NOAA and NASA in its process—both in an executive advisory capacity and on the teams working to address each of the four certification requirements. Further, NOAA and NASA officials reported that they believe that they are being effectively involved in the certification process. However, because this is a DOD process and decision, and because Defense requirements differ from NOAA and NASA requirements, there is risk that the chosen alternative could sacrifice NOAA and NASA requirements. It will be important for NOAA and NASA to remain active players in the deliberation of options and the final decision on how to move the program forward.
- *Indecision increases the risk of a gap in satellite data.* The potential for a gap in polar-orbiting satellite data is increasing with every day of delay on the NPOESS program. Specifically, if the final satellite in the predecessor satellite series (the Polar-orbiting Operational Environmental Satellites or POES) were to fail, there would be a gap in satellite coverage until the first NPOESS satellite was launched and put into operation (see fig. 2). Such a gap could have a devastating effect on our national ability to forecast severe weather events, such as those associated with future hurricane seasons. Since a decision on how the NPOESS program is to proceed is not expected until June 2006, and there will likely be at least another year while a new baseline is established and the contract modified, it is important that the departments move expeditiously to fund their chosen program direction and to implement contract changes.

Figure 4: A Potential Gap in Satellite Coverage



Source: GAO analysis based on NPOESS Integrated Program Office data.

- *Continuing oversight of program and executive management is warranted.* Management problems at multiple levels—subcontractor, contractor, project office, and executive oversight—led to NPOESS recent cost and schedule overruns. As the program implements a new management structure and increased contractor oversight, it will be important to measure and report on the progress of these changes so as to not repeat past problems.

In summary, in November 2005, we reported that NPOESS was "a program in crisis" because of technical problems on critical sensors, escalating costs, poor management at multiple levels, and the lack of a decision on how to proceed with the program. Today, the program is still troubled, and its future direction is not yet known. The program office and contractor are addressing problems on the critical sensors and have adopted strategies that are expected to reduce risks on these sensors. Additionally, the program office is working to address management challenges by increasing program office skills and staffing, increasing contractor oversight, and restructuring the program office to allow for more timely and authoritative decisions. Further, the Nunn-McCurdy certification in June 2006 is expected to result in a firm decision on how to proceed with the program. Over the next few months, it will be important for all of the agency partners to have a voice in the final decision on how to proceed. Once this decision is made, it will be important to move quickly to implement the decision in agency budgets and contracts. Further, as the project continues, it will be critical to ensure that the management issues of the past will not be repeated.

This concludes my statement. I would be pleased to respond to any questions that you or other members of the Subcommittee may have at this time.

APPENDIX I. OBJECTIVES, SCOPE, AND METHODOLOGY

Our objectives were to determine the National Polar-orbiting Operational Environmental Satellite System's (NPOESS) current status and plans, and to discuss considerations in moving the program forward. To accomplish these objectives, we focused our review on the Integrated Program Office, the organization responsible for the overall NPOESS program. We also interviewed officials from the Department of Defense (DOD), the National Aeronautics and Space Administration (NASA), and NOAA's National Weather Service and National Environmental Satellite Data and Information Service to determine plans for the program.

To identify schedule and cost changes related to NPOESS's status we reviewed program office data and interviewed program officials. We compared changes in NPOESS cost and schedule estimates to prior cost and schedule estimates as reported in our July 2002, July 2003, and November 2005 testimonies and in our September 2004 report.[12]

To further analyze trends that could affect the program in Fiscal Year 2006, we assessed the prime contractor's cost and schedule performance. To make these assessments, we applied earned value analysis techniques[13] to data from the contractor earned value and variance analysis reports. We compared the cost of work completed with the budgeted costs for scheduled work during January 2006 to show trends in cost and schedule performance against the interim plan for Fiscal Year 2006.

NOAA and DOD officials generally agreed with the facts presented in this statement and provided some technical corrections, which we have incorporated. We performed our work at the Integrated Program Office, DOD, NASA, and NOAA offices in the Washington, D.C., metropolitan area, between February 2006 and March 2006, in accordance with generally accepted government auditing standards.

Senator DEMINT. Mr. Powner, you mentioned financial incentives. At this point, are there any penalties for delays or cost overrun, financial-related, for the contractors or subcontractors? Is

[12] GAO, *Polar-orbiting Environmental Satellites: Status, Plans, and Future Data Management Challenges,* GAO–02–684T (Washington, D.C.: July 24, 2002); *Polar-orbiting Environmental Satellites: Project Risks Could Affect Weather Data Needed by Civilian and Military Users,* GAO–03–987T (Washington, D.C.: July 15, 2003); *Polar-orbiting Environmental Satellites: Information on Program Cost and Schedule Changes,* GAO–04–1054 (Washington, D.C.: September 30, 2004); and *Polar-orbiting Operational Environmental Satellites: Technical Problems, Cost Increases, and Schedule Delays Trigger Need for Difficult Trade-off Decisions,* GAO–06–249T (Washington, D.C.: November 16, 2005).

[13] Earned value analysis is a means of placing a dollar value on a project's status in order to compare budget versus actual costs versus project status in dollar amounts. For our analysis, we used standard earned value formulas to calculate cost and schedule variances.

there anything built into the system? Or do we just pay more money when it doesn't work out?

Mr. POWNER. There is an award fee structure built into the system for better performance. And I think if you look historically at this program, that award fee has been paid out pretty much in full. And the important thing is to use that award fee structure to hold the contractor more accountable on a going-forward basis.

Senator DEMINT. Are you saying it's already been paid out in full in—on this project, even though it's delayed and over——

Mr. POWNER. Historically on this project—our understanding is, historically, it has been paid out close to full—the full percentage on the award fees, correct.

Senator DEMINT. OK.

Mr. PAYTON. Mr. Chairman, if I might add some amplification to that. Early in the program, there was a high award-fee awarded, but the last two award-fee periods, the award fee amounted to 82 percent of the maximum possible, and the most recent one was 48 percent of the maximum possible.

Senator DEMINT. Mr. Powner mentioned that NOAA needs to be involved in the Nunn-McCurdy process. Are you not involved now, Mr. Withee?

Mr. WITHEE. Yes, sir. We have been welcomed by the Department of Defense and their components, into the process. We keep a diligent eye on it to keep our interests in the forefront. But, so far, so good. I'm one of the principals, and Conrad Lautenbacher, my boss, administrator of NOAA, is on the executive panel with Under Secretary Krieg.

Senator DEMINT. We're talking about this June review and the possibility of cancellation, is that even a possibility, or are we just throwing that out? Can we cancel the new program, when the old program is basically going to disappear? What is the real situation? What are our real options?

Mr. PAYTON. Within the realm of the possible in any generic Nunn-McCurdy process, canceling the program is one extreme. I have seen Mr. Krieg at several of these Nunn-McCurdy meetings, and, because of the priority on data continuity, because the Nation needs this environmental data for realtime operations, both military and civil, Mr. Krieg understands, and the four interagency working groups understand, that going without a polar-orbiting environmental satellite is unacceptable. So, in the theory—if you look at the legislation, if you look at the implementing policies, canceling the program is possible within the realm of the possible, but, due to the priority and the necessity of these—of this data that we gather from these satellites, I—Mr. Krieg is not marching down that path.

Senator DEMINT. Yes, sir.

Mr. WITHEE. If I may add, Mr. Chairman, NOAA is fully committed to having a certified outcome, as well. Both partners gain benefits by working together on this. We have a common set of requirements, and then a separate set, which, when you put together in one single system, derive mutual benefit from one another. And it would be against our—the basic program wishes to go separately, at this point. So, we're totally onboard with certification, working together.

Senator DEMINT. Well, it seems to make common sense that we combine the civilian and the military aspects of this, but has that, in effect, been one of the reasons that—trying to work together and bring two agencies together, that this has been delayed and over budget?

Mr. Powner? They're looking at each other. Maybe you—what was—what would be your——

Mr. POWNER. Well, first of all, if I could also—before I get to that—just on the cancellation, we're just reporting the facts. It was DOD who made it very clear to us when we sent our written statement over to them for comment, that we should include that cancellation clause, because we wanted to talk, as Mr. Payton clearly mentioned, the extremes. There are also many discussions going on at lower levels within both organizations on contingency plans. So, we know that is going on. So, I just want to highlight that that is something we need to consider and at least have on the table.

In terms of the partnership arrangement that has been set up for this joint program, several years ago, we testified—I believe it was in the 2003 time frame—that there were some indications—it's very important that both agencies are clearly dedicated and fund this program fully in the 2003–2004 time frame, there was some missteps where it wasn't fully funded by DOD. Then, because of the matching-fund arrangement, which is written into law, that did have an impact on costs and schedule, because there was a trickle-down effect that I know—the prime contractor was involved with—that resulted in some work not getting done and schedules getting pushed out and costs increasing. So, that has been a—what I would consider a minor factor, not a major factor. But, overall, I think there has been cooperation among the three agencies, but there have been some missteps, Mr. Chairman.

Senator DEMINT. Can I assume that the principals of—everyone represented here today are fully committed to this project, the way it started? Are we on track? I know we're going through this review, and some of what we're talking about, maybe, is not relevant, in that we'll get a report from the review process. But, is there a commitment, or are there now questions within the ranks that maybe this is not such a good idea?

Mr. PAYTON. From what I've seen in the workings of the—both at the Office of the Secretary of Defense, the Under Secretary for Acquisition, and within the Air Force, we all know that we have to have a polar-orbiting environmental satellite collecting the data that feeds our digital models for predicting the weather globally, around the world.

Senator DEMINT. I notice you said you're committed to something like this. But not necessarily the way it's set up now?

Mr. PAYTON. Within the second question of the Nunn-McCurdy process, there is an analysis of alternatives. And, again, at the extreme—the two extremes are: you go ahead and fund the program as it's currently architected, or you cancel the program. Those are sort of the two extremes. There's a wealth of options in the middle that—where we would still have polar-orbiting spacecraft, but it might not necessarily—it does not necessarily look like the design of NPOESS today, where you could have different mixes of different sensors on different spacecraft, perhaps launch smaller sat-

ellites more often, mix and match different satellites in different orbits. And so, those—that trade space is being analyzed and costed as we speak this week, today.

Senator DEMINT. Currently, you have your own satellites, NOAA has their own satellites.

Mr. PAYTON. Yes, sir.

Senator DEMINT. Reading between the lines, I sense that you might prefer to go your own way at this point. Is that a sentiment within the DOD?

Mr. PAYTON. We have not come up with that preference at all, truthfully. In the fundamental interagency working relationship amongst all three agencies, truthfully, when you include NASA, NOAA, and the Defense Department, we don't view that as an underlying problem of the program.

Senator DEMINT. Mr. Withee, did you want to make a comment?

Mr. WITHEE. Just to confirm that statement for NOAA, that we are totally committed to the tri-agency program. Each one of us have committed separately—and we committed jointly, our highest priority is no gap in service. So, everything we do is focused on minimizing or having no gap at all. And so, we're in this together, and we're going to see it through.

Senator DEMINT. Let me focus on the gap, because that's probably our greatest interest here. As you mentioned, you've got a satellite on the ground that could fulfill the current function until, what, 2011? Was that——

Mr. WITHEE. 2013, sir.

Senator DEMINT. 2013. And the military has separate satellites. What is the end date for what you have?

Mr. PAYTON. Yes, sir. We've got four satellites on the ground right now. And again, depending on which orbit you put which spacecraft; and, again, how long they last on orbit—we're confident that we could probably get to 2014 before a potential gap might open.

Senator DEMINT. What are possible delays? What are the scenarios, Mr. Ryan, if we decide to go ahead with this? Could we be delayed beyond the points that we're talking about here, 2013–2014?

Mr. RYAN. Mr. Chairman, first of all, I would like to say that Northrop Grumman is also extremely committed to this program and its success, and we will do everything in our power to make sure that it is successful.

The current baseline that we have been operating under for 2006 was put into place to be a baseline that we execute to that would not only fulfill the program of record and that architecture, but be flexible enough, if there are some other changes that come out of the Nunn-McCurdy process, that we will apply the work that we've been doing this year directly into those changes, too. So, no time has been wasted or lost while being—we've been going through this decision process.

Senator DEMINT. When can we finish? Can—when can we have——

Mr. RYAN. Our projections—again, it depends on the fiscal funding that is put into the program over the next 5 years, but our current projections are on the 2012 time frame, that we would have

the first satellite on orbit and operating. Again, it will depend on many factors coming out of the Nunn-McCurdy process.

Senator DEMINT. It seems there is—a lot of it depends on very close dates here. Mr. Powner——

Mr. POWNER. If I can just also clarify on this potential gap, there's a number of things that have to happen. When NPOESS was originally planned, the first NPOESS satellite was to be ready for launch when the final POES, which is the predecessor suite of satellites, was to be launched. OK? And the reason for that is, satellites do fail at launch. OK? I think at one time there were figures, one out of ten fail on launch. So, you want a backup ready to go. So, that's what drove the initial NPOESS schedule. That kept being moved out.

Now, fortunately, the POES schedule is being moved out, too. So, there's a number of things that are factoring into play here. But there still is—if the final POES fails on launch, there are contingencies and options that these gentlemen are aware of, and they can work. But there is a potential for a gap in the continuity of polar-orbiting data.

Now, fortunately, some of the satellites do outlive their useful lives. And that helps us. But we're still playing in a risky environment here, the more this gap widens.

Senator DEMINT. This satellite on the ground that NOAA has is—could fail at launch, and we could be back to 2011 or—that's——

Mr. WITHEE. Yes, sir. At the moment, that launch would not occur before the one in orbit now has—would have—shown signs of problems.

Senator DEMINT. Right.

Mr. WITHEE. But, likely, 2009 is the date for that. And that is a—it's always a problem. When you launch, you have a 2- or 3-percent chance of failure, and that's a possibility, and we are concerned with it. We do have backup in that same orbit, with a NASA program, which will have similar sensors flying about that same time. And there's also—the Europeans are flying U.S. instruments in another orbit, which will provide another backup capability for us.

Senator DEMINT. The Nunn-McCurdy review, does that, in addition to just looking at the cost and schedule, does it look at the potential problems of a gap in service, or is that something that we need to do separately?

Mr. PAYTON. No, sir. Again, that's wrapped up into the schedule of the program that emerges from Nunn-McCurdy.

One of the options that the Air Force is looking at, as part of the Nunn-McCurdy, is Service—something called a Service Life Extension Program on one or more of those four satellites that's sitting on the ground right now. The current experience with military weather satellites has been that their inertial measurement units, their gyroscopes, fail first. And so, there is more modern technology for gyroscopes that we could—if necessary, we could take apart those satellites that are sitting on the ground, insert the new inertial measurement units, and improve the expected on-orbit lifetime of those existing spacecraft that are on the ground. Again, but that doesn't come free. That would cost us money. And, therefore, that

Service Life Extension Program is, again, part of the trade space that we are looking at inside the analysis of alternatives.

Senator DEMINT. Good.

Well, this has been very helpful. Obviously, it's a big issue. It's not an issue American people are thinking about, and they won't think about it until there's an interruption in service, and then it becomes very serious. The costs and delays are significant. It's also, I think, an indication of how well, at the Federal level, we can manage projects, how well agencies can work together. There's a lot on trial here, and as well as our government oversight of what happened. So, we all look forward to the June outcome of this. And I suspect as soon as we have a new plan on the table, it will be important to bring that back to the members here to make sure there's a strong consensus.

But, clearly, we're interested in it. And I think the more our members hear about it, the more they're going to want to know. And, as long as the Chairman is interested in it, which he is very interested, I'm sure you'll hear a lot from us.

So, thank you all for being here. This has been very helpful.

[Whereupon, at 12 p.m., the hearing was adjourned.]

A P P E N D I X

PREPARED STATEMENT OF HON. DANIEL K. INOUYE, U.S. SENATOR FROM HAWAII

Mr. Chairman, it is very important for us to examine the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Program and the history of our troubled, but incredibly vital, environmental satellite programs.

The data collected by the polar satellites is especially important in the vast Pacific, where both land and ocean monitoring stations are few and far between. However, if this system continues to be plagued by mismanagement, schedule delays, and cost overruns, public safety will suffer. We cannot compromise or go backward on coverage needs in those and other vulnerable areas.

Also, given tight budgets across the government, we cannot ask the National Oceanic and Atmospheric Administration (NOAA), with a budget of less than $4 billion, to absorb the potential $3 billion cost overrun facing NPOESS.

I am particularly concerned with both the contractor's performance on this program and the structure of the contract. The contract places cost overrun risk squarely on the Federal Government, rather than on the contractor, and it also provides the contractor with an exceedingly lucrative 20 percent award fee, which deserves further examination.

Today's hearing will help us determine the roles that each of the participants—including the contractors—played in the current situation, and how we can ensure that the costs and risks are spread fairly among the programs and contracting entities.

I expect candid testimony from our panel today about how the NPOESS program got into this predicament, what is being done to fix the problems, and how we can be assured that we will neither lose polar satellite coverage nor endanger NOAA missions in getting the program back on track.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. DANIEL K. INOUYE TO HON. GARY E. PAYTON

Northrop Grumman's Contract Terms and Award Fees

Question 1. At our March 30, 2006 Hearing, David Powner of the Government Accountability Office, stated that under the NPOESS contract, the award fees for Northrop Grumman have been "paid out pretty much in full," even though the program is roughly $3 billion over budget and was, by most accounts, mismanaged. You also stated that in the last two award-fee periods Northrop Grumman received 82 percent and 48 percent of the possible maximum.

Please provide us with the following information regarding payments to Northrop Grumman under the contract, as well as award fees:

> Summary of the current contract terms, budget, and schedule for payment (including for award fee) for the entire length of the NPOESS contract.

Answer. The NPOESS Contract includes a Cost-Plus Award Fee (CPAF) type of contract for Engineering, Manufacturing and Development (EMD) which includes labor, materials, facilities, etc. to design, manufacture, field and test a complete satellite system comprised of sensors, satellite, NPOESS command, control, communications (C3) and Interface Data Processing System (IDPS), distribution of said data and system operations. Further, this portion of the contract requires the contractor to furnish 3 sensors for the NASA NPOESS Preparatory Project (NPP) satellite and 2 NPOESS satellites (on orbit) along with C3, IDPS data distribution and system operations. Also included in the contract, is the Fixed Price Incentive-Firm (FPIF) Production Options for an additional 4 NPOESS Satellites. And last, there are Fixed Price Incentive-Successive (FPIS) Target Options for the Operation and Support of NPOESS after completion of the EMD portion of the contract.

A very important and unique aspect of the NPOESS System Contract is that this is a "performance-based" contract wherein the contractor is guaranteeing system

performance. Most of the contract terms are standard to system contracts except for the Shared System Performance Responsibility, Shared Ownership, Fee Risk Covenant, Capital Facility Investment Agreement and Termination Costs, which are unique for the NPOESS Contract.

Question 2. Description of award fees available under the contract, including amounts, schedule, conditions for issuance (or refusing payment) of the award fee, or portion thereof (e.g., for poor performance).

Answer. The NPOESS contract contains an Award Fee Pool of 13 percent, which totals $374,033,039. The Award Fee Pool is paid every 6 months. The award is issued through a standard DOD) process in which an Award Fee Review Board (AFRB), composed of the leadership of the program, reviews contractor performance against criteria and provides their recommendation to a senior official called the Fee Determining Official (FDO). The FDO reviews the AFRB assessment and a self-assessment by the contractor, and determines the amount to be issued. The criteria used for assessing contractor performance during the fee period is specified at the start of the award fee period and is covered by the general areas of Management, Technical and Cost. The award fee amount for any specific period is based upon the subjective assessment of the AFRB and FDO of the contractor performance in meeting the award fee criteria for that specific period.

The award fee and the mission success fee are held at risk by the government until system performance has been clearly demonstrated. This unique contract provision allows the government to assess system performance on-orbit and require the contractor to return part or all of these two fees if performance is unsatisfactory.

Question 3. Contract Payments made to date, by year, as well as payments likely through the end of calendar year 2006.

Answer. Payment to date—$1,757,879,631.00

Payments by year:

FY 2002—$67,292,912.00
FY 2003—$398,495,830.00
FY 2004—$477,256,839.00
FY 2005—$543,995,639.00
FY 2006—$270,833,411.00

Payments through end of calendar year 2006—$322,929,000.00

Question 4. Award fees paid to date, including the date of payment, and percentage of the maximum available award fee for that period the payment represented.

Answer.

Period #1—$26,973,949, May 2003, 95 percent
Period #2—$23,695,976, Dec. 2003, 89 percent
Period #3—$21,206,973, May 2004, 94 percent
Period #4—$20,755,760, Dec. 2004, 92 percent
Period #5—$19,816,094, May 2005, 82 percent
Period #6—$10,672,635, Dec. 2005, 48 percent

Adequacy of Contract Cost Controls

Question 5. The Geostationary Operational Environmental Satellite (GOES), a joint program of the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautic and Space Administration (NASA), was developed through a cost-plus-award-fee contract awarded in 1985. This program experienced serve technical problems, cost overruns, and schedule delays.

In August 2002, a cost-plus-award-fee contract was used again by the Air Force for the development and production phase of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) program.

"Cost-plus" contracts can leave the government in very vulnerable position, forcing an agency to absorb all of the costs. We learned with the GOES satellite problems fifteen years ago that this means we just send good money after bad. How can you instill any cost controls in a "cost-plus" contract?

Answer. The DOD has implemented a wide variety of cost controls on cost plus contracts and has even tried Fixed Price contracts for this type of development. Finding the right mix of cost, technical and schedule performance incentives or outcome-based criteria is the key to successful cost control in a cost type contract. While cost type contracts increase the government's share of risk in the endeavor they do offer advantages for advanced state-of-the-art R&D, which characterizes the NPOESS program.

1. Unlike Fixed Price contracts, Cost Plus contracts give the government complete insight into every cost element of work.

2. When executed properly, the detailed cost insight coupled with detailed schedule insight and earned value metrics can provide early indicators of impending problems.

3. If discovered early enough, work around plans, alternative suppliers, alternative facilities, etc., can be found to mitigate the impending problems.

4. Fixed Price contracts do not mandate equivalent insight into the details of a developments program.

Question 6. What controls were in place in this contract?

Answer. The NPOESS contract relies heavily on a combination of award fee and a milestone completion fee called the Mission Success Fee (MSF). These two subjective awards are also complimented by an extensive Earned Value Management System, which tracks all monthly expenditures by the contractor, and measures the program's progress.

Question 7. Were sufficient contract controls in place to stop work when subcontractor or contractor performance was sub-standard?

Answer. The NPOESS Contract includes the ability to stop work at any time should the government decide to do so due to contract or subcontractor performance being sub-standard. However, stopping work was not the appropriate mitigation here, because of the criticality of the NPOESS mission and the risk of operational gaps. The primary effort over the past 12 0915 months has been a concerted effort by the government and prime contractor to apply additional management, technical expertise, and oversight to some of the failing sensor subcontractor development work to remedy the problems. This has added to the cost problems in the near-term however, the longer term risks of technical surprises and schedule slips are greatly reduced.

Question 8. What alternatives to Cost-Plus structure could be used for this type of development?

Answer. As previously discussed, the only other type of contract available is Fixed Price. Government experience with Fixed Price developments has not been good. Fixed Price contracts place undue financial risk on industry during R&D, which they cannot adequately cover. In the 1990s, the industrial base of the DOD was being damaged by the practice. Only Cost Plus contracts are presently authorized by DOD policy for this type of research and development, at this time.

Question 9. We know what the cost to the taxpayer will be of this failure—what repercussions do the contractors face?

Answer. The contractors face a double-edged problem with this type of performance. First, profit is forfeited through the award fee program and they have already lost profit on this program via the decrements to the award fee. Second, the contractors are also faced with the reduced ability to be considered competitive for future Government contracts of this nature. This is based upon the tracking of contractor past performance under a program called Contractor Performance Analysis Report (CPARs).

Question 10. Do they absorb any of the cost for their management failures?

Answer. The contractors have lost the fee through the award fee program.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. DANIEL K. INOUYE TO DAVID A. POWNER

We are responding to two of your questions related to my statement that the award fees for Northrop Grumman had been "paid out pretty much in full" (questions 2 and 4, regarding Northrop Grumman's contract terms and award fees). However, as discussed with your offices, we are unable to answer your other eight questions involving contract cost controls and contract award fees because these questions are outside the scope of work we performed on the NPOESS acquisition. Specifically, contract cost controls were not part of our evaluation. Further, regarding contract award fees, we coordinated our efforts with the Department of Commerce Inspector General (IG) in order to avoid duplication, and agreed that the IG would evaluate NPOESS contract award fees while we focused on the options for moving the program forward.[1] Your questions, along with our responses, follow.

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[1] See Department of Commerce Office of Inspector General, *Poor Management Oversight and Ineffective Incentives Leave NPOESS Program Well Over Budget and Behind Schedule,* 0IG–17794–6–0001 (May 8, 2006).

Question 2. Provide a description of award fees available under the contract, including amounts, schedule, and conditions for issuance (or refusing payment) of the award fee, or portion thereof (*e.g.,* for poor performance).

Answer. The NPOESS development contract includes three types of incentives totaling 20 percent of the total estimated contract cost—about $563 million. *Base fees* constitute 2 percent of the contract costs (about $57 million). These are guaranteed fees and paid each billing cycle. *Mission success fees* are capped at 5 percent of the contract cost (about $137 million) and are tied to the contractor's performance at seven milestone events. *Award fees* are capped at 13 percent of the contract cost (about $369 million) and are spread out over 18 separate payment periods between 2002 and 2011. The total amount available for award fees is divided unevenly among the 18 payment periods, depending on the expected amount and complexity of the work during an individual pay period. The contract also offers a "rollover" provision that allows the NPOESS program office to add unearned award amounts from one payment period to the subsequent payment period as an added incentive to the contractor. In addition, all award fees are earned "at risk"—meaning that the government could recoup some of the fees if the completed system does not meet performance goals.

The NPOESS program office determines actual award amounts based on three criteria: management performance, technical performance, and cost performance. These criteria are weighted at 40, 30, and 30 percent, respectively. Each of these criteria is supplemented by key elements that the contractor is to provide. Table 1 provides a summary of the criteria and key elements.

Table 1: Criteria for NPOESS Award Fee Determination

Criteria	Key elements
Management (40 percent)	*Performance baseline management*—entails having tracking tools, including an earned value management system, that provide accurate status information on the program.
	Subcontract management—entails providing proactive leadership to resolve issues; support subcontractor problem areas or deficiencies; and provide timely, accurate, and substantive direction to subcontractors.
Technical (30 percent)	*System performance*—entails providing system performance that meets or is projected to meet specification.
	Hardware, software, and algorithm design—entails providing designs that are in conformance with technical objectives.
	Test and verification—entails providing test and verification plans that are sufficient and meet objectives.
Cost (30 percent)	*Cost control*—entails ensuring that reasonable and prudent measures are taken to control and reduce program costs, and that cost estimates (when requested) are accurate, timely, and complete.

Source: NPOESS program office.

Question 4. Describe award fees paid to date, including the date of payment, and percentage of the maximum available award fee for that period the payment represented.

Answer. During the first five of the seven award payment periods to date, the prime contractor earned an average of 90 percent of the potential award available. As discussed with your offices, we did not obtain data on the two most recent payment periods because it was not in the scope of our recent work.

Table 2 provides the award fee earned as a percentage of the award fee available for each of the five payment periods. This calculation includes any rollover amount earned and available. This information is provided at a summary level, rather than in actual dollars, because the details we have on NPOESS award fees are considered sensitive and are marked for official use. Our policies require that we protect this information from public disclosure.

Table 2: Award Percentage During the First 5 Award Periods

Period	Dates	Award percentage (award fee earned + rollover earned)/ (award fee available + rollover available)
1	Sept. 2002–March 2003	95
2	April 2003–Sept. 2003	87

Table 2: Award Percentage During the First 5 Award Periods—Continued

Period	Dates	Award percentage (award fee earned + rollover earned)/ (award fee available + rollover available)
3	Oct. 2003–March 2004	94
4	April 2004–Sept. 2004	90
5	Oct. 2004–March 2005	82
Average		90

Source: GAO analysis of NPOESS program office data.

In responding to your questions, we relied on our previous audit work on the NPOESS program. We performed this prior audit work in accordance with generally accepted government auditing standards between June and November 2005, and between February and March 2006.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. DANIEL K. INOUYE TO GREGORY W. WITHEE

Impact of $3 Billion Cost Overrun on NOAA

Question 1. In 2002, the National Polar-orbiting Operational Environmental Satellite System (NPOESS) program officials estimated the cost of the NPOESS program at $6.5 billion. In November 2005, the Government Accountability Office asserted the life-cycle cost estimate to be $10 billion, and estimates will likely climb further. While program costs are shared equally by the National Oceanic and Atmospheric Administration (NOAA) and the Department of Defense (DOD), NOAA's proposed FY 2007 budget was only $3.8 billion, compared to a $500 billion DOD budget.

What would the payment schedule be for a $3 billion increase needed to cover the growing cost of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) program?

Answer. The increased costs will be allocated over the program life cycle through the annual budget process as required to achieve the recertified program's new mission milestones and schedules. DOD has prepared estimates of the costs to support a schedule that minimizes the possibility of a gap in coverage, but until the contract with Northrop Grumman Space Technology (NGST) is renegotiated to reflect the recertified program we will not have an accurate payment schedule. Once that is achieved, the multi-year funding profile will be included in the President's Budget requests to Congress as required in NOAA's statutory appropriations language.

Question 2. When would the first payment be due and how much is the National Oceanic and Atmospheric Administration (NOAA) expected to shoulder? Is NOAA contractually bound to shoulder extra costs associated with cost overruns?

Answer. Funding for the NPOESS Program is split evenly between NOAA and DOD. Both NOAA and the DOD will request the appropriate funding to support the restructured program in their future President's Budget requests.

Question 3. The President's FY 2007 request for NOAA was $3.8 billion, which is already 6 percent below the FY 2006 enacted level. How could NOAA possibly absorb even half of the $3 billion estimated cost overrun, and still perform its missions?

Answer. The cost overrun is not for FY 2007 only, but represents an increase in the life cycle cost of the program (FY 2007 to FY 2026). The current funding requested for NPOESS in FY 2007 is adequate to fund the Nunn-McCurdy certified program in that year.

Question 4. Can you pledge to us that these costs will not come out of other NOAA core missions and programs?

Answer. NOAA has been working hard to balance its commitment to its core missions and programs today, with the need to ensure there is no gap in polar orbiting environmental satellite coverage in the future.

Adequacy of Contract Cost Controls

Question 5. The Geostationary Operational Environmental Satellite (GOES), a joint program of the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautic and Space Administration (NASA), was developed through

a Cost-Plus-award-fee contract awarded in 1985. This program experienced severe technical problems, cost overruns, and schedule delays.

In August 2002, a Cost-Plus-award-fee contract was used again by the Air Force for the development and production phase of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) program.

"Cost-Plus" contracts can leave the government in a very vulnerable position, forcing an agency to absorb all of the costs. We learned with the GOES satellite problems fifteen years ago that this means we just send good money after bad. How can you instill any cost controls in a "Cost-Plus" contract?

Answer. Cost controls can be instilled in a "Cost-Plus" contract by implementing the right mix of cost, technical, and schedule performance incentives with effective oversight and outcome-based criteria. The Nunn-McCurdy certification increased the management and cost controls for the certified NPOESS program by linking award fees with desired outcomes, ensuring award fees are commensurate with contractor performance, and ensuring appropriate justification for any use of rollover of unearned fee.

Question 6. What controls were in place in this contract?

Answer. All cost controls prescribed by the Federal Acquisition Regulations (FAR) are in place on this contract. This includes an Earned Value Management System, Limitation of Government Obligation and Termination clause. Additional oversight is conducted by the Defense Contracting Audit Agency and the Defense Contracting Management Agency to provide verification of compliance with existing acquisition regulations.

Question 7. Were sufficient contract controls in place to stop work when subcontractor or contractor performance was sub-standard?

Answer. Yes, the NPOESS Air Force contract includes the ability to stop work.

Question 8. What alternatives to Cost-Plus structure could be used for this type of development?

Answer. As a matter of policy, only cost type of contracts are now used by DOD for this type of developmental effort. The only other type of contract available is a fixed price, which was used by DOD for developmental programs in the 1980s. Significant problems arose with those fixed price developments. Consequently, DOD decided that a shared risk approach between government and industry was in the best interest of the country.

Question 9. We know what the cost to the taxpayer will be of this failure—what repercussions do the contractors face?

Answer. The contractor has to date lost $34 million in potential profit on this program by earning less than the allowable award fee. Additionally, $10 million of fee has been converted to cost, which reduces the contractors' ability to earn those fees in the future. The latest award fee was zero dollars, which translates to the loss of tens of millions of dollars. The contractor is also faced with the reduced ability to be considered competitive for future government contracts due to the tracking of contractor past performance through Contractor Performance Analysis Reports. Discussions with the contractor are ongoing concerning more stringent performance metrics under which the contractor will be evaluated.

Question 10. Do they absorb any of the cost for their management failures?

Answer. As mentioned above, the contractor has already lost profit ($34 million in potential profit to date) by earning less than the allowable award fee. In the last two award fee periods, Northrop Grumman has only received 48 percent and zero percent of the available award fee. As the prime contractor, Northrop Grumman shares the award fee with its subcontractors. Discussions with the contractor are ongoing concerning more stringent performance metrics under which the contractor will be evaluated.

NOAA Oversight Process

Question 11. The National Polar-orbiting Operational Environmental Satellite System (NPOESS) program is managed by the Integrated Program Office, which is located within NOAA and consists of personnel from the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautic and Space Administration (NASA), and the Department of Defense (DOD). NOAA has overall program management and operating responsibility and DOD has the lead on the acquisition. NASA has primary responsibility for facilitating the development and incorporation of new technologies into the converged system.

NPOESS is overseen by an Executive Committee (EXCOM) made up of:

(1) Vice Admiral Conrad C. Lautenbacher, Jr., the Administrator of NOAA;
(2) Dr. Ronald M. Sega, Under Secretary of the Air Force; and

(3) Dr. Michael Griffin, Administrator of NASA.

Reading the Government Accountability Office (GAO) report seems like watching a disaster unfold in slow motion. Every failure is documented, yet it appears that the Integrated Program Office Director was not actually exercising adequate oversight, and nobody at the top was exercising any oversight on the Program Office. Who had direct supervision over the National Polar-orbiting Operational Environmental Satellite System (NPOESS) program contract and cost issues at the National Oceanic and Atmospheric Administration (NOAA)?

Answer. The Integrated Program Office's (IPO) System Program Director (SPD) is responsible for the execution of the NPOESS Air Force contract. Pursuant to the 1994 Presidential Decision Directive which established NPOESS, DOD is the lead agency for major system acquisitions. The IPO SPD (i.e., the IPO Director) reports through NOAA's National Environmental Satellite, Data, and Information Service to the NPOESS Executive Committee (EXCOM). The EXCOM is comprised of the Administrator of NOAA, the Administrator of NASA, and the Under Secretary of the Air Force.

Question 12. Was Admiral Lautenbacher, the Administrator of NOAA, actively involved in the oversight and fiscal control of the program?

Answer. Admiral Lautenbacher is a member of the EXCOM and, as such, was actively involved in the oversight of the program. The EXCOM is the authority for the NPOESS program as established by Presidential Decision Directive. The EXCOM does not perform day-to-day management tasks or provide direct control of the Air Force NPOESS contract.

Question 13. How was he kept informed of the financial risks posed by contractor failures, and what did he do to curb them?

Answer. The EXCOM receives a monthly report from the NPOESS Integrated Program Office (IPO) as well as periodic program reviews. Until early 2006, an ad hoc Tri-Agency Steering Committee (TSC), comprised of key executives from the three agencies, reviewed the program monthly and reported to the EXCOM members. The EXCOM began a series of independent reviews of the NPOESS as soon as the government became aware of the severity of the cost and technical problems. As a function of these reviews, the EXCOM has supervised a restructuring of the NPOESS program management. The TSC has been replaced with a Program Executive Officer (PEO) and staff that can maintain much closer scrutiny and independent review of the program. The PEO is independent of the IPO and is funded to conduct government and independent reviews of the NPOESS program. The IPO changed the way it monitors earned value data, key milestones, dollars spent and contractor personnel. They track these metrics on a more regular basis, which will provide real-time insight into the health and status of the program. These changes provide the PEO and the EXCOM with more meaningful data to understand the actual progress of the program, as well as the potential problems, so corrective actions can be taken sooner. In addition, the IPO has been reorganized and new personnel are being added to increase expertise in budget analysis, systems engineering, and program control. Additionally, significant changes have occurred within Northrop Grumman and its principal subcontractors.

Question 14. What authority did NOAA have under the NPOESS program structure to raise a red flag on costs, or conduct a review, particularly if the Department of Defense (DOD), which has a much larger budget, was not concerned about costs?

Answer. Regardless of budget size, NOAA, or any member of the EXCOM, has the authority to propose a review. As noted above, the EXCOM did initiate a series of independent reviews as the severity of the cost and technical problems became known.

Question 15. Did the procurement contract establish penalties against the contractor for any of its own management or cost failures? Why or why not?

Answer. The award fee is the primary method for establishing penalties. The amount of money awarded to contractors was based on cost, schedule and technical performance. For the last two award fee periods, Northrop Grumman received only 48 percent and zero percent of the available award fee. Discussions with the contractor are ongoing concerning more stringent performance metrics under which the contractor will be evaluated.

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