AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

THE FUTURE OF NPOESS: RESULTS OF THE NUNN–MCCURDY REVIEW OF NOAA'S WEATHER SATELLITE PROGRAM

HEARING

BEFORE THE

COMMITTEE ON SCIENCE
HOUSE OF REPRESENTATIVES

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

JUNE 8, 2006

Serial No. 109–53

Printed for the use of the Committee on Science

Available via the World Wide Web: http://www.house.gov/science

U.S. GOVERNMENT PRINTING OFFICE

27–970PS WASHINGTON : 2007

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

COMMITTEE ON SCIENCE

HON. SHERWOOD L. BOEHLERT, New York, *Chairman*

RALPH M. HALL, Texas
LAMAR S. SMITH, Texas
CURT WELDON, Pennsylvania
DANA ROHRABACHER, California
KEN CALVERT, California
ROSCOE G. BARTLETT, Maryland
VERNON J. EHLERS, Michigan
GIL GUTKNECHT, Minnesota
FRANK D. LUCAS, Oklahoma
JUDY BIGGERT, Illinois
WAYNE T. GILCHREST, Maryland
W. TODD AKIN, Missouri
TIMOTHY V. JOHNSON, Illinois
J. RANDY FORBES, Virginia
JO BONNER, Alabama
TOM FEENEY, Florida
RANDY NEUGEBAUER, Texas
BOB INGLIS, South Carolina
DAVE G. REICHERT, Washington
MICHAEL E. SODREL, Indiana
JOHN J.H. "JOE" SCHWARZ, Michigan
MICHAEL T. MCCAUL, Texas
MARIO DIAZ-BALART, Florida

BART GORDON, Tennessee
JERRY F. COSTELLO, Illinois
EDDIE BERNICE JOHNSON, Texas
LYNN C. WOOLSEY, California
DARLENE HOOLEY, Oregon
MARK UDALL, Colorado
DAVID WU, Oregon
MICHAEL M. HONDA, California
BRAD MILLER, North Carolina
LINCOLN DAVIS, Tennessee
DANIEL LIPINSKI, Illinois
SHEILA JACKSON LEE, Texas
BRAD SHERMAN, California
BRIAN BAIRD, Washington
JIM MATHESON, Utah
JIM COSTA, California
AL GREEN, Texas
CHARLIE MELANCON, Louisiana
DENNIS MOORE, Kansas
DORIS MATSUI, California

CONTENTS

June 8, 2006

	Page
Witness List	2
Hearing Charter	3

Opening Statements

Statement by Representative Sherwood L. Boehlert, Chairman, Committee on Science, U.S. House of Representatives	7
Written Statement	8
Statement by Representative Bart Gordon, Minority Ranking Member, Committee on Science, U.S. House of Representatives	9
Written Statement	10
Statement by Representative Vernon J. Ehlers, Chairman, Subcommittee on Environment, Technology, and Standards, Committee on Science, U.S. House of Representatives	11
Written Statement	12
Statement by Representative David Wu, Minority Ranking Member, Subcommittee on Environment, Technology, and Standards, Committee on Science, U.S. House of Representatives	13
Written Statement	14
Prepared Statement by Representative Jerry F. Costello, Member, Committee on Science, U.S. House of Representatives	15

Witnesses:

Vice Admiral Conrad C. Lautenbacher, Jr. (U.S. Navy, Ret.), Administrator, National Oceanic and Atmospheric Administration, U.S. Department of Commerce; Under Secretary of Commerce for Oceans and Atmosphere	
Oral Statement	16
Written Statement	19
Biography	21
Dr. Michael D. Griffin, Administrator, National Aeronautics and Space Administration	
Oral Statement	22
Written Statement	24
Dr. Ronald M. Sega, Under Secretary of the Air Force, U.S. Department of Defense	
Oral Statement	25
Written Statement	29
Biography	31
Discussion	
Confidence Levels of Budget and Schedule Estimates	33
Nunn-McCurdy Decision Package	36
Decision-making Process and Cost Targets	38
Cost of Climate-related Sensors	40
Cost Targets	41
Information Oversight, Reporting, and Budgets	42
International Bases and U.S. Control of Data	43
Cost-benefit Analysis of NPOESS Costs	44
Status of VIIRS Sensor	45
Cost of Program in Context	46
Mandatory Confidence Levels	47

Page

Employees Qualifications 48
Guarantee of Plan 49
Mistakes Leading to Current Problems 49
Joint Agency Effort 50
Awards and Bonuses 51
Cost Confidences and CMIS 51
Award Fee 52
Loss of Climate Data and Sensors 53
Prioritizing Additional Sensors 55

Appendix 1: Answers to Post-Hearing Questions

Vice Admiral Conrad C. Lautenbacher, Jr. (U.S. Navy, Ret.), Administrator, National Oceanic and Atmospheric Administration, U.S. Department of Commerce; Under Secretary of Commerce for Oceans and Atmosphere 58

Dr. Michael D. Griffin, Administrator, National Aeronautics and Space Administration 67

Dr. Ronald M. Sega, Under Secretary of the Air Force, U.S. Department of Defense 71

Appendix 2: Additional Material for the Record

Letter to Chairman Boehlert from Kenneth J. Krieg, Under Secretary of Defense, Department of Defense, dated June 5, 2006 80

Letter to Kenneth J. Krieg from Chairman Boehlert, dated June 6, 2006 86

THE FUTURE OF NPOESS: RESULTS OF THE NUNN–MCCURDY REVIEW OF NOAA'S WEATHER SATELLITE PROGRAM

THURSDAY, JUNE 8, 2006

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE,
Washington, DC.

The Committee met, pursuant to call, at 2:35 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Sherwood L. Boehlert [Chairman of the Committee] presiding.

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

The Future of NPOESS: Results of the Nunn-McCurdy Review of NOAA's Weather Satellite Program

Thursday, June 8, 2006

2:30 PM – 4:30 PM

2318 Rayburn House Office Building (WEBCAST)

Witness List

Vice Admiral Conrad C. Lautenbacher, Jr. (Ret.)
Administrator
National Oceanic and Atmospheric Administration

Dr. Michael Griffin
Administrator
National Aeronautics and Space Administration

Dr. Ronald M. Sega
Under Secretary of the Air Force
U.S. Department of Defense

Section 210 of the Congressional Accountability Act of 1995 applies the rights and protections covered under the Americans with Disabilities Act of 1990 to the United States Congress. Accordingly, the Committee on Science strives to accommodate/meet the needs of those requiring special assistance. If you need special accommodation, please contact the Committee on Science in advance of the scheduled event (3 days requested) at (202) 225-6371 or FAX (202) 225-0891.

Should you need Committee materials in alternative formats, please contact the Committee as noted above.

HEARING CHARTER

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

The Future of NPOESS: Results of the Nunn-McCurdy Review of NOAA's Weather Satellite Program

THURSDAY, JUNE 8, 2006
2:30 P.M.—4:30 P.M.
2318 RAYBURN HOUSE OFFICE BUILDING

Purpose

The key program to build new weather satellites for both military and civilian forecasting has just undergone a statutorily required review because the program was more than 25 percent over budget. The program, the National Polar-orbiting Operational Environmental Satellite System (NPOESS), is jointly run by the Department of Defense (DOD), the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA), with DOD and NOAA evenly splitting the costs, except for the costs of providing one preliminary satellite, which are being borne by NASA.

The program has a troubled history of cost increases and schedule delays and it has been the subject of several previous Science Committee hearings, most recently a hearing on May 11 on a report by the Department of Commerce Inspector General (IG), which raised concerns about NOAA's program management and award fees paid to the prime contractor, Northrop Grumman.

The June 8 hearing will focus on the results of the statutorily required review, known as a Nunn-McCurdy review. Under the law, any DOD-funded program that is more than 25 percent over budget must be reviewed to see if it should be continued and if so, in what manner.

The review, which was carried out under the auspices of DOD by all three NPOESS agencies, determined that the program should be continued, but the number of satellites and their capabilities will be scaled back. The NPOESS agencies argue that the scaled back program will be able to capture all weather data collected by current satellites and will minimize the chance of having gap periods when a full complement of satellites is not flying.

The revamped program is estimated to have acquisition (as opposed to operational) costs of $11.1 billion ($11.5 billion if launch costs are included). That is an increase of about 50 percent, or $3.7 billion over the most recent official baseline of $7.4 billion issued in 2004. The original cost estimate for the program as configured before the Nunn-McCurdy review, which was issued in 2000, was $6.5 billion. No additional funds beyond those already projected will be needed until fiscal year (FY) 2010, according to the three NPOESS agencies. The first NPOESS satellite would be launched in 2013. The 2004 estimate assumed a first launch in 2010; the 2000 estimate assumed a launch in 2008. The Committee is seeking background materials to better evaluate and understand these estimates.

Witnesses

Dr. Ronald Sega, Under Secretary of the Air Force

Vice Admiral Conrad C. Lautenbacher (ret.), Administrator, National Oceanic and Atmospheric Administration

Dr. Michael Griffin, Administrator, National Aeronautics and Space Administration

Overarching Questions

The hearing will address these overarching questions:

1. Are the new launch dates and cost estimate for NPOESS realistic?
2. What capabilities are lost in the new NPOESS program?

3. Are critical weather forecasting capabilities maintained and/or improved in the new NPOESS program?
4. What are the underlying assumptions (technical, cost, and schedule) that support the new NPOESS program design?
5. Are there better alternatives than the one chosen in the Nunn-McCurdy review, especially for fulfilling civilian needs such as climate science?

Background

Basic background on NPOESS can be found in the Committee's charters from November 16, 2005 and May 11, 2006, available at: *http://www.house.gov/science/hearings/index.htm*

Nunn-McCurdy Review

The NPOESS contract follows DOD acquisition procedures. As a result, it is subject to the Nunn-McCurdy provisions of the DOD acquisition law (10 U.S.C 2433). Under the Nunn-McCurdy law, if a program's costs increase more than 25 percent, the Secretary of Defense (or the Secretary of the appropriate branch of the military) must certify the program in a period of time specified under the law or no additional funds can be obligated for the program. Certification requires a written justification that:

(1) The program is essential to national security;

(2) There is no alternative the can provide equal capability at less cost;

(3) New estimates of costs have been developed and are reasonable; and

(4) Management structure is adequate to control costs.

On January 11, 2006, the Secretary of the Air Force notified Congress that the NPOESS program would exceed the 25 percent Nunn-McCurdy notification threshold (meaning that acquisition costs would increase by at least $1.85 billion over the program's most recent cost estimate of $7.4 billion). This triggered a formal certification process that effectively superseded any previous independent reviews as well as pending program direction decisions about mitigating cost overruns and schedule delays.

To address each of the four criteria for the NPOESS program, DOD established four Independent Program Teams, each assigned to look at one of the criteria. These teams consisted of representatives of each of the agencies involved in NPOESS (DOD, NOAA, and NASA) and other experts on both satellite acquisition and on the technical capabilities of satellites. The Nunn-McCurdy certification process for NPOESS represents the first time an interagency program has undergone a Nunn-McCurdy review. For FY 2006, the NPOESS program put an interim plan in place to continue building key components of the program pending a Nunn-McCurdy decision. Thus far under the new plan, the program is mostly on schedule and within cost estimates.

On June 5, 2006, the Under Secretary of Defense for Acquisition, Technology and Logistics notified Congress that he is certifying NPOESS with the following major changes:

- New total program acquisition costs are $11.5 billion to have polar satellite coverage by NPOESS through 2026. This is a $3.7 billion increase over the most recent official total acquisition budget of $7.4 billion adopted in 2004. It is a $4.6 billion increase over the original program estimates of $6.5 billion.
- The NPOESS program will consist of four satellites, rather than six. The polar satellites basically are designed to operate in groups of three to cover the earth in three separate orbits. With the reduction to four satellites, we will rely on European satellites (with the acronym METOP) for one orbit. In the past, the U.S. has been concerned about getting all the data we need from European satellites in a form that is useful to U.S. scientists. It's not entirely clear how all of these concerns will be addressed, although the concerns were more at DOD than at NOAA.
- The first NPOESS satellite will launch in 2013. It was most recently supposed to launch in 2010. The preliminary test satellite, known as NPP and being built by NASA, will launch in late 2009 rather than this year.
- The NPOESS program will drop five sensors, three of them related to climate research. (The satellite itself will be designed in such a way that if money is found elsewhere to pay for the sensors they could be placed on the satellite, but finding money elsewhere seems unlikely.)

- Work on one of the key weather sensors that is behind schedule, known as CMIS (pronounced sea-miss), will be discontinued and instead the program will begin development of a new sensor that would have some or all of CMIS's intended capabilities. That will not be ready for the initial NPOESS satellite. Instead, the U.S. will have to rely temporarily on the Europeans for data that was to be collected by CMIS, including ocean wind speeds.
- Management reforms, including those recommended by the Commerce IG, will be implemented. The Executive Committee (EXCOM), which includes the three hearing witnesses, will meet at least quarterly and the Northrop-Grumman contract will be renegotiated.
- The changes will require renegotiating the contract with the prime contractor. This contract renegotiation will provide an opportunity to change the award fee structure of the NPOESS contract to conform to recommendations from both GAO and the Department of Commerce IG. The contract renegotiation could also result in increased costs above the $11.5 billion number certified by DOD.

Witness Questions:

The witnesses were asked to address the following questions in their testimony.

Dr. Ronald Sega, Under Secretary of the Air Force

Please describe the results of the Nunn-McCurdy review of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) and its implications for the United States Air Force, including information that addresses the following questions:

1. In what ways, if any, does the Nunn-McCurdy decision change the capabilities and launch schedule of the NPOESS program?
2. To what extent does the Nunn-McCurdy decision prevent a potential gap in the National Oceanic Atmospheric Administration's (NOAA) polar-orbiting weather satellite coverage? If a coverage gap in NOAA satellites were to occur, what are the implications for the Air Force and/or the Department of Defense weather forecasting capabilities? What are the contingency plans for a gap in polar satellite coverage?
3. How does the Nunn-McCurdy decision incorporate the recommendations of the Department of Commerce Inspector General regarding NPOESS program oversight and contract award fees?

Vice Admiral Conrad C. Lautenbacher (ret.), Administrator, National Oceanic and Atmospheric Administration

Please describe the results of the Nunn-McCurdy review of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) and its implications for the National Oceanic and Atmospheric Administration (NOAA), including information that addresses the following questions:

1. In what ways, if any, does the Nunn-McCurdy decision change the capabilities and launch schedule of the NPOESS program?
2. To what extent does the Nunn-McCurdy decision prevent a potential gap in the NOAA's polar-orbiting weather satellite coverage? If a coverage gap in NOAA satellites were to occur, what are the implications for NOAA's weather forecasting capabilities? What are the contingency plans for a gap in polar satellite coverage?
3. How does the Nunn-McCurdy decision incorporate the recommendations of the Department of Commerce Inspector General regarding NPOESS program oversight and contract award fees?

Dr. Michael Griffin, Administrator, National Aeronautics and Space Administration

Please describe the results of the Nunn-McCurdy review of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) and its implications for the National Aeronautics and Space Administration (NASA), including information that addresses the following questions:

1. In what ways, if any, does the Nunn-McCurdy decision change the capabilities and launch schedule of the NPOESS program?
2. To what extent does the Nunn-McCurdy decision prevent a potential gap in the National Oceanic Atmospheric Administration's (NOAA) polar-orbiting weather satellite coverage? If a coverage gap in NOAA polar-orbiting sat-

ellites were to occur, what would be the implications for NASA and NASA-funded scientists? Would a gap require NASA to consider launching any additional satellites of its own or to change launch plans for any of its satellites?

3. How does the Nunn-McCurdy decision incorporate the recommendations of the Department of Commerce Inspector General regarding NPOESS program oversight and contract award fees?

Chairman BOEHLERT. The hearing will come to order.

I want to welcome everyone to this extraordinarily important hearing, at which we will begin to figure out how to move ahead with the NPOESS program.

I underscore "begin to figure out" because we have just this week received the results of the Nunn-McCurdy review, and we necessarily can only begin to raise questions about the revised NPOESS proposal today. But I thought it was vital that this committee immediately begin asking questions and laying out concerns, given the troubled history of the program.

So far, there is only one thing we know with certainty, and that is that the success of NPOESS is critically important for both military and civilian weather forecasting; which is to say, for both national security and for public health and safety. We have to make this work. NPOESS stands for National Polar-orbiting Operational Environmental Satellite System, and at some point, that word "operational" has to mean more than adding a vowel to the acronym.

So, what we do need to know for this program to move ahead? I would start by saying that the Nunn-McCurdy review was a serious, tri-agency undertaking that has been put forward with a plausible plan. But we need more information to move from plausible to credible to persuasive, and the burden of proof is on the agencies represented before us today. We need to be convinced that these costs and schedule estimates are more reliable than all of those we have received in the past, and that they include adequate reserves and schedule margins.

We also need to be convinced that the proposed configuration of satellites is the best way to meet U.S. weather and climate needs, that now we are finally cost-conscious, we are not recklessly throwing sensors, especially climate sensors, overboard to save relatively small amounts of money. And we need to be sure that this configuration represents the best arrangement for the public, not, and I emphasize not, the least common denominator of bureaucratic infighting.

Let me be very clear that this committee is not going to be able to be convinced of anything unless we have the documents we need and the discussions we need to evaluate for ourselves the way costs and schedules were estimated and the way decisions were made. So far, the Department of Defense, which controls the Nunn-McCurdy documents, has not been exactly a model of cooperation.

We requested some pretty basic documents on Tuesday afternoon, and we finally received some of them less than an hour ago, and then, only because the Commerce Department and NOAA officials kept hammering away on our behalf, which I appreciate.

I don't know how we are supposed to do our jobs on behalf of the public if we can't see how decisions were made. We need to be able to judge the validity of the $11.5 billion price tag for this program, and we need to understand what it would cost to do more or less than has been proposed. For an agency whose previous cost estimates have been off by more than 66 percent to tell us, "Trust us," is on its surface preposterous, and we will not stand for it. We will make sure we get what we need to oversee this program. That is not just my opinion. That is our collective opinion. Mr. Gordon and

the Chair just had a conversation less than a half-hour ago with Mr. Wu. Everyone we talked to on both sides of this center podium is of the same mind.

In the meantime, working on NPOESS instruments and the preliminary satellite, NPP, is continuing, and apparently, has been going relatively smoothly.

Management changes are beginning to be instituted, as we called for at our last hearing, echoing the Inspector General, who we think did a fine job, and the contract with the prime contractor, Northrop Grumman, will be renegotiated to, among other things, put in place a more defensible award regime. And the contractor, for the first time, received no award fees for the most recent period. A new program office has been established, and seems to well staffed.

So I am hopeful that NPOESS will be able to move ahead more steadily from here on, but for that to happen, Congress and the Administration will need to work together to keep each other informed about this program. We need to make informed decisions. That has to start with determining if this scaled back, but more expensive, version of NPOESS is the way to move forward. It very may well be, but we can't take that on faith.

So, I will end where I began. We have to make this work. Too much has been expended to start from scratch. We have to all work together to ensure that the public has the weather information it has come to expect and depend on, at key times for their very lives.

Mr. Gordon.

[The prepared statement of Chairman Boehlert follows:]

PREPARED STATEMENT OF CHAIRMAN SHERWOOD L. BOEHLERT

I want to welcome everyone to this extraordinarily important hearing at which we will begin to figure out how to move ahead with the NPOESS program.

I underscore "begin to figure out" because we've just this week received the results of the Nunn-McCurdy review, and we necessarily can only begin to raise questions about the revised NPOESS proposal today. But I thought it was vital that this committee immediately begin asking questions and laying out concerns, given the troubled history of the program.

So far there's only one thing we know with certainty, and that's that the success of NPOESS is critically important for both military and civilian weather forecasting, which is to say for both national security and for public health and safety. We have to make this work. NPOESS stands for National Polar-orbiting Operational Environmental Satellite System, and at some point that word "Operational" has to mean more than adding a vowel to the acronym.

So what do we need to know for this program to move ahead? I'd start by saying that the Nunn-McCurdy review was a serious, tri-agency undertaking that has put forward a plausible plan. But we need more information to move from "plausible" to "credible" to "persuasive." And the burden of proof is on the agencies. We need to be convinced that these cost and schedule estimates are more reliable than all of those we have received in the past, and that they include adequate reserves and schedule margins.

We also need to be convinced that the proposed configuration of satellites is the best way to meet U.S. weather and climate needs—that now that we're finally cost conscious, we're not recklessly throwing sensors, especially climate sensors, overboard to save relatively small amounts of money. And we need to be sure that this configuration represents the best arrangement for the public, not the least common denominator of bureaucratic infighting.

Let me very clear that this committee is not going to be able to be convinced of anything unless we have the documents we need and the discussions we need to evaluate for ourselves the way costs and schedules were estimated and decisions were made. So far, the Department of Defense, which controls the Nunn-McCurdy documents, has not exactly been a model of cooperation.

We requested some pretty basic documents on Tuesday afternoon, and we finally received some of them a little while before the hearing, and then only because Commerce Department and NOAA officials kept hammering away on our behalf, which I appreciate.

I don't know how we're supposed to do our jobs on behalf of the public if we can't see how decisions were made. We need to be able to judge the validity of the $11.5 billion price tag for this program and understand what it would cost to do more or less than has been proposed. For an agency whose previous cost estimates have been off by more than 66 percent to tell us "trust us" is preposterous, and we will not stand for it. We will make sure we get what we need to oversee this program.

In the meantime, work on NPOESS instruments and the preliminary satellite, NPP, is continuing, and apparently has been going relatively smoothly.

Management changes are beginning to be instituted, as we called for at our last hearing, echoing the Inspector General. And the contract with the prime contractor, Northrop Grumman, will be renegotiated to, among other things, put in place a more defensible award regime. And the contractor, for the first time, received no award fees for the most recent period. A new program office has been established and seems to be well staffed.

So I am hopeful that NPOESS will be able to move ahead more steadily from here on out. But for that to happen, Congress and the Administration will need to work together to keep each other informed about this program. That has to start with determining if this scaled back, but more expensive version of NPOESS is the way to move forward—it very well may be, but we can't take that on faith.

So I'll end where I began. We have to make this work. Too much has been expended to start over from scratch. We have to all work together to ensure that the public has the weather information it has come to expect and depend on, at key times for their very lives.

Mr. Gordon.

Mr. GORDON. Thank you, Mr. Chairman—and for Dr. Griffin and Dr. Sega and other guests here today who haven't attended any of these NPOESS hearings, in response to our Chairman's opening statement, I would like to say amen.

It should be very clear that we are very much in sync about this important issue. And as the Chairman said, the Nunn-McCurdy review is complete, but there is still much to do before this plan is solidified and implemented. I expect this is the first of a series of hearings the committee will hold on the new program.

I don't want to start off with a confrontational tone this afternoon, but I want to make it clear that we need—that to have confidence in this plan, we need more information. At this point, we have only a bare-bones, heavily censored description of the redesigned polar satellite program and that is simply not sufficient.

What we do know, based on what we have been shared, is that we know that the best case interpretation of this plan is that there are more—it is more than $4 billion above the original cost estimate. We are on a path to purchase four satellites instead of six, with fewer instruments and reduced capacity.

Now, that may very well be the best that can be done. Perhaps this plan may, in fact, deliver us the best combination of capabilities at the lowest cost, on a schedule that limits the degradation in weather forecasting ability. However, we cannot evaluate that proposed plan without more documentation to explain this choice and the annual budget estimates that flow from the proposed baseline.

Additionally, we are—we really need to understand not just the annual budget estimates, but also, how reliable these estimates are, how much budgetary risk is calculated in this plan. Right now, no one in this room can answer that question, or at least none of the witnesses knew the answer as recently as yesterday.

This committee has been told for many things—about the program over the years. For example, we were told that the program would cost $6.8 billion for six satellites with thirteen sensors, that the technical problems were manageable, that there is no delay in the schedule for the launch of the first satellite, that the cost overruns will not trigger the Nunn-McCurdy law's review provisions. I could go on, but I think you understand my point.

So, again, let me be clear. I do not believe that any of the witnesses have come here today to mislead this committee, but I simply cannot endorse this program on the basis of assurances alone. Now, I should add that Members and staff have had briefings by the officials from DOD, NOAA, and NASA, but more often than not, the officials could not answer our questions. In those meetings, we have asserted our desire to see the underlying documents that led to this Nunn-McCurdy decision. No documents have been made available to us. The Under Secretary of Defense for Acquisition, Mr. Krieg, is said to have those documents, and control them. He has to give his blessing before the Committee can have them. He was invited to testify, but is supposedly on travel. Apparently, there are no phones where he is at the present time, so the Department of Defense could not approve, or could not get approval for the documents.

Congress has a Constitutional responsibility to oversee the programs that we authorize and fund. We would not be fulfilling our responsibility if we blindly accept the program as offered. We need to see documentation that confirms the validity of this choice. We need to see annual estimates of the budgets that are associated with the estimates of the proposed $11.5 billion acquisition, and we need to understand what level of risk attached both to the plan to maintain weather data continuity and to the cost estimated to this program, and I hope that we can move forward in a cooperative partnership.

Five minutes ago, we received some information, but I don't think it is going to be adequate. We look forward to absorbing that, and again, I welcome you as witnesses, and look forward to hearing your testimony.

[The prepared statement of Mr. Gordon follows:]

PREPARED STATEMENT OF REPRESENTATIVE BART GORDON

We are here this afternoon to take testimony on the plan for moving the NPOESS (N–POES) program forward.

The Nunn-McCurdy review is complete, but there is still much to do before this plan is solidified and implemented. I expect this is the first in a series of hearings the Committee will hold on the new program.

I don't want to start off with a confrontational tone this afternoon, but I want to be clear about what I need to have confidence in this plan—I need information.

At this point, I have only a bare-bones, heavily-censored description of the redesigned polar satellite program. That is simply not sufficient.

What do I know based on what has been shared? I know that the best case interpretation of this plan is that for more than $4 billion above the original cost estimate, we are on a path to purchase four satellites instead of six, with fewer instruments and reduced capability.

Now that may be the best that can be done. Perhaps this plan may, in fact, deliver us the best combination of capabilities at the lowest cost on a schedule that limits the degradation in weather forecasting ability.

However, I cannot evaluate the proposed plan without much more documentation to explain this choice and the annual budget estimates that flow from the proposed baseline.

Additionally, we really need to understand not just the annual budget estimates, but also how reliable those estimates are. How much budgetary risk is attached to this plan? Right now, no one in this room can answer that question—or at least none of the witnesses knew the answer as recently as yesterday.

This committee has been told many things about this program over the years. For example, we were told:

- That the program will cost $6.8 billion dollars for six satellites with thirteen sensors.
- That the technical problems are manageable.
- That there is no delay in the schedule for the launch of the first satellite.
- That the cost overruns will not trigger the Nunn-McCurdy law's review provisions.

I could go on, but I think I have made my point. I do not believe that any of our witnesses have come here today to mislead this committee. But I simply cannot endorse this program on the basis of your assurances alone.

I should add that Members and staff have had briefings by officials from DOD, NOAA and NASA, but more often than not the officials could not answer our questions.

In those meetings we have asserted our desire to see the underlying documents that lead to this Nunn-McCurdy decision. No documents have been made available to us. The Under Secretary of Defense for Acquisitions, Mr. Kreig, is said to have those documents and control them. He has to give his blessing before the Committee can have them. He was invited to testify, but is supposed to be on travel.

Apparently, there are no phones where he is at the moment so the Department of Defense could not get approval to provide the Committee with the documents we need. I hope the Chairman knows how much support he will get from me in the effort to get the Nunn-McCurdy decision package for our review.

Congress has a constitutional responsibility to oversee the programs that we authorize and fund. I would not be fulfilling my responsibility if I blindly accept the program as offered.

I want to see documentation that confirms the validity of this choice.

I want to see annual estimates of the budgets that are associated with the estimate of the proposed $11.5 billion acquisition.

I want to understand what level of risk attaches both to the plan to maintain weather data continuity and to the cost estimates of this program.

I hope that we can go forward in a cooperative partnership to deliver this important satellite system to the Nation. Thank you.

Chairman BOEHLERT. Thank you very much, Mr. Gordon. The distinguished Subcommittee Chairman, Dr. Ehlers.

Mr. EHLERS. Thank you, Chairman Boehlert. I am pleased the Committee is holding this hearing today to help us all understand what the recent Nunn-McCurdy decision means for this critical program.

These satellites provide data that are essential to NOAA's ability to provide accurate forecasts of severe weather, including hurricanes. Additionally, with the NPOESS program, NOAA's needs are now tied to the military's needs. The men and women of the armed forces put themselves on the line for us every day, and the least we can do is ensure that they have accurate weather forecasts, so they can perform their jobs effectively, and we can ensure that they return home safely when those jobs are done.

The importance of the NPOESS program cannot be overstated. Lives are at stake, both the military lives I mentioned, as well as the civilian lives, and letting down our fellow citizens is not an option. We must make sure that we have the satellites we need when we need them.

Excuse me. Unfortunately, the NPOESS program has been deeply troubled, resulting in billions of dollars in cost overruns and years of delays that ultimately triggered the Nunn-McCurdy process. The NPOESS program that has emerged from this process is

significantly different from the program we started with. At first glance, the newly certified program looks reasonable, but 12 years into the program and three years before the first launch, we are at a critical point where there is little room left to recover from further missteps. I am ready to be convinced that the Nunn-McCurdy process has produced the best possible map of the way forward, and frankly, I am pleased with what I have seen of the result, and I appreciate all the work that has been done with it. But we need more specifics. It is basically up to you to convince me.

I look forward to hearing more details of the alternatives that were considered, and how you worked together to arrive at the program we have before us. I also expect to hear more about what we have given up, and the implications for those choices.

Finally, this program was also meant to aid important atmospheric research. Many of these research capabilities have been lost, so we need to be certain that we know exactly what we are giving up as we try to create a successful satellite system out of NPOESS. And furthermore, how we can, at some time in the future, recover those research capabilities and put them in space.

I look forward to a lively, informative discussion today. I certainly am not interested in playing a game of gotcha or anything else. We are in this together. What we need is openness with each other, and a true desire to achieve a good result on the part of all persons and all parties.

I want to thank our witnesses for being here. We are—I don't enjoy putting anyone through torture, and that is not my intent. I hope it is not the intent of anyone here, but we certainly have to work this problem through together.

I yield back the balance of my time.

[The prepared statement of Mr. Ehlers follows:]

PREPARED STATEMENT OF REPRESENTATIVE VERNON J. EHLERS

Thank you Chairman Boehlert. I am pleased the Committee is holding this hearing today to help us all understand what the recent Nunn-McCurdy decision means for this critical program.

These satellites provide data that are essential to NOAA's ability to provide accurate forecasts of severe weather, including hurricanes. Additionally, with the NPOESS program, NOAA's needs are now tied to the military's needs. The men and women of the Armed Services put themselves on the line for us every day and depend on accurate weather forecasts to perform their jobs effectively and ensure that they return home safely when those jobs are done. The importance of the NPOESS program cannot be overstated—lives ARE at stake, and letting down our fellow citizens is not an option. We must make sure that we have the satellites we need when we need them.

Unfortunately, the NPOESS program has been deeply troubled, resulting in billions of dollars in cost overruns and years of delays that ultimately triggered the Nunn-McCurdy process. The NPOESS program that has emerged from this process is significantly different from the program we started with. At first glance, the newly certified program looks reasonable, but twelve years into the program, and three years before the first launch, we are at a critical point where there is little room left to recover from further missteps. I am ready to be convinced that the Nunn-McCurdy process has produced the best possible map of the way forward. But it is up to you to convince me.

I look forward to hearing more details of the alternatives that were considered and how you worked together to arrive at the program we have before us. I also expect to hear more about what we've given up and the implications of those choices. Finally, this program was also meant to aid important atmospheric research. Many of these research capabilities have been lost, so we need to be certain that we know exactly what we're giving up as we try to create a successful satellite system out of NPOESS.

I look forward to a lively, informative discussion today. I want to thank our witnesses for being here, and I yield back the balance of my time.

Chairman BOEHLERT. Thank you very much. Thanks for that assurance.

Mr. Wu.

Mr. WU. Thank you, Mr. Chairman, and Mr. Chairman, I always thank you for calling these hearings. However, today, I am at least a little concerned that this hearing may be premature unless this hearing is only one of a continuing series of oversight hearings.

Chairman BOEHLERT. Let me assure you this is the beginning.

Mr. WU. Thank you, Mr. Chairman.

Because for this hearing, I believe that neither the Members nor our staff, have received sufficient substantive materials on the Nunn-McCurdy decision that would allow us to exercise real oversight, to do our job, to hold both the agencies and ourselves accountable for taxpayer dollars. The result is that the witnesses before us today can pretty much tell us anything they want, and we can't sort out the hard facts from the hopeful scenarios.

Admiral Lautenbacher was very generous with his time yesterday in meeting with me. He briefed me at some length in an effort to reassure me that stretching the program out was a good thing, and that the plan would not have any effects on weather forecasting capabilities.

Perhaps those claims are true if every element of the Nunn-McCurdy plan unfolds as hoped, but there are enormous risks built into the Nunn-McCurdy plan. For example, the plan assumes that the N prime satellite works as advertised as a gap filler, but given the N prime satellite project's track record, no one can be certain how it will perform in orbit. I believe this was a satellite that was dropped off a stand during construction.

The plan also assumes that we will have 13 successful launches of thirteen satellites constructed by four different agencies, on schedule in each case. Those 13 satellites all have to work as advertised for at least as long as planned. If any of these vehicles or programs come up short, there will either be radical revision required, a loss of capability, or a dangerous gap in coverage.

Not only is risk associated with providing continuous weather satellite coverage, but risk also overshadows the cost assessment. The Nunn-McCurdy plan says the base program should now cost, and I am not sure if the number is $11.1 billion or $11.5 billion, and perhaps the witnesses can work out that difference for us today. We don't know what level of confidence we should put in whatever that number is, $11.1 or $11.5. It seems to me that since we are canceling one of the two key instruments for weather forecasting, and starting an entirely new acquisition, that perhaps the confidence boundaries on that number might be low, and that even if the items are moving forward have had problems, and therefore, that these problems, as they are addressed, will cost more money.

But that is the point. Until we see more information on what the DOD Cost Analysis Improvement Group actually says on all these items, we don't know how much confidence to put in the new bottom line number. I would not be surprised if the costs climb again, though at least I am hopeful that the rate of growth might decline.

But even if costs don't go up, it appears that there are other costs or risks associated with this plan not included in the base program. For example, the use of European satellite data for real time forecasting models, we need ground station downlink—we need our own ground station downlink capability. That too will cost money, but how much, we don't know. No one has thus far been able to tell us.

There is another example. Six instruments were dropped from the NPOESS program. DOD has invited those who might have an interest in that data to step up to the plate and pay for the instruments themselves. If, for example, Space Command decides that it must have the SESS instrument, and then puts up tens or even hundreds of millions of dollars, then the instrument might fly, but those dollars are not in the baseline $11.5 or $11.1, or whatever that number is, and the baseline Nunn-McCurdy number.

My message is twofold. First, I would like to see the documentation that led Under Secretary Krieg to certify this new version of the NPOESS program under Nunn-McCurdy, and until I see that, and consult with staff and outside experts, I don't know how to best evaluate what we will hear today. When we are dealing with a program that has overrun its budget from $6.8 billion to at least $11 billion, the time for wishful thinking should be behind us.

Second, we must find a way forward that maintains the quality and continuity of our weather forecasting system. Billions of dollars of our nation's GDP are tied to those forecasts, and not only America's quality of life, but actual American lives hang in the balance, and I don't think that we can afford to get this wrong.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Wu follows:]

PREPARED STATEMENT OF REPRESENTATIVE DAVID WU

Normally, Mr. Chairman, I would thank you for calling these hearings. However, I am concerned that this hearing may be premature.

Neither the Members nor the Staff has received sufficient, substantive materials on the Nunn-McCurdy decision that would allow us to exercise real oversight; to do our job and be accountable for tax-payer dollars. The result is that the witnesses before us today can pretty much tell us anything they want and we can't sort out the hard facts from the hopeful scenarios.

Administrator Lautenbacher was very generous with his time in meeting with me yesterday. He briefed me at some length in an effort to reassure me that stretching the program out was a good thing and that this plan would not have any impact on weather forecasting abilities.

Perhaps those claims are true, if every element in the Nunn-McCurdy plan unfolds as hoped. But there are enormous risks built into the Nunn-McCurdy plan. For example, the plan assumes that the N prime satellite works as advertised. Given this project's track record, no one can be certain how it will perform in orbit.

The plan also assumes that we will have 13 successful launches of 13 satellites constructed by four different agencies on schedule in each case. Those 13 satellites all have to work as advertised for at least as long as planned. If any of these variables comes up short, there will either be radical revisions required, a loss of capability, or a troubling gap in coverage.

Not only is risk associated with providing continuous weather satellite coverage, but risk also overshadows the cost assessment. The Nunn-McCurdy plan says the base program should now cost $11.5 billion. We do not know what level of confidence we should put in that number. It seems to me that since we are canceling one of the two key instruments for weather forecasting and starting an entirely new acquisition, that perhaps the confidence boundaries on that item should be very low. And even those items that are moving forward have had problems; problems that will need to be addressed and therefore, will cost money.

But that is the point. Until we see more information on what the DOD Cost Analysis Improvement Group (CAIG) actually says on all these items, we don't know how much confidence to put in the new bottom line number. I would not be surprised if the costs climb again, though I am hopeful that the rate of growth will decline.

But even if costs don't go up, it appears there are costs associated with this plan not included in the base program. For example, to use European satellite data for real-time forecasting models, we need our own ground station down-link capability. That too will cost money, but how much, we don't know. No one has been able to tell us.

Another example. Six instruments were dropped from the NPOESS program. However, DOD has simply invited those who might have an interest in that data to step up to the plate and pay for the instruments themselves. If, for example, Space Command, decides they must have the SESS instrument and they put up the tens or even hundreds of millions that might cost, then it will fly. But those dollars are not in the $11.5 billion base program, as reconstituted by the Nunn-McCurdy review.

My message is two-fold. First, I want to see the documentation that led Under Secretary Krieg to certify this new version of the NPOESS program under Nunn-McCurdy. Until I see that, and can consult with staff and outside experts, I don't how to evaluate what we will hear today. When we are dealing with a program that has overrun its budget from $6.8 billion to at least $11 billion, the time for wishful thinking should be behind us.

Second, we must find a way forward that maintains the quality and continuity of our weather forecasting system. Billions of dollars of our nation's GDP are tied to those forecasts, and not only quality of life, but actual American lives can hang in the balance. We can't afford to get this wrong.

Chairman BOEHLERT. Thank you very much, Mr. Wu. I thank all my colleagues for their constructive and illuminating opening statements.

[The prepared statement of Mr. Costello follows:]

PREPARED STATEMENT OF REPRESENTATIVE JERRY F. COSTELLO

Good morning. I want to thank the witnesses for appearing before the Committee to discuss the Nunn-McCurdy decision on the National Polar-orbiting Operational Environmental Satellite System (NPOESS) satellites program.

The agencies in charge of NPOESS are the National Oceanic and Atmospheric Administration (NOAA), the Department of Defense (DOD), and the National Aeronautics and Space Administration (NASA). The DOD is required by law to report to Congress any program they expect to have a 15 percent cost overrun. The NPOESS program breached this limit several months ago, with DOD providing notice to Congress on September 28, 2005. While I knew the NPOESS program would be at least 15 percent above the estimate of $6.8 billion, I was shocked to learn after a Full Science Committee hearing on November 16, 2005, that the NPOESS program was projecting cost overruns exceeding 25 percent. A program with a numerical value higher than 15 percent triggers an additional requirement under the Nunn-McCurdy law. Specifically, the DOD Under Secretary must review the program and certify that it satisfies four criteria before the project can proceed.

Science Committee staff was briefed by the Department of Defense that the NPOESS program had been restructured from six satellites to four satellites. However, the Department said that they may terminate this acquisition after two satellites are completed. Further, the total program acquisition cost is estimated to be $11.1 billion, which is an increase of $4.3 billion. I would like to hear from the witnesses why we are buying fewer satellites at a higher price.

I welcome the panel of witnesses and look forward to their testimony.

Chairman BOEHLERT. Now, what specifically was done to make sure these numbers in Nunn-McCurdy. I am so anxious to ask you questions, that I was going to forget about your testimony.

But I have been experienced in this business, and I know that the testimony usually is not particularly illuminating. It is the exchange. But we will go to the testimony. Thank you, Mr. Goldston, for reminding me of the importance of having these witnesses here, and giving them an opportunity to testify.

First, our panel consists of Vice Admiral Conrad C. Lautenbacher, Jr., Administrator, National Oceanographic and Atmospheric Administration; Dr. Michael Griffin, Administrator, National Aeronautics and Space Administration; and Dr. Ronald M. Sega, Under Secretary of the Air Force, U.S. Department of Defense.

Chairman BOEHLERT. Admiral, you are first up.

STATEMENT OF VICE ADMIRAL CONRAD C. LAUTENBACHER, JR. (U.S. NAVY, RET.), ADMINISTRATOR, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE; UNDER SECRETARY OF COMMERCE FOR OCEANS AND ATMOSPHERE

Admiral LAUTENBACHER. Thank you, Mr. Chairman, Ranking Member Gordon, and distinguished Chairmen of the Subcommittees, and distinguished Members of the Committee, thank you very much for the opportunity to be here today to discuss the recent Nunn-McCurdy certification of the National Polar-orbiting and Operational Environmental Satellite System, known as NPOESS. I hope that I can answer some of your questions before you have to ask them. I will try to do as much as I can in my testimony, and make it meaningful to all of you.

Although the Nunn-McCurdy process is a DOD endeavor, both NOAA and NASA have been fully engaged in the process. Our personnel were members of all working groups, and the EXCOM met with DOD's Under Secretary Krieg, and participated in the decision-making process. I support the certification decision, and I want to thank Under Secretary Krieg for the inclusive manner in which the process was conducted.

Let me first start by laying out the results of the certification from NOAA's point of view. First of all, data continuity and improvements for weather forecasting are maintained, but we will rely on European satellites for one of the three orbits.

Second, we have minimized the potential for any gap in the coverage. Three, all major sensors are maintained, except for the CMIS sensor, which will be replaced by a smaller and less complex version that still meets our weather forecasting requirements. Number four, we were not able to keep some of the climate sensors in the final decision, and we could potentially lose some climate data, especially on solar irradiance, but we are working on specific mitigation plans with NASA and DOD, and will come up with a plan in the near future to provide for continuity.

Number five, significant management changes are happening at all levels, including the EXCOM, which at my request will meet at least quarterly, and include the senior management of the prime contractor. In addition, all Department of Commerce Inspector General's recommendations will be implemented.

Most specifically, now, the revised program consists of four NPOESS satellites operating in two orbits, and utilizes data from European weather satellites for the third orbit. We have put into place a key decision point before procuring the final two satellites. We have concerns with past performance of the prime contractor, and are exploring options to procure these two production satellites using an alternative integrator, which could be the government.

This decision does not have to be made until fiscal year 2010, which gives us time to assess realistically the performance of the NPP satellite, and the prime contractor. The first NPOESS satellite is expected to be launched at this point in early 2013, and the program is expected to last until 2026. The estimated total acquisition cost of the revised program is $11.5 billion, and the difference between $11.1 are the launch costs, $11.1 without launch, $11.5 with launch costs. We will provide more information.

There has been skepticism over any NPOESS cost and schedule information, given the history of the program. We have much more confidence in these new estimates for several reasons. First of all, the DOD Cost Estimating Group has significantly changed the way they run their cost models, correcting inadequate assumptions from earlier versions, and updating their database to the experience that we have had in the beginning of this program. The $11.5 billion also includes much more realistic schedule margins and management reserves for the overall program and each critical sensor.

To minimize any potential gaps in coverage, we are actively managing the remaining NOAA and DOD satellites, as well as the NPOESS Preparatory Program or NPP satellite, which will carry many of the core NPOESS sensors on a NASA platform. We do not believe there will be gaps in satellite coverage under this plan. However, should the remaining NOAA POES satellite fail on launch or in orbit, the N Prime satellite, we would have to rely on DOD, European, and the NASA satellites, and there would be some degradation to NOAA's forecasting ability until NPP or a NPOESS satellite could be launched.

As part of the Nunn-McCurdy process, we have reevaluated all the key performance parameters, and we worked with the user community to prioritize the 13 NPOESS sensors. The certified program will procure and integrate the key sensors which will provide all of the capabilities NOAA requires to improve our weather forecasting mission.

The only exception, as stated earlier, is CMIS. This project has too many technical challenges and risks, and will be terminated. However, a smaller, less complex replacement sensor will be competitively procured and integrated into the second satellite of the series. We believe that the new sensor, along with the use of European satellites, will meet all NOAA requirements, including ocean wind speed and all weather imagery, with less risk and at a lower cost. To further reduce risk to the program, we are also developing an alternative imaging sensor, which could be available for launch for the first satellite, in case VIIRS cannot finish its technical—overcoming its technical challenges and finish final tests.

Although the primary mission for NPOESS is to provide data for weather forecasting, many of the core sensors and some of the secondary sensors also provide climate and space weather observations. Unfortunately, difficult choices and tradeoffs had to be made, and funding to purchase five of the secondary sensors originally planned to be on NPOESS are not included in the certified program.

To meet the requirements to measure the Earth's radiation budget, we are taking a research sensor already built, and backup operational space weather instrument from the POES series, and plac-

ing them directly on the NPOESS spacecraft to continue continuity in those areas. There will be no loss in continuity in those two areas, and we are using proven sensor technology.

For measuring aerosols, NASA is planning an upcoming mission using the same sensor plan for NPOESS. However, the NASA research satellite is likely to last only five to ten years, so we are still identifying the long-term solution for the instrument.

Finally, NOAA, NASA, and DOD are still formulating a plan for solar irradiance, which is used to determine how much heat content of the Earth is due to solar forcings, and an important continuity for us to maintain.

We specifically decided that the NPOESS spacecraft will be built with the capacity to house all of the sensors, and includes funding to integrate them on the spacecraft. This decision was made because the EXCOM agreed that any additional funding gain through contract renegotiation or in unutilized management reserve would be considered to procure these secondary sensors, in addition to other organizations bringing money for these sensors to the table.

Regarding management changes, NOAA insisted that management processes must be made more transparent, auditable, and strengthened at all levels. We cannot accept what occurred in the past, or fall guilty to the mistaken belief that cost and schedule overruns are the norm for satellite programs. We are putting into place additional checks and balances at all levels, and actions are underway to implement each of the Department of Commerce Inspector General's recommendations.

At my request, as mentioned, the EXCOM will meet quarterly, and we will include the senior leadership from the prime contractor. We are implementing a new oversight level with the establishment of a program executive office, which reports to the EXCOM. This office will be led by an experienced senior acquisition executive, who will provide oversight of the government and prime and subcontractor performance. We have directed the PEO to obtain regular independent reviews of the program by outside experts, and the PEO will be the fee determining official, instead of the program director. The NPOESS contract will be renegotiated, and the top priority will be to lower the award fee percentage, while also implementing the recommendations of the DOC IG and the changes outlined in the DOD acquisition policy on award fee distribution.

We have directed the NPOESS program office to change the way it monitors earned value data, key milestones, dollars spent, and contract personnel. They will now track these metrics on a more regular basis, which will provide real time insight into the health and status of the problem. These changes should 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 much sooner.

In addition, the program office has been reorganized, and new personnel are being added to increase expertise in budget analysis, cost estimating, systems engineering, and program control.

I would also point out the EXCOM will meet in August with the prime contractor to evaluate the restructured program. The meeting will examine how well the program office, PEO, and contractor

are measuring early warnings to contain costs and schedule growth. I fully understand and share the concerns by this committee and the DOC IG about the cost overruns and schedule delays that have occurred, and I am committed to correcting the management flaws in this program.

The good news is that we have been keeping to the schedule and costs of the interim plan we put into effect for 2006. We have also significantly reduced the overall risk in the program, and increased our confidence of success, one, by providing appropriate management reserves and schedule margins into the cost estimate, two, by providing more rigorous management oversight at all levels, and three, by assuring we can meet our performance requirements by substituting a smaller sensor for CMIS, and having a backup plan for the VIIRS instrument.

We now have a path forward for NPOESS that, while not the NPOESS we envisioned originally, will ensure the Nation receives the vital weather information we require. I have more confidence this program can be successfully completed, and we have ensured we can add additional sensors in the future, which would fulfill all of the original NPOESS capabilities. Again, as in the past, I want to work directly with this committee to ensure that the rest of the NPOESS story is a positive one.

Thank you for the opportunity to make the testimony.

[The prepared statement of Vice Admiral Lautenbacher follows:]

PREPARED STATEMENT OF VICE ADMIRAL CONRAD C. LAUTENBACHER, JR.

Introduction

Chairman Boehlert, Ranking Member Gordon and Members of the Committee, I am Conrad C. Lautenbacher, Under Secretary for Oceans and Atmosphere at the Department of Commerce (DOC) and head of the National Oceanic and Atmospheric Administration (NOAA). I am here to discuss the recent decisions made by the Administration regarding the National Polar-orbiting Operational Environmental Satellite System (NPOESS) program.

What is NPOESS?

The U.S. has historically operated two operational polar satellite systems, one for military and one for civilian use. In 1994, it was decided to merge the two programs together. This new program, NPOESS, was originally designed to be a series of six satellites with a total 13 different sensors. The new sensors would provide higher quality data that would support more sophisticated environmental models for improved weather forecasting.

NPOESS is a unique program in the Federal Government. It is jointly managed by DOC, the Department of Defense (DOD) and NASA with direct funding provided by DOC and DOD. At the senior level, the program is overseen by an Executive Committee (EXCOM) and managed by an integrated program office (IPO).

NPOESS is the most complex environmental satellite system ever developed. The program has presented numerous technical, developmental, integration and management challenges. As the Committee is well aware, in March 2005, the contractor informed the government NPOESS would not meet cost and schedule, mostly because of technical challenges with one sensor known as the Visible/Infrared Imager Radiometer Suite (VIIRS). In November, after several independent reviews, the EXCOM decided on management structure changes and narrowed a list of options on how to change the program. However, in December, the IPO notified the Air Force projected cost overruns would exceed the 25 percent threshold triggering a breach of the Nunn-McCurdy statute.

Nunn-McCurdy Process

Although the Nunn-McCurdy process is a DOD endeavor, both NOAA and NASA have been fully engaged in the process. Our personnel were members of all working groups and the EXCOM met with DOD's Under Secretary Krieg and participated in the decision-making processes leading to the certification. I support the recertifi-

cation decisions and the actions outlined in the June 5, 2006 NPOESS Acquisition Decision Memo (ADM), and I want to thank Under Secretary Krieg for the inclusive manner in which the process was conducted.

Fixing NPOESS has been and continues to be my number one priority. Since the start of the certification process in January 2006, I have personally participated in many Nunn-McCurdy meetings, developed NOAA's position on the issues that arose in the various working groups and received frequent progress updates. Additionally, I continually monitored and assessed the status of the ongoing NPOESS program. Brigadier General (Select) Sue Mashiko, acting Program Executive Officer (PEO), provided weekly program status updates and met with me on a regular basis. The program has met each milestone for this year's interim plan and is within cost and schedule for the Fiscal Year 2006 plan.

Throughout the Nunn-McCurdy process I have had three priorities: 1) ensure continuity of polar satellite data; 2) implement management changes at all levels to improve oversight of the program and prevent recurrence of past problems; and 3) ensure the certified program meets NOAA requirements for improved weather forecasting and provides for growth potential in the areas of climate and space weather observations.

I believe the certified program achieves these priorities. The revised program consists of four NPOESS satellites operating in two orbits and utilizes data from European weather satellites for the third orbit. The original NPOESS concept covered the same number of orbits. We have put into place a key decision point before procuring the final two satellites. We have concerns with the past performance of the prime contractor and are exploring options to procure these two production satellites using the government as the integrator. This decision does not have to be made until FY 2010, which gives us time to realistically assess the performance of the NPOESS Preparatory Program (NPP) satellite and the prime contractor. While the NPP mission is expected to be launched in 2009, the first NPOESS satellite is expected to be launched in early 2013 and the program is expected to last until 2026. The estimated total acquisition cost of the revised program is $11.5 billion. The DOD cost estimators working closely with the program office have determined the FY 2006 and FY 2007 budgets are adequate to support the revised program.

To minimize any potential gaps in coverage, we are rescheduling launches of the remaining NOAA and DOD satellites as well as the NPP satellite, which will carry four of the core NPOESS sensors on a NASA platform. We do not believe there will be a gap in data used for weather forecasting under this plan. However, should the remaining NOAA POES satellite fail on launch or in orbit, we would have to rely solely on DOD, European and NASA satellites and there would be some degradation to NOAA's weather forecasting ability until NPP or an NPOESS satellite could be launched.

I insisted that management processes must be made more transparent and auditable and strengthened at all levels. We cannot accept what occurred in the past or fall guilty to the mistaken belief that cost and schedule overruns are the norm for satellite programs. We are putting into place additional checks and balances at all levels and actions are underway to implement each of the Department of Commerce Inspector General's (DOC IG) recommendations. At my request, the EXCOM will meet quarterly and we will invite senior leadership from the prime contractor. We are implementing a new oversight level with the establishment of a Program Executive Office, which reports to the EXCOM. This office will be led by a senior experienced acquisition executive who will provide oversight of the government and prime and subcontractor performance. We have directed the PEO to obtain regular independent reviews of the program by outside experts and the PEO will be the fee determining official instead of the program director. The NPOESS contract will be renegotiated and a top priority will be to lower the award fee percentage, while also implementing the recommendations of the DOC IG and the changes outlined in the recent DOD acquisition memo on award fee distribution.

We have directed the NPOESS program office to change the way it monitors earned value data, key milestones, dollars spent and contractor personnel. They will now track these metrics on a more regular basis, which will provide real-time insight into the health and status of the program. These changes should 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 program office has been reorganized and new personnel are being added to increase expertise in budget analysis, systems engineering, and program control.

As part of the Nunn-McCurdy process, we reevaluated all the key performance parameters and worked with the user community to prioritize the 13 NPOESS sensors. The certified program will procure and integrate the key sensors which will

provide all of the capabilities NOAA requires to improve our weather forecasting mission. These sensors include VIIRS, the Cross-track Infrared Sounder, the Advanced Technology Microwave Sounder, and the majority of the Ozone Mapping and Profiler Suite capabilities. The only exception is the Conical Microwave Imager Sounder (CMIS). This project has too many technical challenges and risks and will be terminated. However, a smaller and less complex replacement sensor will be competitively procured and integrated onto the satellite. We believe the new sensor, along with the use of European satellites, will meet all NOAA requirements, including ocean wind speed and all-weather imagery with less risk and at a lower cost. To further reduce risk to the program, we are also developing an alternative imaging sensor which could be available for launch of the first satellite in case VIIRS cannot overcome its technical challenges.

Although the primary mission for NPOESS is to provide data for weather forecasting, many of the core sensors mentioned above and some of the secondary sensors would provide some additional climate and space weather observations. Unfortunately, difficult choices and trade-offs had to be made and the cost to procure these sensors is not included in the certified program, however the program will plan for and fund the integration of these sensors on the spacecraft. Some of these sensors provide continuity to certain long-term climate records while other sensors would provide new data. NOAA, NASA and DOD will be assessing the impacts of these trade-offs, and will work in conjunction with our international partners to identify what mitigation strategies may be available. We specifically decided that the NPOESS spacecraft will be built with the capability to house all of the sensors and the program budget will include the dollars to integrate them on the spacecraft. This decision was made because the EXCOM agreed any additional funding gained through contract renegotiation or in unutilized management reserve would be used to procure these secondary sensors.

To summarize, the certified NPOESS program will have fewer satellites, less sensors, while costing more money. But we will provide continuity of all current polar satellite data critical for our weather forecasting models while satisfying our requirements for future forecasting improvements. We have also significantly reduced the overall risk in the program (and increased our confidence of success) by providing appropriate management reserves and schedule margins into the cost estimates; through management changes at all levels; and by ensuring we can meet our performance requirements by substituting a smaller sensor for CMIS and having a backup plan for VIIRS.

I believe this is a well-constructed, achievable plan and will address all known deficiencies with the program. I am fully committed to making this program a success. I appreciate the Committee's ongoing oversight of this critical weather satellite program, and I am ready to respond to your questions.

BIOGRAPHY FOR VICE ADMIRAL CONRAD C. LAUTENBACHER, JR.

A native of Philadelphia, Pa., retired Navy Vice Admiral Conrad C. Lautenbacher, Ph.D., is serving as the Under Secretary of Commerce for Oceans and Atmosphere. He was appointed Dec. 19, 2001. Along with this title comes the added distinction of serving as the eighth Administrator of the National Oceanic and Atmospheric Administration. He holds an M.S. and Ph.D. from Harvard University in applied mathematics.

Lautenbacher oversees the day-to-day functions of NOAA, as well as laying out its strategic and operational future. The agency manages an annual budget of $4 billion. The agency includes, and is comprised of, the National Environmental Satellite, Data and Information Services; National Marine Fisheries Service; National Ocean Service; National Weather Service; Oceanic and Atmospheric Research; Marine and Aviation Operations; and the NOAA Corps, the Nation's seventh uniformed service. He directed an extensive review and reorganization of the NOAA corporate structure to meet the environmental challenges of the 21st century.

As the NOAA administrator, Lautenbacher spearheaded the first-ever Earth Observation Summit, which hosted ministerial-level representation from several dozen of the world's nations in Washington July 2003. Through subsequent international summits and working groups, he worked to encourage world scientific and policy leaders to work toward a common goal of building a sustained Global Earth Observation System of Systems (GEOSS) that would collect and disseminate data, information and models to stakeholders and decision makers for the benefit of all nations individually and the world community collectively. The effort culminated in an agreement for a 10-year implementation plan for GEOSS reached by the 55 member countries of the Group on Earth Observations at the Third Observation Summit held in Brussels February 2005.

He also has headed numerous delegations at international governmental summits and conferences around the world, including the U.S. delegation to 2002 Asia-Pacific Economic Cooperation Ocean Ministerial Meeting in Korea, and 2002 and 2003 meetings of the World Meteorological Organization and Intergovernmental Oceanographic Commission in Switzerland and France, as well as leading the Commerce delegation to the 2002 World Summit on Sustainable Development in South Africa.

Before joining NOAA, Lautenbacher formed his own management consultant business, and worked principally for Technology, Strategies & Alliances Inc. He was President and CEO of the Consortium for Oceanographic Research and Education (CORE). This not-for-profit organization has a membership of 76 institutions of higher learning and a mission to increase basic knowledge and public support across the spectrum of ocean sciences.

Lautenbacher is a graduate of the U.S. Naval Academy (Class of 1964), and has won accolades for his performance in a broad range of operational, command and staff positions both ashore and afloat. He retired after 40 years of service in the Navy. His military career was marked by skilled fiscal management and significant improvements in operations through performance-based evaluations of processes.

During his time in the Navy, he was selected as a Federal Executive Fellow and served at the Brookings Institution. He served as a guest lecturer on numerous occasions at the Naval War College, the Army War College, the Air War College, The Fletcher School of Diplomacy, and the components of the National Defense University.

His Navy experience includes tours as Commanding Officer of USS HEWITT (DD–966), Commander Naval Station Norfolk; Commander of Cruiser-Destroyer Group Five with additional duties as Commander U.S. Naval Forces Central Command Riyadh during Operations Desert Shield and Desert Storm, where he was in charge of Navy planning and participation in the air campaign. As Commander U.S. Third Fleet, he introduced joint training to the Pacific with the initiation of the first West Coast Joint Task Force Training Exercises (JTFEXs).

A leader in the introduction of cutting-edge information technology, he pioneered the use of information technology to mount large-scale operations using sea-based command and control. As Assistant for Strategy with the Chief of Naval Operations Executive Panel, and Program Planning Branch Head in the Navy Program Planning Directorate, he continued to hone his analytic skills resulting in designation as a specialist both in Operations Analysis and Financial Management. During his final tour of duty, he served as Deputy Chief of Naval Operations (Resources, Warfare Requirements and Assessments) in charge of Navy programs and budget.

Lautenbacher lives in Northern Virginia with his wife Susan who is a life-long high school and middle school science teacher.

Chairman BOEHLERT. Thank you very much, Admiral. You can see why I was anxious to get started with the questions, because they usually have five minutes for opening statement, and you were double that, but that is all right. We allowed that, and we are going to be generous with the time. It is too darn important to constrain what you want to tell us. But—well, that is enough said about that.

Dr. Griffin.

STATEMENT OF DR. MICHAEL D. GRIFFIN, ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Dr. GRIFFIN. Good afternoon, Chairman Boehlert, Ranking Member Gordon, Members of the Committee.

I normally enjoy hearings and meetings with you and your staff, but I wish today's hearing was under better circumstances. But we are where we are, and you have NASA's commitment to keep you informed about our role and responsibilities as a junior partner in the NPOESS program.

One axiom applicable to today's hearing is when you are in a hole, stop digging. The Congress codified this axiom into law for DOD program managers, with the Nunn-McCurdy provision in the *Defense Authorization Act of 1983.* In fact, I have scheduled an up-

coming meeting with former Congressman Dave McCurdy to discuss his perspective on this legislation, and lessons learned from this NPOESS recertification process. Because, as you know, we now have analogous reporting requirements to Congress in the *NASA Authorization Act of 2005*.

The Nunn-McCurdy recertification process for programs like NPOESS is a necessary step in restoring credibility for major programs to our stakeholders in the Congress when those programs stray from cost, schedule, and performance plans. NASA has been active in this process this past year, and we remain committed to our role in the overall program.

As I have testified to this committee on other NASA issues, space missions, even weather satellites, which many Americans appreciate but often take for granted, are quite simply the most technically challenging tasks our nation undertakes. Weather and climate research satellites are no exception. They are just as difficult.

We at NASA are committed to doing our part to meet this challenge with the NPOESS program. NASA's role was to develop and demonstrate one of a kind technologies, leading to operational capabilities. NASA is developing the NPOESS Preparatory Project, or NPP, and we provide long-term climate measurements for the science community. The NASA-managed NPP satellite is a joint project between us and the NPOESS program office. We are providing the NPP spacecraft bus. We have developed an advanced microwave sounder instrument to measure atmospheric temperature, pressures, and moisture, and we will provide launch service, currently planned for the fall of '99—I am sorry, of '09, pardon me.

While NPP is not designed as an operational weather satellite like NPOESS, it could provide partial coverage while on orbit, as the NPOESS satellites come online in 2013. The NPP satellite is currently awaiting delivery from NPOESS program office of the Visible/Infrared Imaging Radiometer Suite, or the VIIRS instrument, for integration on the spacecraft. This instrument is on the critical path of the NPP mission, and is essential to the risk mitigation of the operational NPOESS program.

Further, the Nunn-McCurdy recertified NPOESS program includes other key instruments for climate measurements. However, in the process of re-baselining NPOESS, we chose to place the highest priority on continuing existing operational environmental monitoring sensors, and we will defer or delete those censors that do not provide continuity with existing operational measurements. This has been a careful balance of tradeoffs for cost and schedule, but as government managers, we needed to set priorities within the resources provided and the schedule permitted.

You have my commitment to work with the Science Committee, international partners, as well as NOAA and the DOD, to define those climate measurements which are of the highest priority, and which might be hosted on other satellite platforms.

Mr. Chairman and Members of the Committee, when you are in a hole, stop digging. We have recertified to the Congress, through the Nunn-McCurdy process, what we are willing and able to do to ensure our nation's weather and climate monitoring program begins to climb out of the hole. I realize that we at NASA have had a credibility problem with Congress, and promising to do more with

the resources provided than is reasonable to propose. NASA cannot afford everything that our many constituencies would like us to do, and working with the science community and Congress, we have had to make some difficult decisions on other programs. NPOESS is no exception. We are trying to be as realistic and forthcoming with you as we can be on our programs.

We are a junior partner in the tri-agency NPOESS effort, and we are committed to the NPOESS team. We have got a challenge ahead of us, and we will need your help now more than ever.

Thank you.

[The prepared statement of Dr. Griffin follows:]

PREPARED STATEMENT OF MICHAEL D. GRIFFIN

Mr. Chairman and Members of the Committee, thank you for this opportunity to appear today to share with the Committee information regarding NASA's stake in and commitment to the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Nunn-McCurdy certification.

The NASA role in the NPOESS program, in accordance with Presidential Decision Directive/NSTC–2, is to facilitate the development and insertion of new cost-effective technologies that will enhance the ability of the converged system to meet its operational requirements. NASA's primary stake in the NPOESS program is a scientific one; we look to NPOESS to provide long-term continuity of measurement of key climate parameters, many of which were initiated or enhanced by NASA's Earth Observing System. Toward this end, NASA has also entered into a partnership with the NPOESS Integrated Program Office (IPO) for the NPOESS Preparatory Project (NPP).

NASA is committed to doing its part as a technology provider to make the NPOESS program, as restructured in the Nunn-McCurdy certification, succeed in collaboration with NOAA and the DOD. Below, I will address the two primary features of the Nunn-McCurdy certified program of critical importance to NASA: the NPP mission and the continuity of long-term climate measurements.

NPOESS Preparatory Project

The mission of the NPP is twofold; first to provide continuity for a selected set of calibrated observations with the existing Earth Observing System measurements for Earth Science research, and secondly to provide risk reduction for four of the key sensors flying on NPOESS as well as the command and data handling system. The NASA-managed NPP project is a joint project between the NPOESS IPO and NASA.

For NPP, NASA is providing the Spacecraft bus, the Advanced Technology Microwave Sounder (ATMS) sensor, and the launch services for NPP. The spacecraft bus is complete and the ATMS flight unit was delivered to the spacecraft integrator in October of 2005 for integration. The project is awaiting delivery of the IPO provided sensors so that final integration and testing can be completed.

The IPO's delivery of the Visible/Infrared Imaging Radiometer Suite (VIIRS) instrument is on the critical path for the NPP launch. The development of this instrument for both NPP and NPOESS is continuing, with delivery of the sensor anticipated at the earliest, technically feasible date, for a September 2009 NPP launch. This represents nearly a three year slip from the originally planned launch in October 2006. The launch of the first operational NPOESS spacecraft is delayed until 2013. NPP's planned launch in advance of NPOESS will ensure that NPOESS data products can be fully evaluated as to their effectiveness in providing the continuity of climate-quality data records.

It is NASA's understanding that the IPO provided elements of the NPP mission will be adequately supported within the certified NPOESS program to ensure the launch of the NPP in September 2009. To support continuation of the 30-year record of NASA and NOAA ozone profile measurements, it is essential that the already completed OMPS (limb) sensor complete testing and integration onto the NPP spacecraft as previously planned.

Continuity of Long-term Climate Measurements

The NPOESS program in the Nunn-McCurdy certification configuration includes advances in the measurement of key climate parameters through the inclusion of the VIIRS, CrIS, ATMS and OMPS (Nadir) instruments. Nevertheless, the decision during the Nunn-McCurdy process to place the highest priority on continuity of leg-

acy operational measurement capabilities resulted in a lower priority for a number of environmental and climate measurement capabilities. Many of these measurements have been demonstrated in recent years on NASA's Earth Observing System platforms and are being widely used by researchers. Difficult choices and trade-offs had to be made and the cost to procure several of the secondary sensors that provide climate and space weather observations is not included in the certified program. However, the program will plan for and fund the integration of these sensors on the spacecraft. For example, some of these sensors provide climate measurements such as the Earth's energy balance, atmospheric ozone profiles, and solar energy input to the Earth, some of which have 30-year data records. These climate measurements are important to the public by providing a better understanding of atmospheric greenhouse effects, Earth ozone levels, and subtle changes in solar energy input that can have dramatic impacts on the overall climate.

The certified NPOESS program also relies on the European MetOp satellites to cover the mid-morning NOAA orbit. MetOp will carry an older, less capable imaging instrument than NPOESS. The first of these European satellites, MetOp A is planned for launch in 2006 and will provide that coverage. NOAA is relying on its one remaining POES satellite (NOAA N') to provide operational coverage of the NOAA afternoon orbit until the launch of the first NPOESS spacecraft, C1, in 2013. Depending on the lifetime of NOAA-N' there is a possibility of a short gap in operational coverage. However, NASA has agreed to fly NPP in the same afternoon orbit, and although it is not designed as an operational system, it could provide partial coverage until the launch of C1.

NOAA, NASA and DOD will be working together on a mitigation strategy to lessen any impacts, including working with our international partners. The NPOESS spacecraft will be built with the capability to house all of the sensors and the program budget will include the dollars to integrate them on the spacecraft. This decision was made because the EXCOM agreed any additional funding gained through contract renegotiation or in unutilized management reserve would be used to procure these secondary sensors. NASA's plans in this regard will be guided by the forthcoming Earth science decadal survey now underway by the National Academy of Sciences. The science community, through this NRC decadal survey activity, has already registered its concerns with unmet expectations for key climate measurements in their interim report, and changes in climate capabilities in the revised NPOESS configuration will factor into their final report.

Given the new priorities that resulted from the Nunn-McCurdy process, NASA looks forward to continuing to work with our NPOESS partners to successfully implement changes in response to the recent reviews of the program. The recommendations of the Department of Commerce Inspector General's (DOCIG) report are being addressed by a number of recommendations by the Nunn-McCurdy review team. First, the implementation of a Program Executive Officer (PEO) structure assists in providing better leadership, oversight, and communication with the EXCOM. Second, the program reviews should provide consistent feedback and increased visibility to the EXCOM on the status of the program. Third, the management challenge provided to the IPO to consider an award fee restructure and increase scrutiny of the award fee decisions are necessary steps towards addressing the Commerce Inspector General's report.

The NPOESS Nunn-McCurdy process has been inclusive and NASA has been an active participant. NASA remains committed to the tri-agency partnership and will endeavor to meet our obligations in support of both NPP and NPOESS.

Once again, thank you for the opportunity to testify today. I appreciate the support of Congress and this committee and would be pleased to answer any questions.

Chairman BOEHLERT. Thank you very much, Dr. Griffin. Dr. Sega.

STATEMENT OF DR. RONALD M. SEGA, UNDER SECRETARY OF THE AIR FORCE, U.S. DEPARTMENT OF DEFENSE

Dr. SEGA. Mr. Chairman, Congressman Gordon, and distinguished Members of the Committee, I am honored to appear before you today to update you on the status of the NPOESS program. I request that my written statement be placed as part of the record.

Chairman BOEHLERT. Without objection, so ordered. The entire written statements submitted will be part of the official record, as

will the anticipated response we get from DOD to our information request.

Dr. SEGA. As I mentioned in the hearing last fall, we are committed to preserving the space capabilities that our commanders and forces depend on to conduct their missions.

NPOESS will be a very important addition to the space systems that make swift, effective military actions possible. The program has encountered problems, but in concert with our NOAA and NASA partners, we have worked hard to fix them and get NPOESS back on track to deliver the capabilities we need.

Whether it is ground troops relying on information via SATCOM or air crews planning strike, rescue or relief missions with weather satellite data, or analysts making up target sets, our space systems have done and are doing great things for U.S. security.

I would like to relate a story that would help illustrate how important the space sensing systems are for weather. This involves Captain, now Major (select) John Roberts, part of Operation Iraqi Freedom. And this mission occurred on March 26, 2003. It is a night time parachute drop by the Army's 173rd Airborne Brigade. The weather was rough, and it was a mountainous region in northern Iraq is where the mission was to take place. Captain Roberts is a U.S. Air Force combat weatherman—turns out that he had served nine of his ten years directly in Army units. In March 2003, while assigned to the 173rd Airborne Brigade in Italy, he was planning the weather part of a jump that was to occur in northern Iraq to secure that area. A week prior, all the predictions were that the weather would be horrible on the planned jump night. The brigade commander said this is the night, make it work. John spent the week studying models, satellite photos, talking to CENTCOM and USAFE weather forecasters—all the weather looked bad.

I got verification, not only from talking from John, but also from Major Shannon Klugg—it is in the back—if you would kind of raise your hand there. So on the 26th, jump day, John used the satellite imagery to review his predicted weather window—it was one hour long. He told me he was betting his bars on this decision. The predicted short window of opportunity was the only place where the weather would be lifting. They changed the takeoff time to match the open weather time. The brigade in flight was in 16 C–17s. In the first ten, there was over 1,000 troops, in the last six was the equipment—in the C–17s. An hour out, the ground team said the weather was still no go—800 foot ceiling and blowing snow. John came on the satellite phone to convince the brigade commander in one of the C–17s to proceed—keeping his eye on the satellite data. Thirty minutes out, the weather was still bad. Fifteen minutes out, the sky begins to clear, and the jump happens, and an hour after the jump, the weather closed back in.

John landed the next day in a C–17 and for the Army folks, John Roberts could do no wrong. He is headed to Alabama to teach at Maxwell Air Force Base. It is important that the Captain John Robert's of the future have at least today's capability. Continuity is critical for this NPOESS program. Chart, please.

In the DOD space part of acquisitions, we are getting back to basics, to maximize the probability of success. This approach is reapportioning the risk, to reduce the risk in that top systems pro-

ductions phase, while accepting greater risk in science and technology and technology development. This approach lowers the risk and assists in production by incorporating only proven technologies and taking smaller, more manageable steps.

The cost estimation allows more reserve. The system engineering is more rigorous. Some of these basic, fundamental principles, we are applying to the NPOESS program. On the 22nd of November 2005, just after our last appearance before your committee, I met with the NPOESS executive committee for the third time in my tenure, which started in August. During that meeting, the EXCOM received a report from the OSD Program Assessment and Evaluation, PA&E, Cost Analysis Improvement Group, the CAIG, that independently assessed the NPOESS program costs.

After receiving the CAIG assessment, the acting program director determined that reasonable cause existed to believe that the program had grown beyond the 25 percent Nunn-McCurdy threshold, and sent a letter to that effect to the EXCOM on November 30, 2005. As you recall in the past hearing, we were looking at various options that the EXCOM was considering in the present situation.

Once the Nunn-McCurdy breach has been certified—in this case, the Secretary of the Air Force notifying the members of the Defense and Commerce Oversight Committees—the certification process by statute reverts, to the Office of the Secretary of Defense and through the Secretary of Defense, delegated to the Under Secretary of Defense for Acquisition, Technology, and Logistics. He then owns the process.

In the meantime, day-to-day operations and execution of the NPOESS program continued while this analysis took place. And by statute, this process has run outside of the military services by the Defense Acquisition Executive, Secretary Ken Krieg, on behalf of the Secretary of Defense. He was supported by integrated product teams chaired by OSD members, who examined the Nunn-McCurdy criteria. And ultimately the Nunn-McCurdy certification is made by the office of the Secretary of Defense.

Secretary Krieg launched an extensive program analysis of NPOESS to meet the requirements of the Nunn-McCurdy process. This was a collaborative process, led by OSD and conducted with our agency partners, NOAA and NASA. It involved a rigorous examination of the program consistent with the Nunn-McCurdy process. Secretary Krieg's Nunn-McCurdy certification letters to Congress on the 5th of June provided the details of the certified program.

Now OSD, through Secretary Krieg who owns this process, is the authority to release the data, that was part of the analysis and deliberations in the Nunn-McCurdy process. I assure you when I return to the Department, I will clearly articulate your requests and concerns with respect to the desired information to Secretary Krieg.

Next chart, please. The certified NPOESS program reduces technology integration and risk. It increases our confidence level in timely delivery of core capabilities to the war-fighter, which we believe is the number one priority. These core capabilities were identified by a Senior User Advisory Group, composed of members of NOAA, NASA, and DOD, and subsequently approved by the DOD

Joint Requirements Oversight Council, the JROC, augmented by senior members from NOAA and NASA.

The restructured NPOESS program implements many of these "back-to-basics" principles and the philosophy I discussed earlier. The core capabilities would be provided in the first block of satellites, with additional payloads that could be integrated in later satellite blocks, as this NPOESS spacecraft bus will have room for payload and growth.

Now what you see is three orbits, and the continuity is paramount. The AM orbit is important to us for forecasting. The PM "model" orbit is the secondary, our second priority, and is crucial for doing our models. And the data that will be received from the mid AM orbit is also augmenting the previous two.

To ensure that we have success in the NPOESS program, the coordination with our partners is clearly important, and we have also reinvigorated the oversight of this program. Also at the November 22, 2005 meeting, the EXCOM decided to establish the program executive officer, PEO, for NPOESS, reporting to the EXCOM on acquisition matters. We assigned one of our best, brightest and most experienced officers, Brigadier General (select) Sue Mashiko—Sue—your hand there—as the PEO, and provided her with a very experienced acquisition professional, Colonel Dan Stockton, as the system program director.

The NPOESS IPO has increased the management discipline of the NPOESS program. In conjunction with the prime contractor, the IPO put together an execution plan for FY '06. The NPOESS program has been meeting the milestones and technical objectives laid out in this plan, within the budget provided. Significant progress has been made on the sensors and ground systems that support both NPOESS and the NPOESS Preparatory Project. We are encouraged by the recent progress. We have a lot of work to do, and I believe this is due in part to this reorganized effort.

The IPO has also reorganized the divisions more directly tied to key program areas, increased systems engineering capabilities and responsibilities to include integrated tests, established an algorithm division to manage critical data, established a mission assurance division to track system integrated performance assurance and, particularly important, established the chief engineer position. NPOESS should benefit from an emphasis on applying proven system engineering practices, such as developing sound, stable system requirements and better cost and schedule estimates.

In closing, Mr. Chairman, the Department of Defense, in close cooperation with our partners from NOAA and NASA, remains committed to successfully delivering the NPOESS system, as restructured, on cost and on schedule. We have implemented significant rigor back into the program management. I believe the restructured program correctly balances requirements, costs, and schedule, while enabling expanded capabilities.

I appreciate the continued support of the Congress and this committee to deliver vital capabilities to our war fighters, and ensure we have the space capabilities we need.

Thank you for the opportunity to appear before you today.

[The prepared statement of Dr. Sega follows:]

PREPARED STATEMENT OF RONALD M. SEGA

INTRODUCTION

Mr. Chairman and Members of the Committee, I am honored to appear before you today to update you on the status of the National Polar-Orbiting Operational Environmental Satellite System (NPOESS). As I mentioned in the hearing last fall, in my role of overseeing Department of Defense (DOD) space activities as DOD Executive Agent for Space, I am committed to preserving the space capabilities that our commanders and forces depend on to conduct their missions.

NPOESS will be an important addition to the space systems that make swift, effective military actions possible. The program has encountered problems, but we have worked hard to fix them and get NPOESS back on track to deliver the capabilities we need. I am confident that, with the support and guidance of this committee, the NPOESS program will enhance the space-based weather sensing capabilities needed to meet our national security requirements in the coming years.

NPOESS STATUS

Presidential Decision Directive NSTC–2, "Convergence of U.S. Polar-Orbiting Operational Environmental Satellite Systems," written under the auspices of the National Science and Technology Council and dated May 10, 1994, established the NPOESS program and the NPOESS Integrated Program Office (IPO), made up of DOD, Department of Commerce (DOC), and National Aeronautics and Space Administration (NASA) personnel. The IPO formed in December 1994 to converge the DOD and DOC polar weather satellite requirements—based on the Defense Meteorological Satellite Program (DMSP) and the Polar Orbiting Environmental Satellite (POES), respectively—into a single system. On May 26, 1995, a Memorandum of Agreement signed by the Secretaries of Defense and Commerce and the NASA Administrator established further guidelines for the NPOESS program.

Shortly after I became Under Secretary of the Air Force, the NPOESS Executive Committee (EXCOM) met on August 19, 2005. The NPOESS System Program Director (SPD) briefed the EXCOM on program status and options. The EXCOM was also briefed on the results of an Independent Review Team study of the program. The SPD analysis showed that the program was experiencing development challenges, including at least 15 percent cost growth. The EXCOM agreed with the SPD analysis that a Nunn-McCurdy notification to Congress should be initiated. On September 28, 2005, a letter from the Acting Secretary of the Air Force was transmitted to Congress.

Also in August 2005, the EXCOM commissioned an Independent Program Assessment (IPA) to review the NPOESS program. The IPA leader, Brigadier General (retired) Jack Wormington, and his team of experts from the Air Force, the National Oceanic and Atmospheric Administration (NOAA), and NASA conducted a thorough and comprehensive review of the NPOESS program. On October 19, 2005, the EXCOM received the interim status briefing from the IPA, which formed the basis of some of the discussion during your committee's hearing on November 16, 2005.

On November 22, 2005, I met with the EXCOM for the third time. During that meeting, the EXCOM received the report from the OSD Program Analysis & Evaluation (PA&E) Cost Analysis Improvement Group (CAIG) that independently assessed the NPOESS program cost. The EXCOM also took the final outbrief from the IPA, which had looked at several different options, including reducing the number of required sensors on the vehicle, using less-capable sensors, developing a smaller spacecraft bus, as well as evaluating the overall NPOESS management structure. As a result of this assessment, the EXCOM decided to establish a Program Executive Officer (PEO) for NPOESS, reporting to the EXCOM on acquisition matters. The NPOESS SPD would report to the PEO and focus on the day-to-day execution of the NPOESS program, while the PEO focuses on external factors and oversight. Air Force Brigadier General-select (BGen(S)) Sue Mashiko was selected by the EXCOM to be the NPOESS PEO.

After receiving the CAIG cost assessment, the Acting Program Director determined that reasonable cause existed to believe that the program had grown beyond the 25 percent Nunn-McCurdy threshold, and sent a letter to that effect to the EXCOM on November 30, 2005. Subsequently, the Secretary of the Air Force notified members of both Defense and Commerce oversight committees. The NPOESS Nunn-McCurdy certification process formally began in January 2006, and ran concurrently with the day-to-day execution of the NPOESS program. As prescribed by statute, the Defense Acquisition Executive, Mr. Ken Krieg, launched an extensive program analysis. This collaborative process, conducted with our agency partners NOAA and NASA, involved a rigorous examination of the program consistent with the Nunn-McCurdy process. Mr. Krieg's Nunn-McCurdy certification letters to Con-

gress on June 5, 2006, provide details of the certified NPOESS program. *(See Appendix 2: Additional Material for the Record.)*

Since October 2005, the NPOESS IPO has increased the rigor in the oversight and management of the NPOESS program. In conjunction with the prime contractor, the IPO put together an execution plan for FY06. The NPOESS program has been meeting the milestones and technical objectives laid out in the plan, within the budget provided. Significant progress has been made on the sensors and ground system that support both NPOESS and the NPOESS Preparatory Project (NPP). The engineering development unit of the Visible/Infrared Imaging Radiometer Suite (VIIRS) sensor successfully completed vibration testing and is currently in thermal vacuum testing. A successful completion of thermal vacuum testing will be a significant milestone in the acquisition of VIIRS, and will demonstrate the feasibility of the VIIRS design. The other NPOESS sensors that will support the NPP mission are making significant progress as well, with the Cross-track Infrared Sounder and Ozone Mapping and Profiling Suite flight units built and in acceptance testing today. NPOESS ground system risk reduction efforts and software development have also shown solid progress. We are encouraged by the progress in the NPOESS program during the last six months while the Nunn-McCurdy certification process took place, due in part to the EXCOM-directed reorganization,. We will keep the committee apprised of the status of this program.

AVOIDING COVERAGE GAPS

As the Nunn-McCurdy team evaluated the NPOESS program, a guiding principle was to minimize the risk of a continuity gap between NPOESS and DMSP, POES, and the Earth Observing Satellite (EOS) Aqua mission. Maintaining polar coverage with the right sensor capabilities is vital to the future of our weather forecasting. The DOD Joint Requirements Oversight Council (JROC), augmented by senior representatives from NOAA and NASA, reviewed the requirements for the NPOESS program. Additionally, the Senior User Advisory Group (SUAG), composed of members from NOAA, NASA and DOD, also reviewed the capabilities that each NPOESS satellite should possess, given the required orbits.

The Air Force is responsible for weather forecasting for global military operations, including coverage of areas from which data are usually unavailable or denied. DMSP is a key source of data to accomplish the military forecasting mission. It provides data on cloud cover, temperature and water vapor profiles, soil conditions, sea conditions, sea ice coverage, and auroral extent. DMSP also provides the necessary spatial resolution to support critical military operations. NPOESS will improve the quality of the data available for forecasting. Polar-orbiting satellites such as DMSP and NPOESS are critical because geostationary data is of lower spatial resolution and cannot effectively cover latitudes higher than 50 degrees—yet conditions at high latitudes are major drivers of worldwide weather. NPOESS, as the replacement for DMSP, is necessary to support national security objectives.

GETTING NPOESS ACQUISITION "BACK TO BASICS"

DOD space acquisitions programs are getting "back to basics" to maximize our probability for success. We believe focusing on acquisition and engineering basics should benefit the NPOESS program as it moves forward.

Acquisition links technology with operations—it turns ideas into real, tangible items and delivers those items to the field. The "back to basics" approach views acquisitions as a continuous process with four distinct but interrelated stages. The first stage is Science and Technology (S&T), where we conduct basic research and explore the possibilities of new technologies. In the second, Technology Development, we evaluate the utility of discoveries made in the S&T stage. The third stage is Systems Development. Here, we take the most promising technologies and mature them to higher readiness levels so they can be integrated into operational platforms in the fourth stage, System Production.

In this acquisition construct, technology is matured through the four stages to move from the lab bench to the test range and then to operations. We are emphasizing early technology development to ensure mature technology is available for our production systems.

Basic research in science and technology generates knowledge and helps develop our scientists and engineers in our laboratories, universities, and research centers. This kind of cutting-edge work is inherently high risk, but we want to take risk in the earlier stages, not in the later stages. The DOD has been moving in the direction of increased emphasis on S&T for some time now; for example, our investment in space-related S&T has doubled over the last four years.

Once we find a promising technology, we investigate its utility in the Technology Development stage. Thus, in the two supporting stages of Technology Development

and Science and Technology, the approach is to take more risk and push the frontier harder.

After we prove a concept or demonstrate the technology, "back to basics" demands that we mature it until we are confident it will work reliably in space. We build that confidence and performance during the Systems Development stage, where we get new technologies ready to incorporate into operational systems.

Finally, once we have mature technology, we move into the fourth stage, System Production. In this final stage, we want to integrate mature technologies while employing a disciplined systems engineering process. We must also incorporate testability and modularity in the design, so we have a path to include newly matured technologies into operational systems in future versions. We will reduce the risk involved in this stage by starting with more matured technologies, more stable requirements, and more discipline in the systems design.

This approach manages, or apportions, risk by accepting higher risk in those beginning stages; it lowers the risk in System Production by incorporating only proven technologies and taking smaller, more manageable steps. By doing so, we allow a constant, on-going rhythm of design, build, launch, and operate that should reduce the cycle time for space product acquisition, insert stability into our production lines and workforce, and enable us to field better systems over time. This approach will deliver timely, affordable capability to the warfighter while increasing confidence in our production schedule and cost.

The NPOESS program has the potential to benefit from this approach, and could implement it through major discrete increments or "blocks." The block approach is enabled by the inherent flexibility designed into the NPOESS spacecraft bus in weight, power, and the nadir deck; thus, the bus has room for growth of payload. Under a block approach, core capabilities would be provided in the first block of satellites; additional payloads could be integrated into later satellite blocks, and higher performance technical capabilities may be incorporated after the technologies have matured. The certified NPOESS program reduces technology and integration risk and increases our confidence levels in timely delivery of core capabilities to the warfighter. These core capabilities were identified by the Senior User Advisory Group (SUAG), composed of members from NOAA, NASA and DOD, and subsequently approved by the DOD Joint Requirements Oversight Council (JROC), augmented by senior representatives from NOAA and NASA. We are applying the back-to-basics acquisition approach to the restructured NPOESS program by including a complement of sensors in the program to provide these core capabilities. These sensors include: Visible/Infrared Imager Radiometer Suite (VIIRS); Microwave Imager/Sounder; Search and Rescue Satellite Aided Tracking (SARSAT); Cross-track Infrared Sounder (CrIS); Advanced Technology Microwave Sounder (ATMS); Advanced Data Collection System (ADCS); Cloud's and Earth's Radiant Energy System (CERES); Ozone Mapping and Profile Suite (OMPS) Nadir; and Space Environment Monitor (SEM).

This back-to-basics approach also hinges on strengthening collaborations between the players involved in the acquisition and requirements process, implementing more rigorous systems engineering processes, and improving the way we recruit and train our acquisition workforce. The NPOESS program should benefit from our efforts to strengthen collaboration across the space community between technical experts, acquisition personnel, weather forecasters, scientists, maintainers, and operators. NPOESS also should benefit from this emphasis on applying proven systems engineering practices such as developing sound, stable, system requirements, and better cost and schedule estimation. Finally, NPOESS should benefit from our efforts to raise the expertise of our systems engineers-and especially from the installation of experienced program managers like BGen(S) Mashiko.

CONCLUSION

I appreciate the continued support and dedication of the Congress and this committee to deliver vital capabilities for national security. I look forward to working with you as we complete the NPOESS system and ensure that we have the forecasting and remote sensing capabilities that our nation needs.

BIOGRAPHY FOR RONALD M. SEGA

Dr. Ronald M. Sega is Under Secretary of the Air Force, Washington, D.C. Dr. Sega is responsible for all actions of the Air Force on behalf of the Secretary of the Air Force and is Acting Secretary in the Secretary's absence. In that capacity, he oversees the recruiting, training and equipping of more than 710,000 people, and a budget of approximately $110 billion. Designated the Department of Defense Executive Agent for Space, Dr. Sega develops, coordinates, and integrates plans and pro-

grams for space systems and the acquisition of all DOD space major defense acquisition programs.

Dr. Sega has had an extensive career in government service, academia and research. He graduated from the U.S. Air Force Academy in 1974 as a distinguished graduate. His active-duty assignments included instructor pilot and Department of Physics faculty member at the U.S. Air Force Academy. He entered the Air Force Reserve in 1982 with the 901st Tactical Airlift Group at Peterson Air Force Base, Colo., serving in a variety of operations positions. From 1987 to 2001 he served at Air Force Space Command in several assignments, including Mission Ready Crew Commander for satellite operations for the Global Positioning System, Defense Support Program and Midcourse Space Experiment. A command pilot with more than 4,000 flying hours, he retired from the Air Force Reserve in 2005 as a major general, last serving as the reserve assistant to the Chairman of the Joint Chiefs of Staff.

Dr. Sega joined NASA as an astronaut in 1990, making his first Shuttle flight in 1994 aboard the Space Shuttle Discovery. From November 1994 to March 1995, he was NASA's Director of Operations, Russia, responsible for managing NASA activities supporting astronaut and cosmonaut training for flight on the Russian Mir space station. He completed his second Shuttle flight in 1996 as payload commander for the third Shuttle/Mir docking mission aboard Atlantis, completing his astronaut tenure with 420 hours in space.

Since 1982, Dr. Sega has been a faculty member in the Department of Electrical and Computer Engineering at the University of Colorado at Colorado Springs with a rank of Professor since 1990. In addition to teaching and research activities, he was Technical Director of the Laser and Aerospace Mechanics Directorate at the U.S. Air Force Academy's F.J. Seiler Research Laboratory, and Assistant Director of the Space Vacuum Epitaxy Center, including management of the Wake Shield Facility Flight Programs at the University of Houston. Dr. Sega was the Dean of the College of Engineering and Applied Science at the University of Colorado from 1996 to 2001. In August 2001, he was appointed as the Director of Defense Research and Engineering, Office of the Secretary of Defense, serving as chief technical officer for the Department and the chief adviser to the Secretary of Defense and Under Secretary of Defense for Acquisition, Technology and Logistics for scientific and technical matters. Dr. Sega has authored or co-authored more than 100 technical publications, has served on numerous local, regional and national advisory and governance boards, and he is a Fellow of the American Institute of Aeronautics and Astronautics and the Institute of Electrical and Electronics Engineers.

EDUCATION

1974 Distinguished graduate, Bachelor of Science degree in math and physics, U.S. Air Force Academy, Colorado Springs, Colo.

1975 Master of Science degree in physics, Ohio State University, Columbus

1982 Doctor of Philosophy in electrical engineering, University of Colorado

CAREER CHRONOLOGY

1974–1982, U.S. Air Force pilot, instructor pilot, and Physics Department faculty member (U.S. Air Force Academy, Colorado Springs, Colo.)

1982–1985, Assistant Professor, Department of Electrical and Computer Engineering, University of Colorado at Colorado Springs

1985–1990, Associate Professor, Department of Electrical and Computer Engineering, University of Colorado at Colorado Springs (1987–1988, Technical Director, Lasers and Aerospace Mechanics Directorate, Frank J. Seiler Research Laboratory, U.S. Air Force Academy, Colorado Springs, Colo.; 1989–1990, Assistant Director for Flight Programs, Space Vacuum Epitaxy Center, Associate Research Professor in Physics, University of Houston, Texas)

1990–1991, Astronaut candidate, NASA, Lyndon B. Johnson Space Center, Houston, Texas

1991–1996, Astronaut, NASA, Lyndon B. Johnson Space Center, Houston, Texas (1990–1996, Adjunct Professor of Physics, University of Houston, Texas)

1996–2001, Dean, College of Engineering and Applied Science, University of Colorado at Colorado Springs

2001, acting Assistant to the Secretary of Defense for Nuclear, Chemical and Biological Programs, Office of the Secretary of Defense, the Pentagon, Washington, D.C.

2001–2005, Director of Defense Research and Engineering, Office of the Secretary of Defense, the Pentagon, Washington, D.C.

1982–2005, U.S. Air Force Reserve officer, pilot (302nd Tactical Airlift Wing), space operator (Air Force Space Command), and reserve assistant to the Chairman of the Joint Chiefs of Staff

2005–present, Under Secretary of the Air Force, Washington, D.C.

DISCUSSION

Chairman BOEHLERT. Thank you, Dr. Sega.

CONFIDENCE LEVELS OF BUDGET AND SCHEDULE ESTIMATES

Gentlemen, I am going to ask this of the panel: to what extent was cost a factor when deciding how to reconfigure NPOESS? Did you have a dollar level target, and how closely did you scrutinize cost estimates for different options? Who wants to go first? Admiral?

Admiral LAUTENBACHER. I will start with that. Affordability is always an issue. We looked at affordability, but as I mentioned to this committee before, we looked at all possible alternatives, those that were above the costs, those that were close to the costs, and those that approximated the original program.

So, we looked at a range of alternatives outside of the affordability issues.

Chairman BOEHLERT. Did you have any target?

Admiral LAUTENBACHER. I didn't have any target. I had a target to figure out how to make this program work, and provide the capabilities the country needs. I think that that is——

Chairman BOEHLERT. But no dollar figure.

Admiral LAUTENBACHER. I did not put a dollar figure on it——

Chairman BOEHLERT. And you costed out various options?

Admiral LAUTENBACHER.—and I didn't see any dollar figure. And we costed out various options, as honestly as we could, as I said, updating the cost models to take into account the performance on these new sensors, or the acquisition performance on these acquisition sensors, and those are the estimates that we have been using now.

Chairman BOEHLERT. Well, that is one of the reasons why we think it is important that we have access to the CAIG people.

Admiral LAUTENBACHER. Yes, sir.

Chairman BOEHLERT. What is the confidence level in the new numbers, and how does that compare to that level for other programs? What does that confidence level mean, in terms of the size of the reserves built into your estimates?

Dr. SEGA. I have discussed the approach the CAIG has used in this cost estimation process. They are clearly the experts. But this program has been ongoing for a while, and so, there is additional data that is available from performance, whether it be building the sensors and buses, than you would have in a program that is starting from scratch. We also place continuity of service, of the data as a premium.

So the CAIG looked at that first, to assure with high confidence—and their estimate is 90 percent confidence—that continuity of needed data was available. Then, within that, the cost confidence was at the 50 percent level.

Chairman BOEHLERT. Fifty percent?

Dr. SEGA. Fifty percent level from the remaining part. Now, as we go forward in many of the programs that we are beginning now, such as the one we submitted to the Congress in fiscal year 2007 called TSAT, the confidence level is at 80 percent. But in this case, we have a portion of their estimate is pegged to 90 percent, so they have included additional schedule—which costs money—and then the pieces in terms of development—their cost confidence was at the 50 percent level.

So, it is a little bit of apples and oranges, comparing a program cost estimation from a program that is beginning to one that they are assessing in mid-stream.

Chairman BOEHLERT. Well, just for example, at DOD in general, what is the confidence level in costs, usually. What percentage are we talking about when we are dealing with big, expensive projects like this?

Dr. SEGA. Traditionally, the cost estimation has been at 50 percent. We have taken many of the recommendations from outside advisory groups, such as the Young panel that did the work also for us in the Defense Science Board, and as we go to the prediction system production phase, if I could have that one first chart, please, when we get to a point where we are looking at system production, the definition, in terms of requirements, the maturity of the technology should be such that we know what we are going to build, and we will be able to reduce the acquisition cycle time, and our level of confidence in that program should increase, but it also will be done with the cost estimators, using an 80 percent figure. That is relatively new.

Chairman BOEHLERT. Dr. Griffin, you know, with the CEV, you have got a cost confidence level of like 66 percent, haven't you?

Dr. GRIFFIN. Pardon me. I was going to round and say 65 percent, but yes, that is what we are aiming for.

Chairman BOEHLERT. Isn't 50 percent a lot lower than we have any right to expect in the confidence level of cost of a project of this magnitude? Admiral?

Admiral LAUTENBACHER. Can I try it for a minute?

Chairman BOEHLERT. Sure.

Admiral LAUTENBACHER. The—and I first of all realize that we need to provide you more information, so I——

Chairman BOEHLERT. You are right.

Admiral LAUTENBACHER. I am not—I am just trying to explain where we are——

Chairman BOEHLERT. And a lot of that information, you don't have in your possession.

Admiral LAUTENBACHER. I do not have it to release it, that is correct. But the issue is on the cost estimates, that it is at a 90 percent confidence level that we are going to maintain the continuity of this program, in other words, we are not going to miss our launch dates, we are going to get the data. We are not going to have gaps.

Chairman BOEHLERT. That is very comforting.

Admiral LAUTENBACHER. So, that was built in from the front end of this, and that, then, translates back into the instruments and the satellites that go with it, so in each instrument and the sat-

ellites that go with it, there has been a schedule increment, and it varies on the instrument that they were estimating from, 20 to 25 percent, 15 percent, so there is a margin, schedule margin, a relatively large schedule margin, when you look at the kinds of schedules that you expect assembly lines to work on, into the schedule. Then, that additional margin, then, was costed, with all of the money that goes along with a schedule slip incorporated in it. And so, when you are talking about a 50 percent cost point, it is talking about one that has a very large schedule margin into it with the money against it. And I cannot, for the life of me, at this point, think of how to come up with a number to tell you, that means it is X percent.

Chairman BOEHLERT. How do the margins factor in?

Admiral LAUTENBACHER. When you add them up, there is a significant margin. I mean, maybe a year. Now, and again, we need to have the data in front of us to debate that.

Chairman BOEHLERT. That is what this committee is saying——

Admiral LAUTENBACHER. I understand that.

Chairman BOEHLERT.—in one voice.

Admiral LAUTENBACHER. And that is why I am here to try to help as much as I can, and we will try to get all the information——

Chairman BOEHLERT. I know, you are from the Federal Government, and you are here to help.

Admiral LAUTENBACHER. Here to help. Yes, sir. But there is—there are significant schedule margins in this estimate, and those have been costed honestly, at a most likely cost, if you want to use that word, because that is a significant increase, and when you look at the fact that the models now are based on the experience that we have had on the front end of this program, which is different than the database that was used previously, which a lot of the NASA smaller instruments, there is a significantly greater element of confidence that we are close to what this is going to cost.

Chairman BOEHLERT. You can understand, and my time is up, and I will go to Mr. Gordon, but you can understand why our confidence level is not at a high percentage rate, given the history of this project. And we want to be able to accept the information given to us, assuming that it is given to us in good faith, and we want to be able to assume that it is very accurate, to the best of your ability, but you have got to earn the confidence of this committee by performance, and once again, I can't stress enough, on a bipartisan basis, we feel very strongly, Dr. Sega particularly, because you work in that funny shaped building across the river, and you have some influence, we need to get more information.

Dr. SEGA. I appreciate that, and as I said in my opening remarks, I will go back and ask——

Chairman BOEHLERT. Well, it has been my experience that you have always been cooperative, and I appreciate that.

Mr. Gordon.

Mr. GORDON. Thank you, Mr. Chairman, and also, Dr. Sega, I appreciate your remarks earlier, and helping us get the information.

NUNN-MCCURDY DECISION PACKAGE

And as you mentioned, the Nunn-McCurdy decision package contains the detailed analysis on every aspect of Under Secretary Krieg's certification. In particular, that included the Cost Analysis Improvement Group, or CAIG analysis, on the recommended options and summaries of costs of other options that were considered.

So, let me—I want to ask all of you some specific questions, and I would like specific answers, and I only have five minutes, so if you could be, you know, direct, I would appreciate it.

Dr. Sega, have you studied the Nunn-McCurdy decision package on NPOESS?

Dr. SEGA. The package that was submitted, yes.

Mr. GORDON. You have studied the Nunn-McCurdy decision package on NPOESS?

Dr. SEGA. The package—The letter that was submitted to Congress, I have read that carefully. And——

Mr. GORDON. Right, the letter that we—but the letter we received is not the package. Have you studied the Nunn-McCurdy decision package on NPOESS?

Dr. SEGA. I am not sure. There has also been an acquisition decision memorandum that is an internal document.

Mr. GORDON. But have you studied the Nunn-McCurdy decision package that was given to Under Secretary Krieg?

Dr. SEGA. Sir, I don't know a package by that name. We had a series of briefings which we attended. Secretary Krieg made this a very inclusive process.

Mr. GORDON. But there was—wasn't there a decision-making package that was given to Secretary Krieg? That is what we are asking for. Have you seen it? Have you studied it?

Dr. SEGA. Sir, it was an evolutionary process, that over a series of a number of meetings——

Mr. GORDON. Was there a final product?

Dr. SEGA.—it began to——

Mr. GORDON. Was there a final product?

Dr. SEGA. There was a final briefing, and——

Mr. GORDON. Well, I am not talking about a briefing. I am talking about a product. I am not talking about somebody else summarizing it for you. Was there a final—I mean, was there a Nunn-McCurdy product that was put together, and given to Secretary Krieg?

Dr. SEGA. And speaking for myself, I did not go through the details of the—for example, the CAIG analysis, but rather reviewed the——

Mr. GORDON. Okay. Well——

Dr. SEGA.—results of the CAIG analysis with——

Mr. GORDON.—let me just try to go back again——

Dr. SEGA.—the different options.

Mr. GORDON. Did Secretary Krieg receive a Nunn-McCurdy decision package?

Dr. SEGA. I don't know, besides the——

Mr. GORDON. Well, then, what else would you call it, then? What would you call it? The information that he received to develop his certification.

Dr. SEGA. His—and——

Mr. GORDON. Was this all oral?

Dr. SEGA. Okay—I will——

Mr. GORDON. You all just—you just sat around and talked about it?

Dr. SEGA. The process went from January—and we hoped it would be earlier—as we had indicated, back to your committee, but we took the entire time—to review as carefully as possible these alternatives. They—

Mr. GORDON. Yeah, and was there—and did that come together in a package that was provided to him to review?

Dr. SEGA. There was not a final package, because it was an evolutionary process by which——

Mr. GORDON. And so, was there material, or was all this oral? Did you all just talk about, or was there——

Dr. SEGA. There was clearly written material that would come together—and a narrowing process. There were four criteria and four IPTs (integrated product teams) that reviewed the Nunn-McCurdy criteria. One was to look at the acquisition program as being essential to national security. That evaluation and that team, and they presented their information in the evolving fashion, from January until earlier this month. IPT–2 determined that there would be no alternatives to such acquisition program that will provide equal or greater military capability at less cost.

Mr. GORDON. Okay. And then, was there—was all this put together into a package for the Under Secretary to review?

Dr. SEGA. There—By the final briefing, we were looking at results that we had incrementally evolved in terms of analysis and decision-making process.

Mr. GORDON. So, you all just talked—you just sat around and talked about it. There was never a document that was put together?

Dr. SEGA. At each point——

Mr. GORDON. I am asking a pretty simple question here. I want you to——

Dr. SEGA. Yes, the answer, basically, is at the end, the information—the decision space continued to be narrowed—and that is the data that we reviewed at the very end.

Mr. GORDON. And so, all you reviewed was the final decision, not the options that were given before.

Dr. SEGA. We reviewed options in an evolutionary path over the period of roughly January through just early this month——

Mr. GORDON. Okay. Well, let me try Dr. Griffin. Have you ever—Have you studied the Nunn-McCurdy decision package?

Dr. GRIFFIN. No, I haven't.

Mr. GORDON. Thank you. Do you know whether anyone in your office has studied it, or anybody that you have authority over has?

Dr. GRIFFIN. I have attended several briefings, as have folks on my staff. The most recent of those was, I believe, last week or the week before. I lose track, but I have not seen a finalized Nunn-McCurdy decision package, as you would put it.

Mr. GORDON. And Admiral, have you seen or studied a Nunn-McCurdy decision package?

Admiral LAUTENBACHER. I am not aware that there is a final decision package. There are a series of briefings and research material, that was presented to us through the course of the process, and I have studied all of those documents, yes.

Mr. GORDON. So what you have seen was what was, I guess, filtered to give to you, then.

Admiral LAUTENBACHER. No, I have looked at the work that each of the subcommittees did. Each subcommittee did, and there were, remember, a couple hundred people involved in this, so I looked at each of the reports that they did——

Mr. GORDON. Well, let me——

Admiral LAUTENBACHER.—in the process of going through this.

Mr. GORDON. Let me, Secretary Sega, let me not say that you are avoiding my question. Let me say that I am not asking it properly, and I will try to do a better job with my terminology, so that you will know exactly what I am asking for. Thank you.

Chairman BOEHLERT. The gentleman's time has expired. Dr. Ehlers.

Mr. EHLERS. Thank you. Thank you, Mr. Chairman.

It is—Frankly, it is not a very happy occasion, and I also don't particularly enjoy sitting here like a bunch of attorneys grilling potential criminals. That is not my intent at all. Frankly, as a scientist, I would be more comfortable sitting around a table looking at a bunch of charts and numbers, and trying to figure out just what you decided, and why you decided it.

DECISION-MAKING PROCESS AND COST TARGETS

But I understand the Chairman asked the question about cost, and I want to just narrow that down again. As I understand your response to him, you didn't have a specific cost target. In other words, you didn't meet, say okay, this is the biggest cost we can do. How, you know, what can we put on it? So, if you didn't have a specific cost target, how were decisions made to terminate sensors, and how were decisions made to decide which sensors were going to be terminated? This reminds me a little bit of what we went through with the Space Station, which started out with a grand vision, and as costs kept up, we kept cutting, and now, we have ended up with something that I am not sure is all that usable. I am not drawing a parallel here, but it seems to me that has been the process.

So my question is how did you make the decisions as to which sensors to terminate, and how does that fit into the whole big picture of what we are trying to accomplish here? I am looking for help from anyone.

Dr. SEGA. The two major groups that came together to look at the requirements was the Senior User Advisory Group, which had members from NOAA, NASA, and DOD, and then at the end, the Joint Requirements Oversight Council. There are key performance parameters that have been identified by us. And so the weighting was the ability of the sensors to meet prioritized need among the organizations.

Admiral LAUTENBACHER. If I—when I maybe have over-exaggerated answering the Chairman's question on the cost. Cost certainly is a factor. We looked at affordability when we looked at capability.

So, you have to look at cost per dollar, or capability per dollar. You have to look at what you are getting, and how you are meeting the requirements, and Secretary Sega has just mentioned the fact that there was a very detailed requirements review conducted by the requirements panel that is set up among all three agencies, to look at the requirements that they consider important. And the first one was continuity. So, continuity was the number one issue that was brought. Then, the need to meet the continuous collection of data, and then, the absolute objective of trying to retain the growth, so that we could achieve the levels that we originally envisioned.

So, that is the, you know, that is a judging factor, which we had to look at the cost, because there is a certain level at which you have to look at, the whole set of budgets that we have. So we looked at a range of things across the cost envelope, and looked at the capabilities, and tried to prioritize them in a way that made sense, for money spent, or for capability gained, in terms of the major missions, and the prioritization of the requirements. We don't have an endless stream of money. I just can't sit here and say that yeah, we just love to buy everything, because there is a requirement for everything that is there.

Mr. EHLERS. Well, I can assure you you don't have an endless stream of money. That is why we are having the hearing.

Admiral LAUTENBACHER. Yes, sir.

Mr. EHLERS. But how did you decide if something was too expensive? How were those—what was the decision process on that, and was everyone involved, or was it primarily——

Admiral LAUTENBACHER. We looked at—yes, these were part of the briefings. We looked at what the gains would be from buying the new instrument versus the old instrument, and looking at that as—it was a very small margin, is it worth the money, when we are in an overrun position, and a risk issue of complexity of the project?

Mr. EHLERS. Yeah.

Admiral LAUTENBACHER. So, it was a logical, you know, taking into account what the priority of the instruments are, and the capabilities we are trying to project. So, we looked at the marginal additions of the money spent on the instruments, and we prioritized them in that way.

Mr. EHLERS. Okay. Mr. Griffin, do you have any wisdom to add to this?

Dr. GRIFFIN. Well, I will say that when we looked at the baseline position, as Admiral Lautenbacher said, was we needed to assure measurement and continuity, and that, in fact, is the issue that is most important to NASA. And we needed to assure that the continuity of measurements was not worse in any category than we had from existing systems. And then, the issue became how much capability growth could we obtain without undertaking a schedule risk, or a cost liability that we could not tolerate? If data continuity is your first priority, then the ability to deliver instruments and spacecraft on schedule outranks all other priorities, and so, that was the primary effort. And then, the options were presented in terms of the risk to that continuity, as well as the overall cost.

We were well aware that we would not have more money available to do the program, and we were well aware that we were in

an overrun condition, but the primary concern was minimizing the risk of not having the capability that we needed.

Mr. EHLERS. Let me just ask you a couple of sequential questions on this.

Dr. GRIFFIN. Yes, sir.

Chairman BOEHLERT. The gentleman's time is rapidly expiring.

Mr. EHLERS. Okay. Well, these are superb questions, if you are curious.

Chairman BOEHLERT. Well, I would expect nothing less from the very distinguished physicist, but try to be somewhat brief, if you will.

Mr. EHLERS. Okay.

Chairman BOEHLERT. There will be a second round after.

COST OF CLIMATE-RELATED SENSORS

Mr. EHLERS. How much money did you save by removing the climate-related sensors from NPOESS, and how much would it cost to put them back on? Can we use scaled back versions of it? Can you just give me some——

Dr. GRIFFIN. I can't. I can take those for the record, but I can't answer them.

Mr. EHLERS. Yeah. Okay. We would—if we can just get that on the record later, that would be—I would be very happy with that, and I thank the Chairman for his generosity.

[The information follows:]

During the Nunn-McCurdy Certification process, the Office of the Secretary of Defense (OSD) Cost Analysis Improvement Group estimated that a total of $862.6 million would be saved by deleting the secondary sensors:

	EMD*	Production	
	($ in Millions)		
Earth Radiation Budget Sensor (ERBS)	$ 57.1	$ 16.0	
Total Solar Irradiance Sensor (TSIS)	$148.6	$ 43.5	
Space Environmental Sensor Suite (SESS)	$194.7	$141.4	
Altimeter (ALT)	$ 96.1	$ 28.1	
Survivability Sensor (SuS)	$ 41.6	$ 38.1	
Ozone Mapping and Profiler Suite (OMPS) Limb	$ 32.5	$ 24.8	
Total	$570.6	$292.0	$862.6

*Engineering Manufacturing and Development (EMD)

There has not been any further analysis to determine what the total cost would be to add these sensors to NPOESS or some other platform in the future, but it is assumed that the cost would be at least the amount indicated above.

The only sensor where scaled-back versions were considered during the Nunn-McCurdy process was the Conical Scanning Microwave Imager/Sounder (CMIS) sensor. The size and rotating mass of the CMIS sensor was likely to cause significant effort to accommodate this sensor on the NPOESS spacecraft. The decision to stop work and revisit the microwave imaging and sounding requirements was driven by the likely impact to the overall system that this sensor would have.

During the Nunn-McCurdy process, a higher priority was given to continuity of legacy operational capabilities, which resulted in a lower priority for a number of environmental and climate measurement capabilities; this led to the deferral or elimination of a number of the climate sensors from the baseline program that did not provide continuity with existing operational measurements. The decision to eliminate climate sensors was not driven by technical complexity.

COST TARGETS

Chairman BOEHLERT. Thank you very much. And just—I started my questioning by saying you know, did you—how did you arrive at cost? Did you have a target you were going to? I mean, $11.5 just didn't—well, it evolved, apparently. Did you say we can go $11 and no more, but then, you had to add something on, because someone made a compelling case, or did you go $10.6, or did you have a target to start with, or was the sheet blank, and say now, here is the capability we want, here is the schedule we have to meet, and then, you factored everything in, and then, when you totaled it all up, it came out to $11.5? Is that the way it happened, or did you start with sort of a target in mind? Dr. Sega, you are shaking your head.

Dr. SEGA. No, I think now mentioned by all of us in different ways, that the continuity of the sensing data to be at or greater than what we currently have on orbit was the driving factor.

Now, in the future, we may be able to go to what our objective system was as it originally, you know, envisioned prior to this process. But as you also add additional sensors, there is a risk in assembly integration and test, that the complexity added by the sensor in the early phases of these, of getting satellites on orbit may in fact drive schedule out, and that is——

Chairman BOEHLERT. And cost up.

Dr. SEGA. Yes. But with additional money and additional sensors, you also have the potential of driving the schedule to the right. And the continuity of service, and continuity of data was one that we wanted to make sure that we had a correct balance.

Chairman BOEHLERT. Thank you. Mr. Wu.

Mr. WU. Thank you very much, Mr. Chairman.

I would like to go from general to specific in a series of questions, and it may, Mr. Chairman, take two or three rounds, but I will start very quickly.

INFORMATION OVERSIGHT, REPORTING, AND BUDGETS

This is just to clarify things a little bit, because in my opening statement, I referred to the fact that one of the problems I have today is with the lack of information, lack of specificity with which to question you all more specifically. And some of the discussion we had last summer was about what information was available to NOAA, what available information was there to DOD, and how much of that was being made available to this committee for our oversight purposes, and I understand, Administrator Lautenbacher, that you were getting monthly reports. Those reports were not being made available to us a year ago. I believe that they are now. I will return to that in a moment.

But it has also come to my attention, and I would like some clarity on this, that as part of the Presidential decision directive that created NPOESS, there is supposed to be, starting in Fiscal '97, at least an annual report to the National Science and Technology Council on the progress of NPOESS, and the National Science and Technology Council currently is headed by John Marburger. The Chair is the President. The Vice Chair is the Vice President, and this is a bipartisan question, since there was a change in control in the Congress in 1994, and there was certainly a change in Administration in the year 2001. What was in that—were those reports done, and what were in those reports? Were people able to keep track of a program, were people able to track a program that was coming off the tracks? Were those—was that information ever supplied to the National Science and Technology Council?

Admiral LAUTENBACHER. I have not seen any of those reports, and I am not aware whether they are or not. I will take the question for the record, and try to get you a better answer.

Mr. WU. I would like to have—on behalf of the Committee, I would like to ask for those reports, going back to the first one in fiscal year 1997, and follow that forward.

Second, Administrator Lautenbacher, you mentioned that you are building a more robust management system, and I hope that that more robust management system also includes more transparency. Those monthly reports that you were receiving from the IPO, the integrated program office, is it your intent to make those,

or their parallel reports, or their successor reports, accessible to this committee for oversight purposes?

Admiral LAUTENBACHER. Yes, it is, on whatever frequency the Committee would like.

INTERNATIONAL BASES AND U.S. CONTROL OF DATA

Mr. WU. Thank you very much. And since I see that I am rushing through my questions a little bit more effectively than I thought, Dr. Sega, one of the things that I noticed in watching Air Force operations in the past is that we have a major base in Diego Garcia, probably the largest base in the Indian Ocean, if not in a broader array, but we rent that base from the British, and when we are on operational missions, there is sometimes a British lawyer and a U.S. Air Force lawyer sitting next to each other before a strike is called, because that mission has flown from Diego Garcia, which is leased by the United States military from the British government. If we are counting on weather data from a European satellite for military functions, will we be running into a scenario where there will be a U.S. Air Force lawyer and a European lawyer of some kind before we are authorized to use that weather data for missions?

Dr. SEGA. I am not sure what the arrangement is at this point, but the partnership with the Europeans with regard to data exchange——

Mr. WU. Well, Dr. Sega, you just said you were not sure, and yet you pointed to the Captain, whose mission was dependent upon this data, in a 15-minute basis. Don't you think that we should be sure before we rely on European data, for which we may need some kind of permission to use it for military purposes?

Dr. SEGA. Sir, I was not sure whether two attorneys had to talk prior to that. I hope that the memorandum of agreement on use of data will have rules of engagement that are clear, that the conversations about situations will occur much sooner, and it is clear as to what the rules are, prior to urgent action having to take place.

Mr. WU. Well, Dr. Sega, the challenge with this is, and this is not a theoretical matter, I saw this in operation. The fellow with the monitor was sitting between two lawyers, and one was British and one was American, and the rules of engagement were that both lawyers had to agree before a strike could be carried out, and I am just concerned that without U.S. control of that mid-orbit, that the same thing might happen with weather data.

Dr. SEGA. I understand your point. I was a mission-ready crew commander at Schriever Air Force Base on satellite systems—Defense Satellite Program and GPS system. And one of our sites was Diego Garcia, and during my tenure there, there was never an issue.

Chairman BOEHLERT. The gentleman's time has expired, but never underestimate your effectiveness, Mr. Wu.

Mr. WU. Thank you, Mr. Chairman, and I would be happy to discuss offline the specifics of the particular capability that we are talking about.

Chairman BOEHLERT. We intend to have more than one round, but the witnesses should know from experience appearing before

this committee that there will be some submission of questions in writing, that we can't expect you to, off the cuff, be able to respond to, but we would appreciate a written response in a timely fashion.

The Chair recognizes Mr. Gutknecht.

Mr. GUTKNECHT. Thank you, Mr. Chairman.

COST-BENEFIT ANALYSIS OF NPOESS COSTS

I guess I have not been in Washington so long that these big numbers just still are mind-boggling to me. The proposed cost for the first four NPOESS satellites is an enormous $11.5 billion. That is a big number. I mean, just to put it in context, the back of the envelope calculations are that would build 1,150 $10 million schools in the United States. That is a lot of money, and that is for four satellites.

I guess the question we have to ask on behalf of our constituents, especially now, from a cost-benefit analysis, what do the taxpayers get for that $11.5 billion? I mean, and is there a way we can recover part of that cost, whether it is from the Weather Channel or some other people?

Admiral LAUTENBACHER. The costs extends the coverage that we have today through the year 2026, so it is amortized per year, over a very long period of time. If you look at the savings of lives, and the cost of damage along our coasts from hurricanes and other severe weather events, they have been going down significantly since the advent of satellites, so there is invaluable benefit to our society to have this coverage. The money, while it is a significant amount, and it is still a big number to me, too, sir. So, I have no—I don't take any issue with that. It is at roughly the level that we have been affording per year for this service that we are providing to the public, that it has been costing us in the last decade or so, and for what we are planning for the future. So, it is not out of whack with what the general agreement of Congress has been to spend money for these benefits for the public.

Mr. GUTKNECHT. Will we recover any of it?

Admiral LAUTENBACHER. Not directly.

Mr. GUTKNECHT. This information can't be sold, then, in other words.

Admiral LAUTENBACHER. No, it cannot be sold. It is—becomes public good information that is for the benefit of saving lives, and beneficial to our economy. It is recovered through taxes from the—remember, this information is used by the entire private weather service companies that we have. Our weather services are split between public good and——

Mr. GUTKNECHT. Right.

Admiral LAUTENBACHER.—and private good, and so, the advantages to one third of the economy depends on this data, so the more it grows, understanding the environment, the more our economy grows, and when you talk about one third of our GDP, that is a pretty big chunk, and you are recovering your taxes from the growth on that.

Mr. GUTKNECHT. Well, my corn growers could use a rain right now, but these satellites won't really change that. I mean, ultimately, the weather is what it is. I mean, we can predict it a little bit better, if we have the technology, but the weather, the hurri-

canes are going to be what the hurricanes are going to be. We may have a better prediction of exactly where and when they are going to come and hit ground, but ultimately, they are going to do enormous damage.

Chairman BOEHLERT. If the gentleman will yield just one second, and I won't take this from your time, but I can't help but observe the cost in human lives and cost in dollars to this Nation of Katrina. Had we had a better capability, those are costs that might have been avoided.

Mr. GUTKNECHT. Well, might is the operative word, Mr. Chairman, with all due respect. I mean, you know, I think we have to be careful when we predict that this huge expenditure of public dollars will somehow accrue right back to us in real benefits, and I think at some point, this is a responsibility of this committee, and I think it is a responsibility of the gentlemen who are in front of us today, to really justify to the American people that we are going to get $11.5 billion—because it is an opportunity cost. We could spend the money on other things that might—that would save lives as well. I mean, we could build a better dyking system all along the coast. You can build an awful lot of other things for $11.5 billion.

STATUS OF VIIRS SENSOR

But I am going to come back to the last question I have, and that is, Dr. Sega, in Dr. Griffin's testimony, he stated that the NPP satellite, or spacecraft, I am sorry, is built and the Visible/Infrared Imaging, or VIIRS technology suite instrument, is on a critical path toward that launch. We have heard testimony that the testing of this sensor has experienced technical problems. Is this accurate, and what is the status of the VIIRS sensor, and when do you think they will be able to deliver that sensor for the NPP launch?

Dr. SEGA. Sir, on the VIIRS sensor, the engineering development unit that we mentioned last time, that we thought it was important to have that work completed prior to the flight unit—has successfully passed vibration testing. Flight units, flight unit electronics have completed a thermovac testing. The engineering development unit is in the thermovac testing process right now. They are looking at a backup plan in the event that there are problems on VIIRS as we go forward, but at this time, it is proceeding along.

Mr. GUTKNECHT. Now, when you say they have completed testing, does that mean they have passed the tests?

Dr. SEGA. There are many tests en route to completing the VIIRS engineering development unit and then the flight unit. And the testing that I mentioned is part of that process.

Mr. GUTKNECHT. Thank you.

Chairman BOEHLERT. Mr. Costa. Mr. Costa yields to Mr. Gordon.

Mr. COSTA. Yes.

Mr. GORDON. As the Chairman knows, even though the Chairman, unlike our former Chairman, does not have the policy of swearing witnesses in, it is still a felony to make a false or misleading statement to Congress. I just point that out, just for general interest.

Now, according to the GAO, the normal practice in a Nunn-McCurdy process is to develop an integrated program team report,

Dr. Sega, which has a CAIG cost evaluation. Was that done in this situation?

Dr. SEGA. I would need to go back and check and see if a formal integrated report that you described was completed.

Mr. GORDON. You don't know. You don't know today.

Dr. SEGA. That is correct.

Mr. GORDON. And you will find that out for us, and let us know.

Dr. SEGA. Absolutely.

Mr. GORDON. Thank you very much. Yield back my time.

Chairman BOEHLERT. Mr. Rohrabacher.

Mr. ROHRABACHER. Thank you, Mr. Chairman, for your leadership and oversight, and you are taking your oversight responsibility very seriously, and I appreciate that, and this is mind-boggling.

COST OF PROGRAM IN CONTEXT

I mean, it just is a mind-boggling issue, and let me just note that last exchange about how we can save, it is going to save so many lives, we are talking, first of all, we are talking about a $4 billion higher cost than what we were first told. I think that $4 billion that now has gone into a big black hole couldn't save some lives somewhere? How about paying for drug rehabilitation for the entire United States, or alcohol rehabilitation? Or how about body armor for our people in Iraq in a very timely way? When you put $4 billion into a black hole, because of incompetence, that is what happens. You don't have that capability any more. It is gone. Pardon me for being upset, but there is a big cost to this, and it can't be just brushed aside, saying the program is going to give us some more hours of understanding what the weather is going to be like, which could save lives, unlike what we would do otherwise with that $4 billion.

Would we have moved forward with this program, and I ask you right now, give me a yes or no down the line, would this program have moved forward, knowing that there was going to be an extra $1 billion per satellite cost, to finishing the program successfully, right in the beginning? Would it have been approved?

Admiral LAUTENBACHER. I don't know. I can't——

Mr. ROHRABACHER. Okay.

Admiral LAUTENBACHER.—project myself back to that time.

Mr. ROHRABACHER. Mike.

Dr. GRIFFIN. I doubt it.

Mr. ROHRABACHER. Doctor.

Dr. SEGA. Not in its current configuration.

Mr. ROHRABACHER. Okay. So, we have circumvented, basically, if there was only a 50/50, Mr. Chairman, we are talking about a 50/50 chance that it was going to have a major overrun when the program first moved forward. Now, I am going to have to say Congress has to share some of this responsibility as well. If we permit our experts to come here and tell us well, there is a 50/50 shot that it is going to be a lot more expensive, and we are going to throw the money right down a rat hole, and actually, we wouldn't even move forward if we could say how expensive it was really going to be. So, we have got to focus on what we demand of these people as well.

It is—I would suggest, and I see here that historically, the 50/50 percent of certainty is what historically, what Department of Defense programs like this generally have. Is that right, Doctor?

Dr. SEGA. That is correct, sir, and that is why we are going to a more back to basics block approach, in which we mature the technology prior to committing to a system production, that we cost at the 80 percent, that we bring the acquisition cycle time in closer, and we do the fundamentals of sound system engineering.

Mr. GORDON. Would the gentleman from California yield just a moment?

Mr. ROHRABACHER. I certainly will.

Mr. GORDON. It is my understanding that the Defense Science Board put out a report in 2003 that described budgets with a 50 percent probability of success, and inadequate reserves as to be unrealistic, and they recommend that it be 80 percent probability of success, with a reserve of 20 to 25 percent, just——

Mr. ROHRABACHER. Well, I think that we are going to have to make sure that we make sure that we place some demands on these people.

MANDATORY CONFIDENCE LEVELS

Dr. Griffin, do you think that we should—that this should be a wakeup call, and maybe, we should make an 80 percent requirement mandatory, rather than a 50 percent confidence level for such programs?

Dr. GRIFFIN. I think this is a community problem. As you know, we have had problems in the past at NASA as well, and as you know, I have, since coming on board, baselined a 65 to 70 percent cost confidence number for budgeting purposes, so I do think it should be higher than 50 percent. I don't know that there is a fixed number that should be used for every program. A program which has a great deal of heritage hardware in it probably should not be baselined at 80 or more percent cost confidence, because the money which is allocated to that program represents an opportunity cost taken away from another program. A program which has a very large amount of new technology, and is, you know, highly integrated program such as NPOESS, probably should be baselined at a very high cost confidence, with adequate schedule reserves and funded schedule reserves.

I do not believe that one size fits all, but I do agree with you that more caution is warranted.

Mr. ROHRABACHER. Well, Dr. Griffin, obviously one size doesn't fit all, but there has to be a standard, and there have to be standards, whether or not it is something that it on a sliding scale or not. Let me note, Mr. Chairman, that from what I hear today, we now have a program that has gone from $7 to $12—$11, maybe $12 billion, and there is still only a 50 percent cost certainty right now. Is that right? That is what I am hearing, isn't it? Even with this suggestion, even what you are telling us today, that budget figure is only coming at us with a 50 percent certainty.

Chairman BOEHLERT. Mr. Rohrabacher, let me point out that that is precisely why the Chair was asking a series of questions about——

Mr. ROHRABACHER. I remember.

Chairman BOEHLERT.—about the cost confidence level. That is why we are very concerned about the reserves and the margins built in to the program. That is why we are insisting that we get more information. How in Hell can we evaluate anything if we are limited in the amount of information that is given to us, as we conduct our very important oversight. We can't do it——

Mr. ROHRABACHER. Mr. Chairman.

Chairman BOEHLERT.—in a manner that does the people proud. So, Mr.——

EMPLOYEES QUALIFICATIONS

Mr. ROHRABACHER. Mr. Chairman, let me note that I also requested information after the last hearing that I have not received, about the confidence level and the qualifications of people in this program, and about whether or not even by your own standards, by the DOD standards, and by official government standards, by who should have what credentials to manage certain programs, that it didn't seem to me, from the research that my staff has done, that this program had those people on there. Now, I want—I am just going to say for the record, I want an answer to the questions that we sent you, and maybe if I could be indulged just one question here, to see maybe they have the answer.

Do we have, for example, well, it is on data line, base certified project management professionals, which is a globally accepted credentialing project, about management competency. We checked this, and it doesn't seem that the managers of NPOESS have the official capability to manage the program. Now, am I wrong? Is my staff just giving me false information here? Are—do you have people managing this program that don't have the standards and the credentials necessary for what we have established as the necessary credentials to manage such high level programs?

Dr. SEGA. Sir, you can take that for the record, of all the people that are in our program, but I assure you that the two leadership positions that we have identified as an EXCOM here, and——

Mr. ROHRABACHER. Okay. Well, let me—okay.

Dr. SEGA.—are at a high level of qualification.

Mr. ROHRABACHER. You pointed out Brigadier General Mashiko.

Dr. SEGA. Absolutely.

Mr. ROHRABACHER. Let us see, and it says that according to the law, which under statute is 10 USC §1735 in terms of qualification and in terms of education and experience, those actual, you know, guidelines as to who is qualified to do that is set down in that law, does Brigadier General-designee Mashiko and Colonel-designee, as I guess it is Stockton, do they meet the legal requirements under that law?

Dr. SEGA. Yes, they do, sir.

Mr. ROHRABACHER. They do?

Dr. SEGA. Both Brigadier General-select Mashiko and the program——

Mr. ROHRABACHER. All right.

Dr. SEGA.—the satellite program.

Mr. ROHRABACHER. So, we have you on record as yes, they do. All right.

Dr. SEGA. The two top positions that we have——

Mr. ROHRABACHER. Under the qualifications set by statute under 10 USC δ1735. And you are saying, answering in the affirmative.

Dr. SEGA. For our PEO and SPD, the answer is yes.

Mr. ROHRABACHER. Okay. Thank you very much. Thank you, Mr. Chairman.

Chairman BOEHLERT. Thank you, Mr. Rohrabacher. Mr. Neugebauer.

GUARANTEE OF PLAN

Mr. NEUGEBAUER. Thank you, Mr. Chairman.

Mr. Lautenbacher, do you own a home?

Admiral LAUTENBACHER. Sorry, I didn't hear the question.

Mr. NEUGEBAUER. Do you own a home?

Admiral LAUTENBACHER. I own a home. Yes, sir.

Mr. NEUGEBAUER. Yeah. Just kind of pretend that I came from the homebuilding business, and I came to you and said I want to build you and your wife a home, and you are interested in me doing that, and you said let me tell you about the last job I did. It cost twice as much as I told the people it was going to cost. They got two thirds of the square footage that we had agreed to, and that we removed most of the amenities from that, and by the way, I still haven't finished that project, and it has been going on for a number of years. Are you ready to sign up a contract with me?

Admiral LAUTENBACHER. Not the way you have put it, no, sir.

Mr. NEUGEBAUER. Yeah, well, I think that is where this committee is today, is that you are bringing us a plan with a very poor performance, right, and I think that, you know, we are already $3.2 billion into this project, and we can't pull up data from one satellite yet. Is that correct?

Admiral LAUTENBACHER. No satellites have been launched yet, that is true.

Mr. NEUGEBAUER. No satellites have been launched. And so, I think the question that I have is do we have a failed plan here? Because you have not been able to execute this plan. It is over budget, you under-delivered, and yet, you have come back to saying today, and saying we have got it all figured out, and yet, we are going to reduce it by two satellites, we are going to remove some of the bells and whistles that we originally promised on this.

And so the question I have is, how can I be assured, as a United States Congressman, that you have a plan that you can execute?

Admiral LAUTENBACHER. We would certainly like to sit down with you and your staff and explain that to you, because we think that the plan will work, and that we have accommodated the issues that we had. All known deficiencies have been covered in one way or another, and I am not asking you to trust us. I am asking you to let us show you.

MISTAKES LEADING TO CURRENT PROBLEMS

Mr. NEUGEBAUER. Well, I guess the question that I have is, and it is a systemic problem, is how did we get to this point? In other words, when things weren't going well, why didn't we decide to make management changes, when we realized, my good friend Mr. Gutknecht really ruins my day, because while I am gone, he tells

me for this great performance, we paid a $200 million bonus to somebody, and I just—I am perplexed here how you guys sitting there can tell us that things are going to be okay, when in fact, things aren't okay.

Admiral LAUTENBACHER. The contractor bonus was reduced to zero for the last round. We have been making management changes for the past year and a half, to improve the fidelity in the reporting of the program. The program was optimistically estimated in the beginning, and it was lightly managed, and we have been working hard in the last year and a half to recover to an area where I think we have the confidence, and hopefully, can gain your confidence that it is under control.

Mr. NEUGEBAUER. How do we get that other $200 million bonus back, that we shouldn't have paid to begin with? That is—I think that is one of the questions I would have. Hopefully, now, we realize that we shouldn't be paying bonuses, but it appears to me that we shouldn't have paid $200 million, and somebody owes the American taxpayers, and we have to be clear about who owns this money, whose money this is, and you gave $200 million of the American taxpayers' money to someone who was not performing. I mean, how do you justify that?

Admiral LAUTENBACHER. You have to look at the—I am not, first of all, I am not the expert on the acquisition contract, but you have to look at the—this was their profit margin, on which they bid, and instead of getting a fixed fee, we basically reduced their fee, so when you look at what they got, they only got 10 percent, or they got about half of what they expected to get on this program. So, they have been put on notice, and as I said, zero the last period. We can give them a lot of zeros, and we can drive it down pretty low. I mean, I think we have their attention on their profit margin, because they are not getting it right now.

JOINT AGENCY EFFORT

Mr. NEUGEBAUER. I want to, I guess, just go back, and my final question is because of where we are today, is it really time to step back and see if this joint effort is the best policy, and should we have let NOAA go their way, the Department of Defense go their direction? I mean, I am for efficiency in government, and utilizing all of jointness, and all of those kind of things, but when that isn't working, you got to go back to blocking and tackling, and maybe this is too ambitious of a project for these two agencies, or three agencies to do together.

Admiral LAUTENBACHER. It is a very legitimate question, and we did look at that. We looked at what would happen if we were to work it on a separate basis, and the conclusions were that when you added it up, given where we are today, it would be more expensive to do that than it would be to try to solve and correct the issues that we have with this tri-agency management program.

Mr. NEUGEBAUER. Wasn't it originally estimated that to do it separately would—it would cost about $1.2 billion more, at that time?

Admiral LAUTENBACHER. Yes, sir. It was.

Mr. NEUGEBAUER. It turned out that that wouldn't have been such a bad buy.

Admiral LAUTENBACHER. Well, we would have had the same misestimates in those parameters, and we would end up with even a bigger delta. I mean, given what I can tell from looking at the experience and the development issues in the program.

Mr. NEUGEBAUER. I see my time is out, Mr. Chairman. Thank you.

Chairman BOEHLERT. Thank you. Thank you very much.

AWARDS AND BONUSES

Admiral, I do commend you for the last award period, but I would point out that you got—you said you have got their attention. We damn sure got your attention, because when it was pointed out to us that after our evaluation, in connection with our oversight, that 84 percent of the eligible awards were paid for, in the tune of $143 million, you know, we found it hard to comprehend that for a project that was billions over budget and years behind schedule. We didn't quite understand why bonuses should be paid, so I am glad that you are on top of it, and I am glad that we have seen the improvement that we had every right to expect, and I commend you for that, but I don't want to miss the opportunity to point out that this committee, in its day to day oversight responsibilities, was right on top of that situation, and brought it forcefully to the world's attention.

With that, I will recognize Mr. Wu.

Mr. WU. Thank you, Mr. Chairman.

COST CONFIDENCES AND CMIS

And I would just like to put a finer point, or get down into more detail about the questions that the Chairman and Mr. Rohrabacher raised, about cost confidences, and this is focusing on one particular instrument. It would seem that the only instrument that provides that data that covers each of the key performance parameters is CMIS, and it would appear that the microwave imager sounder, along with VIIRS, is really at the heart of weather forecasting capability, but CMIS, although it is not, if you will, the guilty instrument, it is being dropped, and it may be added back to a later NPOESS if it is successfully developed.

My understanding of this contract is that well, we have spent about $163 million on CMIS thus far, and that is through February of this year. There will be some shutdown costs, and let us say that shutdown costs are negotiable, but let us say that we roughly wind up with a $200 million figure. I am told that Colonel and General-select Mashiko, congratulations, by the way, that she provided us with information yesterday stating that replacement instrument is to be developed for the difference between what has already been spent on CMIS and its successor instrument, and since that price tag was originally projected to be $465 million, if you subtract $200 million from that, what we are projecting, or what you all have projected, is that what was originally going to be a $465 million instrument is going to be developed for $265 million. That stretches my credulity a little bit, and perhaps, any of you all could explain, you know, how you are going to add the Hamburger Helper to stretch the $265 million to cover what was a $465 million project.

Admiral LAUTENBACHER. We are trying to prevent the risk of getting into a situation where we end up spending as we did on VIIRS. I think that is a substantial risk, given the size of this instrument, and the increase in the ability to build this large instrument. We will downsize that instrument to a smaller weight, less complexity, to one that has already been built. We believe that there is good evidence that this instrument can be built for the price, the differential price. It will be a competitive bid, and we are going to look very hard, we are going to develop a package with—General Mashiko is working on that, to make sure that the specifications are such that this will be accomplished within the envelope of what we know we can build today. We do not want to get into a risk situation, where we keep having to solve technical problems, what you don't know you don't know, that we don't know about at this point. So, we believe we can do that.

Mr. WU. Well, we will be watching with great interest, at each of these smaller components, because when you have this 50 percent or less confidence level at the overall cost package, the devil is always in the details, and it is these individual instrument packages that can cause us a tremendous problem.

AWARD FEE

And I just have one question of curiosity about the overall contracting process. I have it on good authority that only one percent of these acquisition contracts have bonuses of 15 percent or more, and yet, this contract, I believe, has a 20 percent bonus built into that. Administrator Lautenbacher, you mentioned earlier that the payout was 10 percent, half of the expected bonus, so I think that, you know, these numbers jive. It is a 20 percent bonus, whereas only one percent of contracts have bonuses of 15 percent or more. What led to the decision to make this a highly bonus-oriented contract?

Admiral LAUTENBACHER. I am going to ask Dr. Sega for his help on this, since I am not the acquisition authority on this, but I am—I don't know what the exact percentage is, but there are a number of contracts that have higher levels in them, so I don't know whether it is one percent, but it was not uncommon at the time that the strategy was developed for this program. And again, I wasn't there when this was developed, but from my background in Defense Department, the object was if you had a higher risk program, and you wanted to get people's attention, you would have some way to reward them and get their attention, because if they are not making any money on a contract, they are going to put their C team on it, and go off and work on something else where they can get their bonus and their stock levels up. So, that was, I am sure, part of it, but again, I wasn't—I don't know why they made the decision, but this is not a unique contract, and I would defer to these two gentlemen who are into the policy more than I am.

Chairman BOEHLERT. Dr. Sega, you have an opportunity to respond, if you would like.

Dr. SEGA. Sir, I don't know what the history is, but the award incentive fee will be part of the renegotiation as we go forward.

Mr. WU. Well, Mr. Chairman, if I may just close by saying that as a former attorney for—between software vendors and software

consumers, and watching large software development projects, certainly not as large as this, or as Mr. Neugebauer mentioned, having been—he—home builder, and me having been a consumer of home builder services, if you are going to rely on a bonus style contract to, on the one hand, save money, and on the other, to reward high performance, and get the A team on the project, one has to monitor that progress extremely closely, and the metric has to be done in close time gaps, or else the bonus system is going to go off kilter.

And thank you, Mr. Chairman.

Chairman BOEHLERT. Thank you very much.

LOSS OF CLIMATE DATA AND SENSORS

I am concerned about the loss of climate data, and I would like to ask each of you to describe possible ways to mitigate for the loss of the climate sensors, and then, I want to know, related, are there any international agreements affected by this loss? Let us talk about the loss of climate sensors and what are we going to do to mitigate that loss, and then, any international agreements impacted by this loss?

Admiral LAUTENBACHER. Okay Let me just to set the context, of the 55 environmental data records, actually 41 of them are related to climate, or are useful to climatologists, and they are in all—and a majority of those are in the VIIRS instruments, which will show up. So, there is a good deal of information that is included in the basic package. There are five instruments that are not on this package, and at a savings, and one reason why they are not there, but there are some alternatives. Of the five instruments, one is the space environment, so set that aside, that is not a climate issue. That is a space weather issue, of magnetic storms and that sort of thing, and there will be a package to cover that, so we will use the legacy package to cover the space environment monitoring thing, so it is not climate, but it is going to be covered.

There is an APS system, which is called, which is for aerosol data. Aerosols are very important for climate, because we don't understand whether they are a positive or negative forcing in some cases, and this is an area where we need to reduce the uncertainty that we have in climate measurements. NASA will fly an APS on the Glory mission, so we will have, basically, a five to ten year life of that sensor, to be able to continue the aerosol data types of issues. So, part of our plan is to try to figure out how to continue beyond that point for the aerosols.

In the altimetry, which is, I have mentioned, not necessarily climate, but it is useful for heat content in the ocean, the Navy has been directed to develop a mitigation plan, which we will put into our plans on that. The Earth's radiation budget sensor, which is important to determine the balance of radiation, we will fly something called Ceres, which is a cloud and radiation sensor, that is a current sensor that NASA has, and it will continue the climate information that we have had before.

So, we are able to, in the scheduled life expectancy of seven to ten years, have opportunities to look at that. The one that we have not been able to cover directly today, that I can give you assurance on, is the TSIS or Total Solar Irradiance. We have a NASA satellite

called SCORCE, or SCORCE, I don't know how they pronounce it. I will let Dr. Griffin tell me the proper pronunciation, but that life expectancy goes for several years. We are looking at ways to—and then on the Glory mission, to look at ways to incorporate that.

So we are very sensitive to the climate variables that are here, and we have tried to do as much as we can to maintain them with the expectation that we will develop an alternative plan, to come back to you to tell you how we are going to maintain continuity.

Chairman BOEHLERT. Once again, not to pat the Committee on the back, but why not? We deserve a little credit once in a while. We get a lot of blame for things. But you can thank Dr. Griffin and this committee for Glory being resurrected from the dead, a very important mission.

Dr. Griffin, would you care to comment on the question, because it is very important to NASA, I understand.

Dr. GRIFFIN. It is, though the climate measurements are the primary area for us, although, again, Commerce has the overall lead on climate.

Admiral Lautenbacher detailed the climate instruments which would be removed, and there are, I would emphasize we don't have a problem the day after tomorrow. I mean, we have, in terms of missions that are existing, Glory was mentioned, SCORCE was mentioned, the Ceres instrument will be developed. We are not looking at a problem immediately. We are looking at problems that would occur out in the 2010, 2011, that timeframe or later. Of course, there is always the risk that any given instrument operating today would fail, but we do have, we have undertaken, through the National Academy, a decadal survey of Earth science, and we are expecting that survey to provide independent scientific input on what the impact would be of not having these climate sensors fly on NPOESS, together with recommendations. So, we will, in the next year or so, be looking forward to that input as we craft our plan.

Right now, as Admiral Lautenbacher said, we don't have a plan. Any instruments that would need to be developed, any missions that would need to be developed to lessen these impacts, or impacts on our international partners, would require money not presently in the budget.

So, there is no free lunch. These instruments being removed from NPOESS means that if we wish to get this data, we will have to pay to accomplish it by some other means.

Chairman BOEHLERT. Well, in your testimony, you said relying on the Earth science decadal survey now underway, you are going to rely on that for guidance. Are you going to explicitly task the survey to prioritize the sensors, and will you ask them whether NPOESS or another platform will be the best way to fly the sensors?

Admiral LAUTENBACHER. We will be asking those questions and others.

Chairman BOEHLERT. And Dr. Sega, just yesterday, we had an interesting discussion, and you said to me that the problem with the climate sensors is that it is so hard to integrate so many of them on one satellite, and you have had real life experience up in the heavens as an astronaut doing that, but the NPOESS plan still

allows for them all to be on one satellite. It just doesn't pay for the sensors themselves any more. So, do you object to that aspect of the plan?

Dr. SEGA. The issue of the numbers of sensors, climate sensors or meteorological sensors, oceanographic sensors, but the number of sensors that are currently on a singular bus, and the challenges for assembly, integration and tests was the focus of the discussion. For our use in weather forecasting, and doing some of our work—we also saw some of the sensors—through the decision process—being removed. The Navy, in terms of looking at sea elevation and sea state—its sensor is off. The CMIS will probably, most likely be reduced from its 2.2 meter diameter, that has a little lower frequency capacity, goes deeper in the ground, that the Army was hoping to have. At higher frequencies, it has a broader aspect area. We are going to see, probably, a modification of that and reduced a bit. On our space sensing, part of that space package has been removed from the satellite, that looks at the, primarily electron density going up.

So, the issue was looking at how we assure the core capability to have continuity. And so, those were the tough decisions that had to be made in this process.

Chairman BOEHLERT. Dr. Ehlers.

Mr. EHLERS. Thank you, Mr. Chairman. I apologize. I had to step out for another meeting briefly, so I hope I am not asking anything redundant.

PRIORITIZING ADDITIONAL SENSORS

But along the same line that you have been talking about, I understand you are still going to fly the full sized vehicle, and hope that if there is some additional money that becomes available, either from within the agency or from the outside, or if the world is suddenly peaceful, and we have another peace dividend, whatever the source of the money, how—do you have a process in place to decide which additional satellites, pardon me, which additional sensors to put back on this system, or do you think it is so unlikely that you haven't even talked about the process? Mr. Lautenbacher.

Admiral LAUTENBACHER. We have a list of priority of sensors that has been developed as part of this process, so if it doesn't come from outside, that somebody wants to buy a specific sensor, because they have got costs, or they have got, you know, a requirement for it, we have a priority list on putting them back on. Yes.

Mr. EHLERS. You do.

Admiral LAUTENBACHER. Yes, sir.

Mr. EHLERS. And that was developed between——

Admiral LAUTENBACHER. It was developed in the requirements review, subject to the Nunn-McCurdy review.

Mr. EHLERS. Yeah. Okay. Mr. Chairman, I would be happy to yield my remaining time to anyone else who has a question.

Chairman BOEHLERT. Well, I think we have pretty well exhausted the topic, and I thank the very distinguished witnesses for being part of this rather protracted search for a better way to do something that I think we all acknowledge is extremely important for a whole lot of very valid reasons.

We are going to be faithful to our charge, to conduct vigorous and continuous oversight, and I am comforted by the fact that I think we now have a program that got seriously off-track back on-track, but the proof of the pudding is in the tasting, as they say, and we are going to continue to sample, on a regular basis.

We will provide some additional questions to each of you in writing, and would ask that you respond in a timely manner, and I appreciate all of you being available for conversations with the Members, and with our senior staff, which I take pride in pointing out, on both sides of the aisle, is one of the most professional any place in this town.

So, with that, thank you very much. This hearing is adjourned.

[Whereupon, at 4:35 p.m., the Committee was adjourned.]

Appendix 1:

Answers to Post-Hearing Questions

ANSWERS TO POST-HEARING QUESTIONS

Responses by Vice Admiral Conrad C. Lautenbacher, Jr. (U.S. Navy, Ret.), Administrator, National Oceanic and Atmospheric Administration, U.S. Department of Commerce; Under Secretary of Commerce for Oceans and Atmosphere

Questions submitted by Chairman Sherwood L. Boehlert

Q1. NOAA has some responsibility for environmental and climate observations from space. Given that the sensors necessary to provide such observations have been removed from the certified NPOESS program and additional funding over and above the $11.5 billion will be required to add them back, how will NOAA meet its mission requirements in this area? How much money would it cost to add these sensors back to NPOESS or to fly them on another satellite?

A1. NOAA's primary environmental and climate observation mission, highlighted during the Nunn-McCurdy process, is to maintain uninterrupted operational polar satellite coverage in support of U.S. weather forecast capabilities. Several steps have been taken to maintain this continuity. NOAA remains committed to its climate mission and is assessing, along with NASA, ways to mitigate the impact of the Nunn-McCurdy decision to meeting the observational requirements for its climate mission.

To ensure all three satellite orbits (early morning, mid-morning, and afternoon) are covered, NOAA has partnered with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). NOAA's polar-orbiting satellites (POES) will cover the afternoon orbits, DOD polar-orbiting satellites (DMSP) cover the early morning, and EUMETSAT's polar satellite, MetOp, will cover the mid-morning orbit. The NPOESS satellites covering the afternoon orbit contain an advanced imager and advanced sounder, which will enhance weather forecasting by increasing our knowledge of the vertical structure of the atmosphere and providing better information on surface weather phenomena. MetOp flies the same imager as POES; therefore the imaging capabilities presently available from today's operational polar spacecraft will be preserved. MetOp also flies a scatterometer, which will provide sea surface wind speed and direction, a capability not available today on a civilian operational satellite. In addition, MetOp flies an advanced atmospheric sounder, again providing greatly improved data on the vertical structure of the atmosphere to enhance operational weather forecasting capability.

Although some of the climate sensors were removed from NPOESS, it is important to understand a significant amount of critical climate information will come from the main NPOESS sensors (VIIRS, CRIS, ATMS, and the OMPS–Nadir sensor). These sensors will enable NOAA and NASA to provide continuity for a substantial number of these required climate variables. These variables include sea surface temperature, snow cover extent, upper air temperature, land surface temperature, clouds, precipitation, and land surface vegetation, among other variables.

There is the potential for loss of continuity from NASA research spacecraft (primarily the Terra, Aqua, and Aura platforms of the Earth Observing System) in data collection for some variables, under the Nunn-McCurdy certified NPOESS program. These include total solar irradiance, Earth aerosol polarimetric properties, and stratospheric ozone, as well as research imagery in the mid-morning orbit. Additional data were expected from the NPOESS sensors for the Total Solar Irradiance Sensor (TSIS), Aerosol Polarimeter Sensor (APS), Altimeter (ALT), and the Ozone Limb Sensor. Continuation of precision measurements for these climate variables is important for understanding the sensitivity of the climate system to human-induced changes in atmospheric composition, natural climate variability, and other environmental factors. Other measurements of particular concern are sea level and ocean surface winds.

For several of the essential climate variables at risk, NOAA and NASA are working together and with other interagency partners and groups, such as the U.S. Climate Change Science Program (CCSP), to assess the best way forward. NOAA will work with its national and international partners to try to provide data continuity for as many variables as possible. For example, NOAA will work with NASA to develop optimal strategies for ensuring the continuation of total solar radiation and aerosols. There is some time available to work this issue, given that these two measurements had been planned to be made on NASA's Glory mission scheduled for launch in 2008.

NOAA also plans to work closely with international satellite programs such as EUMETSAT's MetOp for ocean winds, and the joint U.S.-European Jason mission and Ocean Surface Topography Mission/Jason-2 for sea level data continuity.

During the Nunn-McCurdy Certification process, the Office of the Secretary of Defense (OSD) Cost Analysis Improvement Group (CAIG) CAIG estimated savings of approximately $860 million by deleting the secondary sensors (EBBS, TSIS, SESS, ALT, SuS, OMPS Limb) as they were allocated in the baseline program. In the baseline program the satellites were to fly in three different orbits with each orbit having a different instrument configuration. The certified program eliminated two production satellites and changed the orbit configurations. The Nunn-McCurdy process only looked at the estimated cost savings achieved by removing these sensors, contract negotiations with the venders would determine the actual cost of adding the sensors back to NPOESS. Total costs for adding these sensors to a non-NPOESS platform in the future have not been analyzed.

Instrument	**Engineering and Manufacturing Development (EMD)**		**Production**		
	$M	**# Units**	**$M**	**# Units**	
Earth Radiation Budget Sensor (ERBS)	57	1	16	1	
Total Solar Irradiance Sensor (TSIS)	149	1	44	1	
Space Environment Sensor Suite (SESS)	195	2	141	4	
Altimeter (ALT)	96	1	28	1	
Survivability Sensor (SuS)	42	2	38	4	
Ozone Mapping and Profiler Suite (OMPS) Limb	30	2	25	1	
Total	**568**		**292**		**$860**

Q2. Both you and Dr. Griffin testified that the decision to build a full size NPOESS spacecraft that can house all of the originally-proposed sensors "was made because the EXCOM agreed any additional funding gained through contract renegotiation or in unutilized management reserve would be used to procure these secondary sensors." Additionally, you said that as part of the Nunn-McCurdy requirements review process, a prioritized list of additional sensors was developed. Please provide a copy of the prioritized list of additional sensors. If additional funds become available, what process will be used to select which additional sensors can be put on the satellite? And who will make the ultimate decisions?

A2. As a part of the Nunn-McCurdy process, the NPOESS Senior Users Advisory Group (SUAG) developed a priority list of the eliminated NPOESS sensors and communicated its justification for the priority list in a letter to the NPOESS Executive Committee (EXCOM). The priority is as follows:

1. Space Environment Sensor Suite (SESS)
2. Altimeter (ALT)
3. Ozone Mapping and Profiler Suite (OMPS) Limb Sensor
4. Total Solar Irradiance Sensor (TSIS)
5. Earth Radiation Budget Sensor (ERBS)
6. Aerosol Polarimetry Sensor (APS)
7. Survivability Sensor (SuS)

If funds become available, the selection process will involve the SUAG recommendations, engineering considerations, risk assessment by the NPOESS Program Executive Officer and the NPOESS Integrated Program Office (IPO). The EXCOM, which represents the Tri-Agency partnership of NOAA, NASA, and DOD, will make the final decision.

Q3. In your testimony, you indicate that the certified NPOESS program will improve the quality of weather forecasting. What specific improvements will each NPOESS sensor (VIIRS, CMIS, CrIS, ATMS, OMPS–Nadir, CERES) provide for weather forecasts? What is the difference between these improvements and what you were expecting from each of the sensors on the original NPOESS program?

A3. The certified NPOESS program will improve weather forecasting quality over what is possible with today's operational satellites, the NOAA Polar-orbiting Operational Environmental Satellites (POES) and the DOD Defense Meteorological Satellite Program (DMSP). Some of the expected improvement of NPOESS is already being realized because of the use of research satellite data/products in preparation for NPOESS. For example, data from the MODIS sensor flown on NASA's Aqua and Terra has been provided to the Air Force and Navy to be used in operational scenarios to provide a true multi-spectral capability to support military operations. Data from the AIRS sounder on Aqua has been provided to forecasting centers for use in numerical weather prediction (NWP).

Improvement is expected in two areas: NWP and direct forecaster use of imagery/products. Improvements in NWP are most directly related to the assimilation of data from the Cross-track Infrared Sounder (CrIS) and the Advanced Technology Microwave Sounder (ATMS). Much of this improvement results from using the increased knowledge of the vertical structure (temperature, moisture, and pressure) of the atmosphere provided by these sensors to allow significant reduction in the number of very poor forecasts. The certified NPOESS program should provide expected improvements in NWP when compared to today's performance based on operational sensors.

Improvements due to direct forecaster use of imagery/products are expected mostly from the Visible/Infrared Imager/Radiometer Suite (VIIRS). VIIRS will allow forecasters to better monitor, detect, and track weather in data sparse polar regions, such as Alaska, and surrounding oceans.

CMIS was expected to provide ocean surface wind vectors (speed and direction). This type of data is useful for hurricane and ocean weather forecasting, as demonstrated by NASA's research QuikSCAT satellite. Specific benefits include more accurate tropical storm/hurricane intensity forecasts and more accurate gale and hurricane force wind event warnings over expansive oceanic areas. The new microwave imager/sounder (i.e., CMIS replacement) in the certified program will most probably provide wind speed and direction information. The use of the Advanced SCATterometer (ASCAT) on MetOp will partially mitigate this loss by providing wind speed and direction information until this new imager/sounder is available on the second NPOESS satellite (C–2).

OMPS–Nadir allows us to detect the total column amount of ozone in the atmosphere. Ozone in the stratosphere affects the heat balance and radiation balance and a lack of knowledge could impact forecasting due to the role energy balance plays in numerical models. The limb sensor, as yet not flown on operational satellites, provides high-resolution information about the vertical distribution of ozone through much of the stratosphere, including the lower stratosphere where most of the observed ozone depletion has taken place.

CERES provides knowledge of the Earth's radiation budget (incoming versus outgoing radiation). Knowledge of this sort can help predict general circulation and where imbalances may occur. This type of data is used in modeling to help predict movement and intensification of features and phenomena. CERES is the same sensor as Earth Radiation Budget Satellite (ERBS) but with a few earlier generation components. In the current certified program, the probability of a gap between the CERES instrument currently flying aboard NASA's Aqua spacecraft (launched in 2002) and that on C–1 is quite high. Given the challenge of calibration of radiation budget measurements, the impending gap will complicate efforts to determine long-term trends in the radiation budget.

Q4. The CMIS sensor was removed from NPOESS and a scaled-back replacement sensor will be developed, but is not scheduled for flight until the second NPOESS satellite in 2016. What satellite and/or sensors (civilian, military, European, other) currently provide CMIS-like information? What is the expected lifetime of these satellites and/or sensors? Will they last until 2016? What is the difference in capability between the current satellites/sensors and what CMIS would have provided? What is the difference in capability between what CMIS would have provided and the proposed replacement sensor?

A4. Conical-scanning Microwave Imager/Sounder (CMIS)-like data is provided by several sensors:

- The National Weather Service uses ocean wind speed and direction data obtained from NASA's QuikSCAT for its operational products. QuickSCAT continues to perform past its prime mission that ended in 2001, and its first extended mission that ended in 2005; NASA is hopeful that QuikSCAT will continue to operate throughout its planned second extended mission that will be complete in September 2009.

- An Advanced Scatterometer (ASCAT) will be flown on European polar orbiters from 2006 to 2020 and will produce CMIS-like data. The ASCAT sensor provides ocean surface wind speed and direction but does not provide some ocean, land and atmospheric data that CMIS was tasked to produce (e.g., soil moisture).
- WINDSAT, a Navy experimental satellite, provides wind speed and direction and some of the imagery products expected from CMIS. WINDSAT is past its expected lifetime of 2006 and continues to perform.
- NOAA's POES and the European polar orbiter, MetOp, both fly the Advanced Microwave Sounding Unit (AMSU), which provides the sounding data and some of the imagery provided by CMIS but does not have the same resolution as CMIS. The certified NPOESS program will fly an instrument similar to AMSU, the Advanced Technology Microwave Sounder (ATMS), in the afternoon orbit. AMSU will be available on MetOp through 2020 and ATMS will fly on NPOESS through 2026.
- NASA flies the Advanced Microwave Scanning Radiometer (AMSR–E) on its Earth Observing System (EOS) Aqua mission. This is a Japanese sensor with products very similar to CMIS. AMSR–E is expected to operate until 2009.
- DOD flies the Special Sensor Microwave Imager (SSMI) and the Special Sensor Microwave Imager/Sounder (SSMI/S) on its Defense Meteorological Satellite Program (DMSP) satellites. These sensors have a similar product suite to CMIS; however, they cannot measure ocean wind direction and can only provide soil moisture over a limited area. They both have degraded resolution compared to what CMIS would have provided. The SSMI sensors are being replaced by the more modern SSMI/S in 2008. SSMI/S is manifested on all remaining DMSP satellites and should last until at least 2019.

CMIS would have been able to provide some small improvements to existing capabilities to delineate between different meteorological features, such as atmospheric temperature and moisture profiles.

The replacement microwave/imaging sensor for the certified NPOESS program is still being defined. The new sensor will reduce risk while maintaining data continuity and improvements for weather forecasting.

Q5. The new NPOESS program relies on Europe to provide data for the mid-morning orbit. This is not a new idea, but one that had to be abandoned earlier in the program. What agreement(s) are already in place with Europe? Do those agreement(s) need to be altered in light of the Nunn-McCurdy decision? Does the United States need to develop new agreements with the Europeans? Given that Europe has backed out of agreements in the past, what assurances do we have that they will be reliable partners now?

A5. The heart of NPOESS cooperation with Europe is NOAA's long-time cooperative relationship with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). EUMETSAT is comprised of 20 member states, the majority of which are fellow members of NATO and members of the European Union. The NOAA-EUMETSAT partnership has spanned over two decades and has emerged stronger from each challenge it has faced. EUMETSAT has always fulfilled its cooperative obligations to NOAA.

In the 1998 Initial Joint Polar-orbiting Satellite (IJPS) system agreement, NOAA and EUMETSAT agreed to coordinate fully their independent polar satellite systems, including exchange of instruments and data. In this agreement, EUMETSAT agreed to assume the cost and responsibility of the mid-morning polar orbit previously covered by NOAA. In 2003, NOAA and EUMETSAT signed the Joint Transition Activities (JTA) agreement, which extended our cooperation through the NPOESS era.

In light of the Nunn-McCurdy decision, we are engaging in discussions with EUMETSAT to verify whether the current JTA agreement still meets the intent of the original cooperation. NOAA and EUMETSAT plan to continue polar cooperation into the long-term and to sign new agreements focused on future systems.

EUMETSAT has made significant efforts to assist NOAA and the United States in times of need. In 1991, when U.S. geostationary satellite coverage was reduced to a single satellite, EUMETSAT provided coverage of the Western Atlantic by moving one of its satellites until the new generation of U.S. geostationary satellites was launched in 1994. Since 1998, EUMETSAT has positioned a geostationary satellite over the Indian Ocean, giving NOAA the ability to monitor tropical cyclones in that strategically important area of the world. In 2003 at a critical time, working with NOAA and the U.S. Air Force, EUMETSAT agreed to modify their imaging over

Southwest Asia to provide the United States with more frequent, higher-quality data of the region. The U.S. Department of Defense expressed appreciation to EUMETSAT for its outstanding support. In 2005, EUMETSAT agreed to another imaging modification to provide better coverage in areas where tropical storms form affecting the United States.

Q6. What was the production unit cost in current dollars for each of the last several POES satellites? What would be required to reconstitute the POES production line, allowing for the insertion of new sensors and technology in cases where obsolescence is an issue? How much would it cost to reconstitute this production line?

A6. The average cost to design, build, and launch the last four Polar-orbiting Operational Environmental Satellites (POES)—NOAA–15 to NOAA–18—has been $425 million (in FY 2006 dollars). This figure includes spacecraft, instruments, technical oversight management, technical support, and launch services but does not include ground system infrastructure development and maintenance or operations.

These satellites were built between 1988 and 2003 and launched between 1998 and 2005. NOAA does not believe that the current production line of instruments and spacecraft could be extended to produce more POES satellites due to obsolescence of parts, difficulties with maintaining personnel experienced with the current design, and the high cost of maintaining aging assembly, integration, and test support equipment. However, we have looked at what it would take to extend the POES program assuming new technology and a new production system with capabilities that maintain POES continuity of data and services. We estimate that the average cost to design, build, launch, and operate two POES-continuity satellites would be $1.4 billion each (in FY 2006 dollars). We estimate that the average cost to design, build, launch, and operate two POES satellites with improved capabilities would be $2.6 billion each (in FY 2006 dollars). In each case, these satellites would be in development between 2007 and 2015.

Q7. How much were you able to reduce the total life cycle costs of the NPOESS program by eliminating two satellites (C–5 and C–6) from the NPOESS constellation?

A7. Estimates for total life cycle cost were not completed in the Nunn-McCurdy analysis. The DOD Cost Analysis and Improvement Group (CAIG) estimated the acquisition costs, an integral facet of life cycle cost. Approximately $3 billion was eliminated from the NPOESS program acquisition cost by eliminating the two satellites from the baseline program scheduled to fly in the mid-morning orbit.

Q8. Please explain the acquisition strategy for developing the CMIS replacement sensor. What is the timeframe for any competition? What role will the government play in developing this sensor? How much will the CMIS replacement sensor cost compared to the original CMIS?

A8. The NPOESS Integrated Program Office (IPO) is currently conducting a trade study to determine the best value acquisition strategy to achieve the lowest risk and best performing sensor for the funds available. The performance must be at least as good as the sensors on the Defense Meteorological Satellite Program (DMSP) and Polar-orbiting Operational Environmental Satellite (POES), and it must satisfy the NPOESS microwave Key Performance Parameter (KPP).

There are two strategies being considered:

- Open competition with industry to build the Engineering and Manufacturing Development (EMD) and flight units
- A government entity (lab) building the EMD sensor and transitioning the flight units to industry through an open competition

The trade study is expected to reach a conclusion by Fall 2006. A recommendation will be briefed to the NPOESS Executive Committee (EXCOM) for final decision.

The CAIG completed a cost estimate for the Conical scanning Microwave Imager/Sounder (CMIS) program as part of the Nunn-McCurdy process. The CAIG cost estimate for the modified baseline program (six flight units) was $1,609M of which $209M has been expended. The estimate for the certified program is $1,076M (including the $209M expended) for three new Microwave Imager Sounder (MIS) flight units. The specifications for the new Microwave Imager Sounders are considered by the Nunn-McCurdy team to have less technical and financial risk than continuing the CMIS program.

Q9. If, as is presumably the case, contract negotiations for the new certified NPOESS baseline will not be in place until after the FY 2008 President's budget

request is transmitted to Congress, what process and parameters will be used to develop the FY 2008 spending plan for NPOESS?

A9. Negotiations with the contractor on the Nunn-McCurdy Certified program will not be completed in time to support the development of the FY 2008 President's budget. During the Nunn-McCurdy process, the DOD Cost Analysis Improvement Group (CAIG) developed a cost estimate of the by-year funding needs for the certified program. Per the Acquisition Decision Memorandum, the CAIG estimate will be the basis for developing the program's FY 2008 requirement.

Q10. The CAIG estimate for the restructured NPOESS program will not require the DOD or NOAA to request additional money for NPOESS until FY 2010 and beyond. Please explain how a program that is growing almost 50 percent over its previous baseline does not require any new funding for four more years. Also, please provide the original annual cost estimates for NPOESS for each of Fiscal Years 2010–2020 and the new cost estimates for each of Fiscal Years 2010–2020. On what basis does the CAIG and/or the EXCOM believe additional funds will be available in FY 2010 and beyond for NPOESS?

A10. The Nunn-McCurdy certified program incorporates both schedule slips and secondary sensor removal from the baseline program, both of which reduced the need for near-term funding. The DOD Cost Analysis Improvement Group (CAIG) was asked to estimate the dollar needs by fiscal year and determined that no new money would be required until FY 2010.

Restructured NPOESS Budget Requirements versus FY 2007 President's Budget (dollars in millions [$M])

	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Acquisition Costs (Nunn-McCurdy)	764	841	832	873	890	727	649	323	198	220	133
O&S Costs							103	113	97	99	102
Program Total	764	841	832	873	890	727	752	436	295	319	235
Budget	763	849	307	168	264	170	301	233	96	94	16
Difference (Requirements - Budget)	1	-8	525	705	627	557	451	202	199	225	219

The NPOESS Executive Committee (EXCOM) members have agreed to work within their agencies to ensure that budget requests are made that reflect the Nunn-McCurdy certified program.

Q11. What margins are built into the new NPOESS program schedule in case of future technical or other difficulties? Please specify the margins for each sensor and other component (i.e., ground system, integration, spacecraft) of the program. How do these margins differ from those in place prior to the Nunn-McCurdy review? Are these margins adequate to reduce risk in the NPOESS program?

A11. The DOD Cost Analysis Improvement Group (CAIG) built a 12-month schedule margin into their acquisition cost estimate. The certified program schedule was arrived at by comparing development periods of analogous historical programs for those items considered to be on the critical paths.

The NPOESS program office is now working with Northrop Grumman to develop the contractual schedules necessary to accomplish the Nunn-McCurdy certified program. These schedules will serve as the basis for negotiating a major modification to the Northrop Grumman contract. The Government's goal is to add adequate schedule margin to specific components of the NPOESS program in order to achieve a high degree of schedule confidence.

With NPOESS management changes in both the government and contractor facilities; maturity of NPOESS; and data from government and independent reviews, we believe the margin recommended as a result of the Nunn-McCurdy process is sufficient to reduce the risk of the NPOESS program.

Q12. Please provide the status and cost estimate, including cost-to-date and cost-to-complete, for developing each of the following sensors: VIIRS, CMIS, CrIS, ATMS, OMPS–Nadir, and CERES. Please also provide the recurring cost to produce each of these sensors.

A12. The following table shows the Nunn-McCurdy program estimates:

Sensor	Status	Cost through FY 2006 ($M)	Cost to Complete Design & EDU ($M)	Recurring Cost for each Flight Unit ($M)	Number of Flight Units
Visible/Infrared Imager/Radiometer Suite (VIIRS)	Engineering Development Unit (EDU) in Thermal Vacuum Testing	$372	$689	$255 (average per unit)	• 3 Engineering and Manufacturing Development (EMD) • 2 production
Conical Scanning Microwave Imager/Sounder (CMIS)	Stop-work in place Termination proceeding	$209	N/A Effort to be Terminated	N/A Effort to be Terminated	N/A Effort to be Terminated
Cross-track Infrared Sounder (CrIS)	NPOESS Preparatory Project (NPP) Flight Sensor in Electromagnetic Interference (EMI) testing	$190	$166	$98	• 2 EMD • 1 Production
Advanced Technology Microwave Sounder (ATMS)	NASA Procured NPP Flight Unit Delivered	$14 (NPOESS) contract cost)	$114	$53	• 1 NASA procured • 1 EMD • 1 Production
Ozone Mapping and Profiler Suite (OMPS)-Nadir	NPP Flight Unit in subsystem assembly and test	$97 (Includes Limb development)	$66	$50	• 2 EMD • 1 Production
Clouds and the Earth's Radiant Energy System (CERES)	NASA Procured Sensor complete and in storage	NASA cost data not available	$0 (Sensor Complete)	$0	• 1 NASA procured

NOTE: The budget information contained within these responses is derived from the Nunn-McCurdy certified NPOESS program. As such, these estimates are subject to change as the program moves forward and the contract is negotiated.

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

FEB 1 2007

Representative David Wu
U.S. House of Representatives
Washington, D.C. 20515

Dear Representative Wu:

I am providing the following response to your question posed to me during the June 8, 2006, hearing entitled, "The Future of NPOESS: Results of the Nunn-McCurdy Review of NOAA's Weather Satellite Program."

At that time, you noted the requirement pursuant to the 1994 Presidential Decision Directive/NSTC-2 on the Convergence of U.S.-Polar-Orbiting Operation Environmental Satellite Systems. For fiscal year 1997 and beyond, the NPOESS Integrated Program Office (IPO) will provide, prior to the submission of each fiscal year's budget, an annual report to the National Science and Technology Council (NTSC) on the status of the national polar-orbiting operational environmental satellite system. I have enclosed a memorandum from the System Program Director for the Integrated Program Office indicating they have satisfied the annual reporting requirement.

If you have any questions, please contact Eric Webster, Director, Office of Legislative Affairs at (202) 482-4981.

Sincerely,

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

Enclosure

THE ADMINISTRATOR

Printed on Recycled Paper

NATIONAL POLAR-ORBITING OPERATIONAL
ENVIRONMENTAL SATELLITE SYSTEM (NPOESS)
INTEGRATED PROGRAM OFFICE
8455 COLESVILLE ROAD, SUITE 1450, SILVER SPRING, MARYLAND 20910

1 FEB 2007

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

FROM: Colonel Dan Stockton
System Program Director
Integrated Program Office
National Polar-orbiting Operational Environmental Satellite System

SUBJECT: Annual Briefing to the National Science and Technology Council on the National Polar-orbiting Operational Environmental Satellite System

I am providing the following response to your question regarding the NPOESS Integrated Program Office (IPO) compliance with the annual reporting requirements outlined in the 1994 Presidential Decision Directive/NSTC-2 on the Convergence of U.S.-Polar-Orbiting Operation Environmental Satellite Systems.

The IPO satisfied the annual reporting requirement on the status of the NPOESS program outlined in the 1994 Presidential Decision Directive/NSTC-2 by providing annual briefings to staff from the Office of Science Technology Policy and the Office of Management and Budget.

ANSWERS TO POST-HEARING QUESTIONS

Responses by Michael D. Griffin, Administrator, National Aeronautics and Space Administration

Questions submitted by Chairman Sherwood L. Boehlert

Q1. NASA has a large amount of responsibility for environmental and climate observations from space. Given that many of the sensors necessary to provide such observations have been removed from the certified National Polar-orbiting Operational Environmental Satellite System (NPOESS) program and additional funding over and above the $11.5 billion will be required to add them back, how will NASA meet its mission requirements in this area? What is NASA's mitigation strategy for each of the removed sensors (Aerosol Polarimetry Sensor, Ozone Mapping and Profile Suite-Limb, Earth Radiation Budget, and Total Solar Irradiance Sensor) to fill the data gap created by removing the secondary sensors important to NASA from NPOESS? Are any of NASA's mitigation activities in place already? Is any element of NASA's mitigation strategy already included in the $11.5 billion estimate for the new NPOESS program?

A1. NASA's role with the NPOESS program is well defined: to develop and demonstrate certain technologies with the NPOESS Preparatory Project and provide long-term climate measurements for the science community. In working with the Air Force and National Oceanic and Atmospheric Administration (NOAA) through the Nunn-McCurdy re-certification process for NPOESS, we placed a higher priority on the continuity of legacy operational capabilities, which resulted in a lower priority for a number of environmental and climate measurement capabilities. Thus, we decided to defer or delete those sensors that do not provide continuity with existing operational measurements.

NASA, along with the science community, is concerned with unmet expectations for key climate measurements and changes in climate capabilities in the revised NPOESS configuration. The loss of many of the climate sensors from the NPOESS program has had a significant impact on NASA's Earth science program planning. NASA is working with the science community, international partners, as well as the Office of Science and Technology Policy, NOAA, and the Air Force to define those climate measurements which are of the highest priority and which might be hosted on other satellite platforms.

In addition, we have directed that the National Research Council (NRC) Decadal Survey address the impact of the loss of these sensors from NPOESS and prioritizes the requirements for this data.

The $11.5 billion estimate for the NPOESS program does not include any mitigation for the removed instruments. However, the NPOESS program estimates do include funding for the integration of some of the climate sensors back onto NPOESS if funding for the sensors could be identified.

Q2. What is the estimated cost and schedule (reasonably optimized to minimize cost) to complete each of the following instruments? The Aerosol Polarimetry Sensor, Ozone Mapping and Profile Suite-Limb, Earth Radiation Budget and Total Solar Irradiance Sensor.

A2. The NPOESS Integrated Program Office (IPO) oversees the Air Force contract for the Ozone Mapping and Profile Suite (OMPS)-Limb sensor so the latest cost details for this instrument would best be obtained from them. The instrument was scheduled to be delivered to the NPP spacecraft in June 2008 to support the September 2009 launch. The IPO is in the process of obtaining the cost implications of removing the limb sensor, which is nearly complete, versus flying the sensor on NPP.

The Aerosol Polarimetry Sensor, Earth Radiation Budget Sensor and the Total Solar Irradiance Sensor contracts have not been awarded yet since they were not planned for flight until 2016 or later. The budget estimates for those sensors should be obtained from the IPO.

Q3. How much was the total life cycle costs of the NPOESS program reduced by removing the climate-related sensors? How much would it cost to put the climate-related sensors back on NPOESS? Were options that included scaled-back versions of those sensors analyzed? In answering the question, please provide an estimate of total life cycle cost savings as well as estimated savings per sensor. To what extent were concerns about the technical difficulty in having additional sensors on the satellite bus a factor in the decision to remove the climate-related

sensors? If technical difficulty was a concern, why is space being allotted to add the climate-related sensors back to the satellite?

A3. During the Nunn-McCurdy Certification process, the Office of the Secretary of Defense (OSD) Cost Analysis Improvement Group (CAIG) estimated that a total of $862.6 million would be saved by deleting the secondary sensors:

	EMD*	Production	
	($ in Millions)		
Earth Radiation Budget Sensor (ERBS)	$ 57.1	$ 16.0	
Total Solar Irradiance Sensor (TSIS)	$148.6	$ 43.5	
Space Environmental Sensor Suite (SESS)	$194.7	$141.4	
Altimeter (ALT)	$ 96.1	$ 28.1	
Survivability Sensor (SuS)	$ 41.6	$ 38.1	
Ozone Mapping and Profiler Suite (OMPS) Limb	$ 32.5	$ 24.8	
Total	$570.6	$292.0	$862.6

*Engineering Manufacturing and Development (EMD)

There has not been any further analysis to determine what the total cost would be to add these sensors to NPOESS or some other platform in the future, but it is assumed that the cost would be at least the amount indicated above.

The only sensor where scaled-back versions were considered during the Nunn-McCurdy process was the Conical Scanning Microwave Imager/Sounder (CMIS) sensor. The size and rotating mass of the CMIS sensor was likely to cause significant effort to accommodate this sensor on the NPOESS spacecraft. The decision to stop work and revisit the microwave imaging and sounding requirements was driven by the likely impact to the overall system that this sensor would have.

During the Nunn-McCurdy process, a higher priority was given to continuity of legacy operational capabilities, which resulted in a lower priority for a number of environmental and climate measurement capabilities; this led to the deferral or elimination of a number of the climate sensors from the baseline program that did not provide continuity with existing operational measurements. The decision to eliminate climate sensors was not driven by technical complexity.

Q4. Both Admiral Lautenbacher and you testified that the decision to build a full size NPOESS spacecraft that can house all of the originally proposed sensors "was made because the EXCOM agreed any additional funding gained through contract renegotiation or in unutilized management reserve would be used to procure these secondary sensors." Additionally, Admiral Lautenbacher said that as part of the Nunn-McCurdy requirements review process, a prioritized list of additional sensors was developed. Please provide a copy of the prioritized list of additional sensors. If additional funds become available, what process will be used to select which additional sensors can be put on the satellite? And who will make the final decision on what will be flown?

A4. The NPOESS Senior User Advisory Group (SUAG) has detailed the user's statement of priorities for the NPOESS non-manifested sensors as follows:

Non-Manifested Sensor Priority:

1. Altimeter (ALT)
2. Ozone Mapping and Profiler Suite (OMPS) Limb Sensor
3. Total Solar Irradiance Sensor (TSIS)
4. Earth Radiation Budget Sensor (ERBS)
5. Aerosol Polarimetry Sensor (APS)
6. Survivability Sensor (SuS)

In addition, the SUAG believed the goal of maintaining continuity with DMSP fell short in some areas with respect to space environment monitoring and recommended portions of the Space Environmental Sensor Suite (SESS) be restored into the afternoon and early morning orbits. The SUAG also expressed support for flying a microwave imager/sounder in the early AM and PM orbits.

If additional funds become available, the list will be used to fund the sensors in the prioritized order. If a specific agency proposes funding for a specific sensor, then that sensor will be procured, regardless of its priority. The Program Director, with

advice from the PEO and EXCOM, will have the ultimate authority with respect to funding a given sensor.

Q5. The CMIS sensor was removed from NPOESS and a scaled-back replacement sensor will be developed, but is not scheduled for flight until the second NPOESS satellite in 2016. What satellite and/or sensors (civilian, military, European, other) currently provide CMIS-like information? What is the expected lifetime of these satellites and/or sensors? Will they last until 2016? What is the difference in capability between the current satellites/sensors and what CMIS would have provided? What is the difference in capability between what CMIS would have provided and the proposed replacement sensor?

A5. There are a number of sensors that provide data similar to the Conical Scanning Microwave Imager/Sounder (CMIS) sensor data. CMIS was intended to provide wind speed and direction, soil moisture, imagery, and atmospheric sounding. The Special Sensor Microwave Imager (SSMI) and Special Sensor Microwave Imager/Sounder (SSMI/S) instruments fly on the DMSP satellites are currently providing microwave observations but are not able to provide the wind speed and direction that CMIS would have provided. The DMSP satellites will fly the SSMI/S sensors through into the 2019 timeframe.

The Advanced Microwave Scanning Radiometer for Earth Observing System (AMSR–E) was launched on NASA's Aqua satellite in May 2002 and provides sea surface temperatures, ice temperatures, and an indication of soil moisture. Aqua has a mission lifetime requirement of six years and should be expected to last into 2008.

The Navy is flying a demonstration mission of a sensor similar to CMIS on their WindSat satellite. WindSat provides wind speed and direction and some of the imaging capability that CMIS would provide. It is currently beyond its expected lifetime on orbit.

MetOp is flying a scatterometor sensor the Advanced Scatterometer (ASCAT) which will provide wind speed and direction observations through the life of MetOp C into the 2020 timeframe.

CMIS was to provide improvement over heritage sensors in many aspects. It would have provided improvements in resolution, measurement accuracy and precision, and reliability. The replacement microwave imager/sounder has yet to be defined but will likely revert to the operational measurements currently being taken on the DMSP satellites.

Q6. Please provide the total cost to build the NPOESS Preparatory Project (NPP) satellite, including a breakdown for the spacecraft bus and the cost for the flight unit for each of the sensors? Could a second NPP satellite bus be outfitted with the climate sensors removed from NPOESS? (Aerosol Polarimetry Sensor, Ozone Mapping and Profile Suite-Limb, Earth Radiation Budget, and Total Solar Irradiance Sensor). If so, what would it cost to build a second NPP satellite bus and outfit it with the climate sensors removed from NPOESS?

A6. NASA is responsible for the NPP spacecraft procurement, the ATMS sensor development, Launch and mission management and the costs for those portions of the NPP project are listed below. These costs are from the FY 2007 President's Budget Request based on an April 2008 launch. Since that submission, the Nunn-McCurdy process and OSD CAIG estimates have established July 2008 as a most likely delivery date for VIIRS. This will push the launch readiness date for NPP to September 2009. The budget request supporting a September 2009 launch is still being worked as part of NASA's FY 2008 budget development process.

NPP Spacecraft		$160M
ATMS Sensor		$194M
Launch Services		$ 73M
Ground Systems		$ 48M
Proj. Mgmt., SE, SMA, Labor Travel, Service Pools, etc.		$182M
Project and Mission Science Team		$ 33M
	Total	**$690M**

The costs for the NPOESS IPO provided sensors are not included above and are part of the overall NPOESS procurement. Below are the sensor contract costs provided by the IPO for the VIIRS, CrIS, and OMPS.

Sensor	Status	Cost thru FY06 ($M)	Cost to Complete ($M)	Recurring Cost ($M)	# Units
VIIRS	Engineering Development Unit in Thermal Vacuum Testing	$372	$689	$255 (Avg per unit)	3 EMD 2 Production
CrIS	NPP Flight Sensor in EMI Testing	$190	$166	$98	2 EMD 1 Production
OMPS-Nadir	NPP Flight Unit in subsystem assembly and test	$97 (Includes Limb development)	$66	$50	2 EMD 1 Production

The Aerosol Polarimetry Sensor (APS), Ozone Mapping and Profile Suite (OMPS)-Limb, Earth Radiation Budget Sensor (ERBS), and Total Solar Irradiance Sensor (TSIS) could all be accommodated on a bus the size of the NPP bus. However, the cost of this mission has not been estimated.

Q7. The proposed plan now calls for delaying the NPOESS Preparatory Project (NPP), NASA's major contribution to the NPOESS program, by nearly three years to September 2009. Since program delays inevitably increase costs, how much will this delay increase the cost of NPP for NASA? Where in NASA's budget will you find the additional NPP funding?

A7. NASA is still in the process of developing the FY 2008 budget request, so we can only provide information on the cost increase up through the FY 2007 President's request. The FY 2007 Budget includes a projected cost increase of $120 million for an 18 month launch delay from October 2006 to April 2008. The additional funding for the delay of NPP from April 2008 to September 2009 will come from other Science Mission Directorate projects.

Q8. If, as is presumably the case, contract negotiations for the new certified NPOESS baseline will not be in place until after the FY 2008 President's budget request is transmitted to Congress, what process and parameters will be used to develop the FY 2008 spending plan for NPOESS?

A8. Negotiations for the certified NPOESS program will not be completed in time to support the FY 2008 budget submissions. Although NASA does not request funding for the NPOESS program, NASA does submit budget requirements for the NPOESS Preparatory Project (NPP). The budget request for NPP is being developed against a September 2009 launch readiness date. This date was developed during the Nunn-McCurdy process based on a likely Visible/Infrared Imager/Radiometer Suite (VIIRS) delivery date of July 2008. The NASA project office is working closely with the IPO to ensure that the negotiations maintain sensor delivery dates developed during the Nunn-McCurdy process.

ANSWERS TO POST-HEARING QUESTIONS

Responses by Ronald M. Sega, Under Secretary of the Air Force, U.S. Department of Defense

Questions submitted by Chairman Sherwood L. Boehlert

VIIRS

Q1. During the question and answer portion of your testimony before the Committee, Mr. Gutknecht asked you about the status of the VIIRS sensor and whether the testing of this sensor had experienced technical problems. You responded as follows: "Sir, in the VIIRS sensor (the engineering and development unit that we mentioned last time that we thought it was important to have that work completed prior to the flight unit) has successfully passed vibration testing. Flight units, flight unit electronics have completed a thermovac testing. The engineering development unit is in the thermovac testing process right now. They are looking at a backup plan, in the event that there are problems on VIIRS as we go forward; but at this time, it is proceeding along." (Hearing Transcript, page 67)

Your answer that the testing of the VIIRS engineering development unit (EDU) was "proceeding along" did not directly, address Mr. Gutknecht's question with respect to technical problems experienced during VIIRS EDU testing. The Committee understands that the subcontractor experienced technical problems with the testing chamber when trying to conduct the thermal-vacuum testing on the VIIRS EDU that took approximately two to four weeks (and additional resources from Northrop Grumman) to resolve. Please clarify your answer with respect to any technical problems experienced during thermal-vacuum testing of the VIIRS EDU and provide the Committee with an update on the status and progress of this testing.

A1. The subcontractor experienced difficulty with the chamber itself and not with the VIIRS instrument in late May. The Thermal Vacuum Chamber (TVAC) was unable to adequately control temperatures on five key cold plates necessary for control of the VIIRS payload temperature test profile. After two weeks of troubleshooting, it was determined that cooling carts were necessary to ensure hardware would only be exposed to the appropriate temperature range and to continue the VIIRS TVAC testing. A complete review was conducted by the Integrated Program Office, NASA, Northrop Grumman Space Technology, and Raytheon Santa Barbara Remote Sensing. The review recommended the addition of cooling carts and an implementation plan which was relatively low-risk to hardware and well planned from a process and procedure perspective. Subsequently, the cooling carts were installed and testing was resumed.

ADDITIONAL SENSORS

Q2. Both Admiral Lautenbacher and you testified that the decision to build a full size NPOESS spacecraft that can house all of the originally-proposed sensors "was made because the EXCOM agreed any additional funding gained through contract renegotiation or in unutilized management reserve would be used to procure these secondary sensors." Additionally, Admiral Lautenbacher said that as part of the Nunn-McCurdy requirements review process, a prioritized list of additional sensors was developed. Please provide a copy of the list of the prioritized list. If additional funds become available, what process will be used to select which additional sensors can be put on the satellite? And who will make the ultimate decisions?

A2. The proposed priority of the non-manifested sensors was developed by the Senior Users Advisory Group (SUAG) as follows:

1. Altimeter (ALT)
2. Ozone Mapping and Profiler Suite (OMPS) Limb Sensor
3. Total Solar Irradiance Sensor (TSIS)
4. Earth Radiation Budget Sensor (ERBS)
5. Aerosol Polarimetry Sensor (APS)
6. Survivability Sensor (SuS)

If additional funds became available, the SUAG would make a recommendation, through the SPD and PEO to the EXCOM for a subsequent decision.

WEATHER FORECASTING

Q3. In your testimony, you indicate that the certified NPOESS program will improve the quality of weather forecasting. What specific improvements will each NPOESS sensor (VIIRS, CMIS, CrIS, ATMS, OMPS–Nadir, CERES) provide for weather forecasts? What is the difference between these improvements and what you were expecting from each of the sensors on the original NPOESS program?

A3. As currently planned, Visible Infrared Imager Radiometer Suite (VIIRS) will provide three times as many observing channels as current systems. Multi-spectral data from VIIRS will enable forecasters to differentiate between clouds at various altitudes, snow cover, and airborne dust and particulates. No change from original program capabilities.

The new microwave sensor should retain the most critical capabilities that had been planned for the original Conical Microwave Imager Sounder (CMIS) as an improvement over the Special Sensor Microwave Imager Sounder (SSMIS) sensor on DMSP and POES. CMIS, as written in the original requirements, would have provided more detailed data on soil moisture content, which is used to support deploying ground and amphibious forces and for flood prediction and control.

Cross-track Infrared Sounder (CrIS) and Advanced Technology Microwave Sounder (ATMS) will provide fifty times more observing channels than current sensors. Their data will yield an unprecedented capability to vertically profile the atmosphere in temperature, humidity, and pressure. These data will improve weather forecast model initialization, which significantly reduces forecast errors as the model propagates over time and improves forecast accuracy. Current CrIS and ATMS capabilities remain as originally planned.

The Navy and the National Centers for Environmental Prediction (NCEP) are making efforts to include data from the Ozone Mapping and Profiler Suite (OMPS) nadir mapper in their forecast models. The Air Force Weather Agency uses NCEP's Global Forecast System (GFS) to initialize its models. The delta between the original and restructured NPOESS is the loss of the OMPS limb profiler. The limb profiler data increases the ozone data available, but useful data can be obtained from the nadir mapper. Also, the profiler would have an average revisit time of four days, which is sufficient for climate science, but may not be as useful in forecasting for military operations.

CERES,which is currently in operation on three NASA research satellites, is replacing the Earth Radiation Budget Sensor (EBBS). ERBS would have built upon CERES sensors and would have been very similar to CERES, gathering data from approximately the same three spectral channels. CERES and/or ERBS data could be used as a basic input for extended range (two-week) forecasts.

The Space Environmental Sensor Suite (SESS) capabilities will be below legacy capabilities, but we will be able to use MetOp data to mitigate this reduction. The first block does not include the capability to remotely sense the ionosphere, which is used to forecast impacts upon satellite communications and precision navigation and targeting. To mitigate the reduction in space weather data, EUMETSAT's MetOp will provide a Space Environmental Monitor (SEM) capability in the mid-morning orbit. Space environmental data will also continue to be provided by NOAA's Geostationary Operational Environmental Satellite (GOES) satellites and the DOD ground based Digital Ionospheric Sounding System and Solar Observatories. The Radar Altimeter (ALT) was also not manifested in the first block of the restructured program, and was intended to globally measure sea surface height and wave characteristics.

SENSOR COSTS

Q4. Please provide the status and cost estimate, including cost-to-date and cost-to-complete, for developing each of the following sensors: VIIRS, CMIS, CrIS, ATMS, OMPS-Nadir, and CERES. Please also provide the recurring cost to produce each of these sensors.

A4. Based on Nunn-McCurdy CAIG Estimate, the following table shows all requested data.

Sensor	Status	Cost through FY06 ($M)	Cost to Complete ($M)	Recurring Cost ($M)	# Units
VIIRS	Engineering Development Unit in Thermal Vacuum Testing	$372	$689	$255 (Avg per unit)	• 3 EMD • 2 Production
CMIS	Stop-work in place - Termination proceeding	$209	N/A Effort to be Terminated	N/A Effort to be Terminated	N/A Effort to be Terminated
CrIS	NPP Flight Sensor in EMI Testing	$190	$166	$98	• 2 EMD • 1 Production
ATMS	NASA Procured NPP Flight Unit Delivered	$14 (NPOESS contract cost)	$114	$53	• 1 NASA procured • 1EMD • 1 Production
OMPS-Nadir	NPP Flight Unit in subsystem assembly and test	$97 (Includes Limb development)	$66	$50	• 2 EMD • 1 Production
CERES	NASA Procured Sensor complete and in storage	NASA cost data not available	$0 (Sensor complete)	$0	• 1 NASA procured

CMIS SENSOR

Q5. The CMIS sensor was removed from NPOESS and a scaled-back replacement sensor will be developed, but is not scheduled for flight until the second NPOESS satellite in 2016. What satellite and/or sensors (civilian, military, European, other) currently provide CMIS-like information? What is the expected lifetime of these satellites and/or sensors? Will they last until 2016? What is the difference in capability between the current satellites/ sensors and what CMIS would have provided? What is the difference in capability between what CMIS would have provided and the proposed replacement sensor?

A5. The Defense Meteorological Satellite Program (DMSP) carries a microwave imager that provides imagery similar to that which CMIS (Conical Microwave Imager Sounder) was expected to provide, but with only one third of the number of observing channels. Also, the Polar-orbiting Operational Environmental Satellite (POES) system and the European Meteorological Operational (Met0p) satellites carry microwave sounders. Barring any premature failures, the remaining spacecraft and sensors in the DMSP and MetOp programs should operate long enough for the second NPOESS spacecraft to replace them in 2016. The joint NASA/Japanese Tropical Rainfall Measuring Mission (TRMM) is also used for hurricane assessment and hosts a microwave imager sensor that has been on-orbit since 1997. The Tropical Rainfall Measuring Mission (TRMM) will be replaced by the Global Precipitation Measurement Mission no earlier than 2010.

The NPOESS Integrated Program Office (IPO) is currently conducting trade studies lending to the identification of the full capabilities of the proposed new microwave sensor.

DMSP SATELLITES

Q6. What was the production unit cost in current dollars for each of the DMSP satellites in the last block upgrade (F15–F20)? What would be required to reconstitute the DMSP production line, allowing for the insertion of new sensors and technology in cases where obsolescence is an issue? How much would it cost to reconstitute this production line?

A6. At the time the DMSP production line was open, the production unit cost for each Defense Meteorological Satellite Program (DMSP) Block 5D–3 satellite in current dollars is $461M.

DMSP satellites have been out of production since FY99 and it would not be technically feasible to reconstitute the former DMSP production line. In order to provide a similar DMSP capable satellite, a new line would need to be established with many new components (due to parts obsolescence), and costs would need to be considered for ground command and control facility modification, direct receipt terminals acquisition, and modifications to data exploitation systems at the Air Force Weather Agency.

LIFE CYCLE COSTS

Q7. How much were you able to reduce the total life cycle costs of the NPOESS program by eliminating two satellites (C–5 and C–6) from the NPOESS constellation?

A7. During the Nunn-McCurdy Certification, the OSD Cost Analysis Improvement Group (CAIG) did not estimate life cycle costs. However, the CAIG did estimate acquisition costs for the procurement of production satellites (C–3 and C–4). Their estimate for acquisition cost on each of these production satellites was approximately $1.4 billion. Using these costs, a total of approximately $3 billion was eliminated from the Life Cycle Cost of the NPOESS program. The program office is still assessing operations and sustainment cost avoidance resulting from reduction of satellites and extension of schedule.

CONTRACT RENEGOTIATION

Q8. How long will the contract renegotiation with the prime contractor be likely to take? When will you complete the integrated baseline review and have a final new contract in place?

A8. In accordance with the Acquisition Decision Memorandum signed by Mr. Krieg as a part of the Nunn-McCurdy process, the Integrated Baseline Review (IBR) must take place on or before April 2007. The NPOESS program office is currently working with the prime contractor to develop a negotiation schedule. Initial negotiations are expected to be complete no later than 60 days prior to the IBR. After the IBR, it could take approximately six months to finalize all terms and conditions in the contract and it is anticipated that the contract will be finalized not later than September 2007.

CMIS REPLACEMENT SENSOR

Q9. Please explain the strategy for developing the CMIS replacement sensor? What is the timeframe for any competition? What role will the government play in developing this sensor?

A9. The Acquisition Strategy for the new microwave sensor will be defined in mid-FY07, at the completion of the Acquisition Strategy Trade Study. This study is assessing various industry and government options for their cost, performance and technical risks. The strategy options under consideration are: 1) Open competition—selection of an industry provided EMD and production microwave sensor; and 2) Government and industry partnership—with the EMD sensor built by a government entity (lab) and transitioned to industry for production.

If Option 1 is selected, the industry developed sensor would be selected through open competition. If Option 2 is pursued, the government will play a key role in developing the sensor as the acquisition manager and possibly developer. Additionally in Opt 2, the industry partner would be involved from the earliest stages of the sensor development to ensure a successful transition to the industry partner for the production builds.

CMIS REPLACEMENT SENSOR

A10. When do you plan to send out the Request for Proposal for the CMIS replacement sensor? When would you decide on a contractor for building the CMIS replacement sensor? How much will the CMIS replacement sensor cost compared to the original CMIS?

A10. Timing of the competition depends on the strategy selected and the availability of funds. Currently, the Request for Proposal (RFP) is planned to be released by late FY07. The contractor selection is estimated to occur not more than six months following release of the RFP. An industry-only option would result in an FY08 Source Selection, with consent to proceed in FY09. An option that includes government development of the sensor, may delay the industry partner selection.

Determination of the cost of the new microwave sensor will be accomplished in the process leading up to the release of the RFP.

FY 2008 SPENDING PLAN

Q11. If, as is presumably the case, contract negotiations for the new certified NPOESS baseline will not be in place until after, the FY 2008 President's

budget request is transmitted to Congress, what process and parameters will be used to develop the FY 2008 spending plan for NPOESS?

A11. Negotiations on the Nunn-McCurdy Certified program will not be completed in time to support the submittal of the FY 2008 President's Budget.

The new NPOESS government leadership team has used the cost estimate developed through the Nunn-McCurdy process, and the program's historical performance, to develop the program funding profile.

COSTS ESTIMATES

Q12. The CAIG estimate for the restructured NPOESS program will not require the DOD or NOAA to request additional money for NPOESS until FY2010 and beyond. Please explain how a program that is growing almost 50 percent over its previous baseline does not require any new funding for four more years. Also, please provide the original annual cost estimates for NPOESS for each of Fiscal Years 2010–2020 and the new cost estimates for each of Fiscal Years 2010–2020. On what basis does the CAIG and/or the EXCOM believe additional funds will be available in FY 2010 and beyond for NPOESS?

A12. The Nunn-McCurdy Certified program incorporates both schedule slip and secondary sensor removal from the baseline program. The CAIG estimated the Certified Program's fiscal year dollar needs and, as a result, determined that no new money would be required until FY 2010.

Nunn-McCurdy Certified Program budget requirements versus FY 2007 President's Budget ($'s in millions):

	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Nunn-McCurdy	763.6	840.7	831.7	872.5	890.3	726.9	752.1	436.6	294.6	319.3	235.0
FY07 PB	762.7	848.7	306.9	167.7	263.7	169.8	301.2	233.4	95.6	94.0	15.7
Delta	0.9	-8.0	524.8	704.8	626.6	557.1	450.9	203.2	199.0	225.3	219.3

The EXCOM has agreed to work within their agencies to ensure that funding requests for the entire program are made that reflect the Nunn-McCurdy Certified program.

MARGINS

Q13. What margins are built into the new NPOESS program schedule in case of future technical or other difficulties? Please specify the margins for each sensor and other component (i.e., ground system, integration, spacecraft) of the program. How do these margins differ from those in place prior to the Nunn-McCurdy review? Are these margins adequate to reduce risk in the NPOESS program?

A13. The OSD CAIG built in what amounts to a 12-month schedule margin into their Total Acquisition Cost Estimate. The 12-month margin was derived by the CAIG assessing the instrument schedules as well as the spacecraft development and integration schedules to identify critical path elements. The schedule assessments were based on actual performance to date as well as actual data from analogous systems. Based on these assessments, the CAIG identified delivery/launch schedules.

The NPOESS program office is currently developing (with the contractors) the various schedules necessary to accomplish the requirements specified in the Nunn-McCurdy Certified program. The schedule margins for the components of the program will be developed as risk areas are identified by the contractor or Government personnel. These schedules will serve as the bases for negotiating the Certified program with the contractors. The goal is to maintain adequate schedule margin to specific components of the NPOESS program in order to maintain a high confidence schedule. When examining ways to reduce the overall risk of the program, the CAIG looked at individual components of the program and assessed where they lay in relation to the critical path to achieve launch. Then, using knowledge of similar systems, they added schedule to arrive at a reduced risk plan for the system. The specific components include:

— Visual Infrared Imager Radiometer Suite (VIIRS)
— Conical Microwave Imager Sounder (CMIS)
— Advanced Technology Microwave Sounder (ATMS)

— Cross Track Infrared Sounder (CrIS)
— Spacecraft
— Ground processing system (Interface Data Processor to include algorithms)
— Ground Command, Control and Communications System (C3S)

INSERT FOR THE RECORD
COMMITTEE ON SCIENCE
HEARING ON THE FUTURE OF NPOESS
JUNE 08, 2006
QUESTION NUMBER (HE-02-014)

INTEGRATED PROGRAM REPORT (NUNN-MCCURDY PROCESS)

MEMBER: Congressman Gordon
WITNESS: Dr. Sega
PAGE NUMBER/LINE NUMBER: 68/1497

(The information referred to follows:)

Question:
Congressman Gordon – (lead to question) Now, according to the GAO, the normal practice in a Nunn-McCurdy process is to develop an integrated program team report, Dr. Sega, which has a CAIG cost evaluation. Was that done in this situation?

And you will find that out for us, and let us know.

Answer:
Dr. Sega – An Integrated Product Team (IPT) report was not generated during the National Polar-Orbiting Operational Environment Satellite System (NPOESS) Nunn-McCurdy program restructure process. The final restructure decision was made following a series of six in-depth program reviews to the Defense Acquisition Executive (DAE) by the four IPTs chartered to assess the NPOESS program's criticality, alternatives, estimate of cost, and management structure. During these meetings, Mr. Krieg, VADM (Ret) Lautenbacher, Dr. Griffin, and I evaluated and sometimes combined options as we progressed through the Nunn-McCurdy Certification process. Although a final decision package was never created nor coordinated through DoD, DOC and NASA, the IPTs generated a series of briefing packages that summarized each team's findings and were a critical resource in the final restructure decision. I have included, for the record, the supporting explanation for the Cost Analysis Improvement Group (CAIG) estimate, which was sent to Congress, along with the revised Acquisition Decision Memorandum, on the 5th of June 2006. (See attachment)

National Polar-orbiting Operational Environmental Satellite System
Nunn-McCurdy Certification
Supporting Explanation
"The new estimates of the program acquisition unit cost or procurement unit cost for such program are reasonable"

The CAIG reviewed the NPOESS program, as recently restructured by the Department of Defense, and developed an independent cost estimate of RDT&E and procurement resource requirements to support the Nunn-McCurdy certification process. The total acquisition cost estimate for the restructured NPOESS program is $9,408.4 million base-year (FY 2002) dollars, $2,039.8 million (BY $) lower than the current estimate reported in the annual SAR dated December 31, 2005. The revised PAUC is $2,352.1 million (BY $) and the revised APUC is $1,242.1 million (BY $). (Launch costs are not included in the PAUC and APUC calculations.)

Based on the independent assessment of the costs for the restructured NPOESS program, the CAIG recommends that USD(AT&L) certify that the PAUC and the APUC figures for the restructured program, based on the CAIG estimate of acquisition costs provided below are reasonable.

	Restructured Program May-06	
	FY02 $M	TY $M
PAUC		
Cost	9408	11138
Unit Cost	2352	2785
APUC		
Cost	2484	3308
Unit Cost	1242	1654

Appendix 2:

Additional Material for the Record

THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

ACQUISITION,
TECHNOLOGY
AND LOGISTICS

JUN 05 2006

The Honorable Sherwood Boehlert
Chairman, Committee on Science
U.S. House of Representatives
Washington, DC 20515-6301

Dear Chairman Boehlert

In an effort to make sure your committee remains informed, I am forwarding this letter as a courtesy. The Under Secretary of Commerce for Oceans and Atmosphere, the Administrator of the National Aeronautics and Space Administration (NASA), and I have agreed to restructure the National Polar-orbiting Operational Environmental Satellite System (NPOESS) program, as explained below, and based on that restructuring and pursuant to section 2433 of title 10, United States Code, I have certified with respect to the restructured NPOESS program that:

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

This certification was based on a tri-agency (Department of Defense, Department of Commerce, and NASA) review of the program reflected in the Selected Acquisition Report (SAR) for the quarter ending December 31, 2005, which was submitted to Congress on April 6, 2006, and on revised production profiles and cost estimates. A supporting explanation is enclosed.

As restructured the NPOESS program includes the two Engineering and Manufacturing Development (EMD) satellites, with the option, in FY 2010, of exercising a re-negotiated procurement option for two additional NPOESS satellites using the existing contract. Between now and 2010, I will monitor the effectiveness of recommended management improvements, contractor performance, and system performance. Based on the results, I reserve the option to change management to another integrator. The restructured program:

- includes the following sensors: Visible/Infrared Imager/Radiometer Suite (VIIRS); Microwave Imager/Sounder; Search and Rescue Satellite Aided Tracking (SARSAT); Cross-track Infrared Sounder (CrIS); Advanced Technology Microwave Sounder (ATMS); Advanced Data Collection System (ADCS); Cloud's and Earth's Radiant Energy System (CERES); Ozone Mapping and Profile Suite (OMPS) Nadir; and Space Environment Monitor (SEM); and
- does not include funding for the following sensors (Aerosol Polarimetry Sensor (APS), Total Solar Irradiance Sensor (TSIS), OMPS-Limb, Earth Radiation Budget Suite (ERBS), and Full Space Environment Sensors (SESS); however, the program will plan and fund for integration of these sensors onto the satellite buses, if the sensors are provided from outside the program;
- terminates Conical Scanning Microwave Imager/Sounder (CMIS), while developing a competition for a new Microwave Imager/Sounder starting with the second EMD satellite; and
- is a two-orbit rather than three-orbit program that uses data from the European Meteorological Operational (METOP) satellites provided by European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) for the mid-morning orbit, while providing flexibility to deploy Defense Meteorological Satellite Program (DMSP) satellites depending on the health of the constellation in either the early-morning or mid-morning orbits.

The restructured program provides for continuity of existing programs, constellation management flexibility, and the most capability for the least cost, while maintaining growth potential to achieve the original capability envisioned for NPOESS.

The Administrator of the National Oceanic and Atmospheric Administration (NOAA), the Administrator of NASA, and I will conduct more proactive oversight, including quarterly reviews, to ensure that cost, performance and schedule milestones are achieved.

Similar letters are being sent to the Chairman and Ranking Members of other Congressional defense and science committees.

Sincerely,

Kenneth J. Krieg

Enclosure: As stated

cc: The Honorable Bart Gordon
Ranking Member

National Polar-orbiting Operational Environmental Satellite System
Nunn-McCurdy Certification
Supporting Explanation
"Such acquisition program is essential to national security"

A polar orbiting environmental satellite system is essential to national security as it provides global monitoring of meteorological, oceanographic, and space environmental data to civil, military, and international users. These data are necessary for, among other uses, measuring polar depletion of the ozone layer, accurate weather forecasts, and climatology. Weather near the poles affects future weather elsewhere and a polar-orbiting satellite represents the only practical method to obtain the polar data needed for climatology as well as mid- and long-term forecasts at lower latitudes. Accurate weather forecasts and environmental data provide critical data in support of civilian weather forecasts and warning for the nation and numerous benefits to the warfighter including improved data for use in aerial/artillery bombardment, carrier operations, and antisubmarine warfare. Presidential Decision Directive NSTC (National Science and Technology Council)-2 (May 5, 1994) directed the merger of the polar orbiting satellite systems (Polar Operational Environmental Satellite (POES) and Defense Meteorological Satellite Program (DMSP), respectively) of National Oceanic and Atmospheric Administration (NOAA) and Department of Defense to create NPOESS, meeting both civilian and military needs.

A polar-orbiting satellite system that replaces POES/DMSP without a continuity gap is essential to national security, with continuity of legacy capabilities a higher priority than meeting new thresholds. As the planned NPOESS capabilities may not all be achievable without continuity gaps, the acquisition strategy must account for available schedule, funding, technology, and available European assets to preserve continuity of data with current capabilities representing a minimum acceptable threshold.

National Polar-orbiting Operational Environmental Satellite System
Nunn-McCurdy Certification
Supporting Explanation
"The new estimates of the program acquisition unit cost or procurement unit cost for such program are reasonable"

The CAIG reviewed the NPOESS program, as recently restructured by the Department of Defense, and developed an independent cost estimate of RDT&E and procurement resource requirements to support the Nunn-McCurdy certification process. The total acquisition cost estimate for the restructured NPOESS program is $9,408.4 million base-year (FY 2002) dollars, $2,039.8 million (BY $) lower than the current estimate reported in the annual SAR dated December 31, 2005. The revised PAUC is $2,352.1 million (BY $) and the revised APUC is $1,242.1 million (BY $). (Launch costs are not included in the PAUC and APUC calculations.)

Based on the independent assessment of the costs for the restructured NPOESS program, the CAIG recommends that USD(AT&L) certify that the PAUC and the APUC figures for the restructured program, based on the CAIG estimate of acquisition costs provided below are reasonable.

	Restructured Program May-06	
	FY02 $M	TY $M
PAUC		
Cost	9408	11138
Unit Cost	2352	2785
APUC		
Cost	2484	3308
Unit Cost	1242	1654

National Polar-orbiting Operational Environmental Satellite System
Nunn-McCurdy Certification
Supporting Explanation
"There are no alternatives to such acquisition program which will provide equal or greater military capability at less cost"

The certification process developed alternatives that covered the full trade space in terms of cost, risk, schedule and performance. It developed metrics to evaluate Key Performance Parameters (KPP) and representative non-KPP performance and infrastructure performance (cost, schedule, risk) for each alternative. The metrics were:

- Six Environmental Data Record (EDR) based KPP metrics
- Eight representative non-KPP EDR based metrics
- Two Infrastructure KPP metrics (Data Access, Interoperability)
- Three Infrastructure non-KPP metrics (Cost, Services, Implementation Risk)

The process started with a review of the Independent Program Assessment (IPA) of November, 2005, and solicited inputs from government and industry members of the environmental monitoring community. Inputs were received from the Departments of Defense and Commerce, National Aeronautics and Space Administration (NASA), Northrop-Grumman and others. More than 40 options and variations were defined. A four-step process was used to reduce the options from 40+ to 19, then to 9, and then to 4, using the criteria below.

- Eliminate duplication
- Consolidate variations
- Cover trade space
- Address special interests and equities
- Metric-based scoring
- Continuity

The four surviving options were: 1) the baseline reference program, 2) a restructured program with 2 orbits of NPOESS and one orbit of Defense Meteorological Satellite Program (DMSP) and Meteorological Operational (METOP) satellites, 3) a restructured program with two orbits of NPOESS and one of DMSP and METOP, and 4) a restructured or non-certified program of one NPOESS orbit, one DMSP orbit and one METOP Orbit. During further study these options were analyzed for performance sensitivity in a wide range of parameters to maximize overall utility for the military and civil sectors. No alternatives were found that provided equal or greater military capability at less cost when compared to the baseline program.

Further analysis was done on the four surviving options that produced modular information, allowing quick response to questions and to guidance from decision makers. Working closely with the cost team, surviving options were modified and re-analyzed based on guidance from decision makers.

National Polar-orbiting Operational Environmental Satellite System
Nunn-McCurdy Certification
Supporting Explanation
"The management structure for the acquisition program is adequate to manage and control program acquisition unit cost or procurement unit cost"

The management evaluation was conducted in six areas to facilitate evaluation and development of recommendations:

- Earned Value Management, Schedule and Management Reserves;
- Contract Strategy;
- Personnel;
- Systems Engineering Process;
- Subcontractor Management, Sustainment and Supportability, and
- Tri-Agency Management Structure.

The evaluation included a review of the Independent Review Team (IRT) of August 2005 and the Independent Program Assessment (IPA) of November, 2005, a review of the government management structure (program executive office and integrated program office structure and staffing), and a review of the primary systems integrator management structure and staffing. It also included additional documentation reviews, on-site process reviews, and interviews.

The NPOESS government management structure comprises three agencies: Department of Defense, Department of Commerce, and National Aeronautics and Space Administration. Previous IRT/IPA found that the management structure for NPOESS was understaffed, poorly defined, and resulted in an overview process that lacked the authority to make cost and performance trade decisions. The evaluation found that previous recommendations for management structure from the earlier IRT/IPA were being implemented. Since Fall, 2005, the fundamental structure of the management chain at the IPO has been changed to improve lines of communication and reporting. A PEO organization has been added to work interagency and external activities which allows the SPD to focus on the acquisition process. Substantial changes have been made at the prime and subcontractors providing better Government insight into cost, schedule, and technical performance. Additional staffing and other changes are underway.

The management structure for the restructured NPOESS program is adequate to manage and control program acquisition unit cost or procurement unit cost, because I have directed the following changes:

- Apply risk avoidance lessons-learned and develop alternate solutions for technical margins management,
- Establish a process to track progress and closure of recommendations from detailed independent review,
- Integrate the Defense Contract Management Agency into the management processes,
- Improve the Award Fee process to incentivize the prime contractor,
- Develop a Diminishing Manufacturing Sources / parts obsolescence plan,
- Update the Logistics and Product support plans,
- Define and develop an improved day-to-day communications process, defining key decisions and relationships between agencies and government management, and
- Establish a process to examine and use cost and performance trades.

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE
SUITE 2320 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-6301
(202) 225-6371
TTY: (202) 226-4410
http://www.house.gov/science/welcome.htm

June 6, 2006

The Honorable Kenneth Krieg
Undersecretary of Defense for Acquisition,
Technology and Logistics
Office of the Secretary
The Pentagon
Washington, D.C. 20301-1155

Dear Undersecretary Krieg:

Thank you for your letter describing the Nunn-McCurdy certification for the National Polar-orbiting Environmental Satellite System (NPOESS) program and for the subsequent briefing by staff from the three NPOESS agencies. After reviewing the briefing materials, I have further questions. To help prepare for the hearing the Committee is holding on Thursday, June 8, I request that you provide the Committee on Science copies of the following information by no later than 6:00 p.m. today:

1. A breakdown of the $11.5 billion total acquisition cost figure included in the briefing material provided today, as follows:
    a. A year-by-year breakdown of when the $11.5 billion will be budgeted – that is, the amount that will be included in the budget request for each year that adds up to the $11.5 billion.
    b. A breakdown of the $11.5 billion by program element – that is, the cost of each sensor, satellite bus, etc. that adds up to the $11.5 billion.
2. The briefing materials and other supporting information used by you or the NPOESS Executive Committee to choose among options 1-4 described in the attachment to your letter titled "There are no alternatives to such acquisition program which will provide equal or greater military capability at less cost."
3. The Acquisition Decision Memorandum described on page six of the briefing material provided today.

Thank you for your assistance on this matter. If you have any questions about this request you may contact me or Amy Carroll of my staff at 202-225-8844 or amy.carroll@mail.house.gov.

Sincerely,

SHERWOOD BOEHLERT
Chairman

○