GO-96-001

AUDIT REPORT

EOS DATA AND INFORMATION SYSTEM (EOSDIS) DISTRIBUTED ACTIVE ARCHIVE CENTERS (DAACs)

GODDARD SPACE FLIGHT CENTER

MARCH 19, 1996

National Aeronautics and Space Administration

OFFICE OF INSPECTOR GENERAL

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

MAR 19 1996

Reply to Attn of: W

TO: Y/Associate Administrator for Mission to Planet Earth

100/Center Director, GSFC

FROM: W/Assistant Inspector General for Auditing

SUBJECT: EOS Data and Information System (EOSDIS)
Distributed Active Archive Centers (DAACs)
Assignment No. A-GO-95-001
Report Number No. GO-96-001

The NASA Office of Inspector General has completed an audit of the EOSDIS DAACs. The objectives of the audit were to determine whether:

- All DAACs will be fully utilized for processing Earth Observing System (EOS) and non-EOS scientific data.
- The DAACs computer system acquisitions were properly justified and whether alternative approaches could have been used.
- Facility requirements were properly justified and supported.

Due to the early stages of the EOSDIS development, we were unable to make an assessment if the DAACs will be fully utilized for processing EOS and non-EOS scientific data. This determination cannot be made until the EOSDIS is fully developed. Our audit did show that:

(1) The current configuration of the EOSDIS DAACs needs to be reevaluated.

(2) The DAACs plan to acquire Automated Data Processing equipment in excess of their needs.

(3) NASA funds may have been used inappropriately to construct or expand DAAC facilities.

(4) Some EOS data holdings may be outside the area of expertise of a particular DAAC.

We have made six recommendations that, if implemented, could result in savings and funds put to better use of $58.1 million. A draft report requesting written comments to the report's recommendations was issued on November 2, 1995. The Office of Mission to Planet Earth's (MTPE) formal response to recommendations 1 and 6 was received on December 16, 1995. The Office of MTPE concurred with both audit recommendations and has planned or begun corrective actions that are considered responsive to the intent of the recommendations. The MTPE's response is summarized after recommendations 1 and 6 and is included in its entirety as Attachment II.

The GSFC's formal response to recommendations 2, 3, 4 and 5 was received on February 12, 1996. GSFC management fully or partially concurred with the four recommendations and has planned corrective actions that are considered responsive to the intent of the recommendations. The Center's response is summarized after each of the four recommendations (numbers 2, 3, 4, and 5) and is included in its entirety as Attachment I. GSFC's response also contained specific detailed comments to the report. These comments were evaluated and incorporated in the report as we deemed necessary.

In accordance with NASA Management Instruction 9910.1B, we request to be included in the concurrence cycle for closure of recommendations 1, 2, 3, 5 and 6. If you have any questions, please contact Daniel Samoviski, Program Director for MTPE and Communications at 301-286-5561, or me at 202-358-1232.

Debra A. Guentzel

Enclosure

cc:
W/D. Samoviski (w/o enclosure)
201/Clark (w/o enclosure)

Table of Contents

TABLE OF ACRONYMS

ADC	Affiliated Data Center
ADP	Automated Data Processing
ASF	Alaska Synthetic Aperture Radar Facility
AWP	Annual Work Plan
CIESIN	Consortium for International Earth Science Information Network
DAAC	Distributed Active Archive Center
DADS	Data Archive and Distribution System
DOI	Department of Interior
ECS	EOSDIS Core System
EDC	Earth Resources Observation System Data Center
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System
FY	Fiscal Year
GAO	General Accounting Office
GSFC	Goddard Space Flight Center
HAIS	Hughes Applied Information Systems
IMS	Information Management System
IWG	Investigator Working Group
JPL	Jet Propulsion Laboratory
LaRC	Langley Research Center

MSFC	Marshall Space Flight Center
MTPE	Mission to Planet Earth
NSIDC	National Snow and Ice Data Center
ORNL	Oak Ridge National Laboratory
PGS	Product Generation System
SEDAC	Socio-Economic Data and Applications Center

EOS DATA AND INFORMATION SYSTEM (EOSDIS) DISTRIBUTED ACTIVE ARCHIVE CENTERS (DAACs)

GODDARD SPACE FLIGHT CENTER

EXECUTIVE SUMMARY

INTRODUCTION

The NASA Office of Inspector General has completed an audit of the Earth Observing System Data and Information System (EOSDIS), Distributed Active Archive Centers (DAACs). The EOSDIS DAACs are located at institutions or facilities that have expertise and on-going research in specific earth science disciplines. NASA's criteria for selection of the DAACs was based on the host institution's:

- Earth science expertise
- Scientific research expertise
- Infrastructure
- Long-term commitment to support science data processing, archival, and distribution functions

A total of nine DAACs have been selected by NASA to carry out the responsibilities for processing, archiving, and distributing EOS and related data, and for providing a full range of user support. For the period of Fiscal Year (FY) 1991 through FY 2000, the DAACs have an overall budget of $295,980,000.

OBJECTIVES

The objectives of the audit were to determine whether:

- All DAACs will be fully utilized for processing EOS and non-EOS scientific data.
- The DAAC computer system acquisitions were properly justified and whether alternative approaches could have been used.

- Facility requirements were properly justified and supported.

RESULTS OF AUDIT

During the audit, we were unable to make an assessment as to whether the DAACs will be fully utilized for processing EOS and non-EOS scientific data, due to the early stages of development of the EOSDIS. Such a determination cannot be made until the EOSDIS is fully developed. The audit did show that (1) the current configuration of the EOSDIS DAACs needs to be reevaluated, (2) the DAACs plan to acquire Automated Data Processing (ADP) equipment in excess of needs, and (3) NASA funds may have been used inappropriately to construct or expand DAAC facilities. The audit also showed that some EOS data holdings may be outside the area of expertise of a particular DAAC.

Six recommendations are being made to management which, if implemented, will ensure that the EOSDIS DAACs are operated in an efficient and effective manner, and could also result in cost savings and funds put to better use of $58.1 million.

1. CURRENT CONFIGURATION OF EOSDIS DAACs NEEDS TO BE REEVALUATED. NASA has not performed a detailed evaluation of the current configuration of nine EOSDIS DAACs, even though the EOS Program has experienced significant changes during the last four years. Specifically, although the overall EOS Program budget has been reduced from $17 billion in FY 1991 to $7.25 billion in FY 1994:

- The EOS Program cost was reduced, including spacecraft, instruments, data systems, and science.
- The number of EOSDIS DAACs increased from seven to nine.
- NASA has allowed some DAACs to expand facilities through new construction or leasing.
- Funding for the DAACs has increased approximately 16 percent.

This condition has occurred because NASA has performed only limited reviews of the DAAC configuration, one of which concluded that up to $55 million in savings could be achieved by closing three DAACs. As a result, NASA program funds may not be expended or budgeted in the most economical manner. In addition, the current configuration of the DAACs may not be the most efficient. (Page 17)

2. DAACs PLAN TO ACQUIRE ADP EQUIPMENT IN EXCESS OF NEEDS. Six of the nine EOSDIS DAACs plan to obtain Automated Data Processing (ADP) equipment in excess of their needs for the EOSDIS Version 0 prototype system. This condition has occurred because the Earth Science Data and Information System (ESDIS) Project Office has not adequately reviewed the planned ADP equipment procurements included in the Annual Work Plans (AWP) submitted by the DAACs. As a result, NASA could acquire approximately $3.1 million ($3,095,404) of ADP equipment that is not warranted for operation of the EOSDIS Version 0 system. (Page 29)

3. NASA FUNDS MAY HAVE BEEN USED INAPPROPRIATELY TO CONSTRUCT OR EXPAND DAAC FACILITIES. Institutions hosting EOSDIS DAACs are using NASA funds to construct or lease expanded facilities. Congressional intent suggests that all DAAC facility costs should be borne by the host institutions, and that NASA funds should not be used for the construction of non-NASA facilities. This condition has occurred because of a lack of oversight by the ESDIS Project Office, and its uncertainty as to whether the Congressional intent applied to leases. As a result, NASA may have expended DAAC operations funds and incurred excessive facility costs contrary to Congressional intent. (Page 37)

RECOMMENDATIONS We recommend:

1. The Associate Administrator for Mission to Planet Earth should request that an independent evaluation of the current DAAC configuration be performed to determine whether opportunities for consolidation or closure exist.

2. Goddard Space Flight Center's (GSFC) ESDIS Project Office should require each DAAC to submit a detailed justification for equipment budget requests, including any planned procurements of equipment between the phase-out of the EOSDIS Version 0 prototype system and delivery of the EOSDIS Version 1 and Version 2 systems.

3. GSFC's ESDIS Project Office should reduce each DAAC's Version 0 budget for equipment not adequately justified or supported. (This recommendation could potentially provide the project with $3.1 million ($3,095,404) in funds that can be put to other uses.)

4. GSFC's ESDIS Project Office should ensure that the Marshall Space Flight Center DAAC is assessed an equitable share of lease costs.

5. The GSFC contracting officer for the Alaska Synthetic Aperture Radar Facility DAAC contract should instruct the University of Alaska-Fairbanks to reclassify leased facility costs as indirect costs.

6. The NASA Headquarters Office of Mission to Planet Earth should obtain a determination as to whether the language in the FY 1994 Congressional Conference Report applies to leases.

INTRODUCTION

The NASA Office of Inspector General has completed an audit of the Earth Observing System Data and Information System (EOSDIS), Distributed Active Archive Centers (DAACs). The Earth Observing System (EOS) Program was proposed by the President and authorized as a new start in Fiscal Year (FY) 1991. The EOS Program is the centerpiece and largest part of NASA's Mission to Planet Earth (MTPE), and a major part of the comprehensive United States Global Change Research Program. The overall goal of the EOS Program is to advance the scientific understanding of the entire earth system on a global scale. The EOS Program consists of three components (1) EOS Science, (2) EOS Flight Systems, and (3) EOSDIS. The EOSDIS is the cornerstone of MTPE, and serves as the mechanism for generating, archiving, and distributing NASA's earth science and other source data to a worldwide pool of users.

The NASA Headquarters Office of MTPE (Code Y) is responsible for the overall EOS Program. GSFC's Mission to Planet Earth Office is responsible for coordinating the work of the ESDIS Project and the EOS Flight Projects. The ESDIS Project is responsible for planning, budgeting, oversight, and management of activities of the DAACs.

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BACKGROUND

The EOSDIS DAACs are located at institutions or facilities that have expertise and on-going research in specific earth science disciplines. NASA's criteria for selection of the DAACs was based on the host institution's:

- Earth science expertise
- Scientific research expertise
- Infrastructure
- Long-term commitment to support science data processing, archival, and distribution functions

A total of nine DAACs have been selected by NASA to carry out the responsibilities for processing, archiving, and distributing EOS and related data, and for providing a full range of user support. The nine DAACs, their location, host institution, discipline focus, and the year established are as follows:

- Earth Resources Observation System Data Center (EDC) DAAC; Sioux Falls, South Dakota The DAAC, established in 1991, is hosted by the EDC, a research field center of the Department of the Interior's, United States Geological Survey (USGS), National Mapping Division. The DAAC's discipline focus is Land Processes Imagery.
- Goddard Space Flight Center (GSFC) DAAC; Greenbelt, Maryland Hosted by the GSFC, the DAAC's discipline focus is Upper Atmospheric Dynamics, Global Biosphere, and Geophysics. The DAAC was established in 1991.
- Jet Propulsion Laboratory (JPL) DAAC; Pasadena, California Hosted by the JPL, the DAAC's discipline focus is Ocean Circulation and Air-Sea Interaction. The DAAC was established in 1991.

- Langley Research Center (LaRC) DAAC; Hampton, Virginia Hosted by the LaRC, the DAAC's discipline focus is Radiation Budget, Aerosol, and Tropospheric Chemistry. The DAAC was established in 1991.

- Oak Ridge National Laboratory (ORNL); Oak Ridge, Tennessee The DAAC, established in 1992, is hosted by the Department of Energy's ORNL. The DAAC's discipline focus is Biogeochemical Dynamics .

- Alaska Synthetic Aperture Radar Facility (ASF); University of Alaska at Fairbanks, Fairbanks, Alaska The DAAC, established in 1991, is hosted by the University of Alaska at Fairbanks. The DAAC's discipline focus is Sea, Ice, and Polar Processes .

- National Snow and Ice Data Center (NSIDC) DAAC; University of Colorado at Boulder, Boulder, Colorado The DAAC, established in 1991, is hosted by the University of Colorado at Boulder. The DAAC's discipline focus is Snow and Ice Processes .

- Marshall Space Flight Center (MSFC) DAAC; Huntsville, Alabama Hosted by the MSFC, the DAAC's discipline focus is Hydrology. The DAAC was established in 1991.

- Socio-Economic Data and Applications Center (SEDAC) DAAC; Saginaw, Michigan The DAAC, established in 1994, is hosted by the Consortium for International Earth Science Information Network (CIESIN). The DAAC's discipline focus is Socio-economic information processing.

For the period of FY 1991 through FY 2000, the DAACs have an overall budget of $295,980,000. The overall budget amount does not include the cost of the contract for the EOSDIS Core System. The chart below provides the budget for each DAAC.

DAAC	FY 1991 - FY 2000 Projected Budget (000)
EDC	$31,435
GSFC	$40,145
JPL	$35,400
LaRC	$22,050
ORNL	$14,179
ASF	$68,285
NSIDC	$19,438
MSFC	$25,396
SEDAC	$39,652
Total	$295,980

Each DAAC contains computer components that provide a product generation system, information management system, and archive and distribution system functions. The product generation system performs the actual data processing functions. The information management system provides connections to external archives to which EOSDIS interoperates. The archive and distribution system provides the archiving and distribution of data and information. The DAACs are also interconnected. This interconnection permits any user from a single interface to obtain data stored at any DAAC location.

Current plans indicate that EOSDIS and the DAACs will be operated in three phases, referred to as Version 0 (V0), Version 1 (V1), and Version 2 (V2).

EOSDIS V0 The EOSDIS V0 system is a prototype of the EOSDIS' functionality. It will interconnect existing data systems at the DAACs through electronic networks, integrate catalogs, and introduce common data distribution procedures to ensure better access to data. Each of the nine DAACs are in the V0 phase. The last DAAC became fully operational for V0 in 1994.

Institutions hosting DAACs in the V0 phase receive NASA funding through three methods (1) direct center funding, (2) NASA contract, or (3) intergovernmental funding transfer. The table below lists each DAAC and its current V0 funding mechanism.

DAAC	Version 0 DAAC Funding Mechanism
GSFC, JPL, LaRC, and MSFC	Direct Center Funding
ASF, NSIDC, and SEDAC	NASA contract
EDC and ORNL	Intergovernmental funding transfer

EOSDIS V1 With EOSDIS V1, the DAACs will provide enhanced functionality for information management, algorithm development and product generation, and data archive and distribution. The EOSDIS V1 system will be designed and developed while the V0 system is operating. The EOSDIS V1 system, at the DAACs, will be operational in March 1997. Until then, the V1 system will be implemented in phased steps between 1995 and 1997. Once operational, V0 data from the DAACs will migrate into the V1 system.

The EOSDIS Core System (ECS) at the DAACs will be an integral component of EOSDIS V1. The ECS provides the "core" common capabilities and infrastructure required for (1) performing, planning, and scheduling, (2) command and control (excluding the Tropical Rainfall Measuring Mission data), (3) product generation, (4) information management, (5) data archiving and distribution, and (6) user access to data held by EOSDIS.

Hughes Applied Information Systems (HAIS) of Seabrook, Maryland was awarded a $766 million, cost-plus-award-fee contract on March 30, 1993, to design, develop, integrate, maintain, and operate the ECS. The contract period of performance is through October 31, 2002. As part of the ECS, HAIS will install a new product generation system, information management system, and archive and distribution system components to support the EOSDIS V1 at the EDC, GSFC, LaRC, and MSFC DAACs, with delivery expected to begin in 1997.

EOSDIS V2 In the EOSDIS V2 phase, the DAACs will be at full functionality and capacity to support full-scale and launch-ready operations of the EOS AM-1 Spacecraft launch in 1998. The EOSDIS V2 system will be implemented October 1997 with the delivery of new ECS Release B equipment. Once V2 is operational, V0 data at the ASF, EDC, JPL, and NSIDC DAACs will migrate to EOSDIS V2.

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OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVES

The objectives of the audit were to determine whether:

- All DAACs will be fully utilized for processing EOS and non-EOS scientific data.
- The DAACs computer system acquisitions were properly justified and whether alternative approaches could have been used.
- Facility requirements were properly justified and supported.

SCOPE AND METHODOLOGY

The audit was performed in accordance with generally accepted government auditing standards and included such examinations and tests of applicable records, documents, and management controls as were considered necessary in the circumstances. Specifically, we reviewed Congressional legislation, contract records, and documents pertaining to DAAC utilization, automated data processing equipment, and facility requirements. We also reviewed reports prepared by the U.S. General Accounting Office. In addition, interviews and discussions were held with representatives of the NASA Headquarters Office of MTPE, the ESDIS Project Office at GSFC, and the nine DAACs.

MANAGEMENT CONTROLS REVIEWED

The following significant management controls relating to the EOSDIS DAACs were identified and tested for compliance:

- Contract NAS5-32393 with the University of Alaska at Fairbanks for operation of the ASF DAAC
- Contract NAS5-32392 with the University of Colorado at Boulder for the operation of the NSIDC DAAC
- Contract NAS5-32632 with CIESIN for the operation of the SEDAC DAAC
- Contract NAS5-60000 with HAIS for the design, development, and operation of the EOSDIS Core System
- Memorandum of Agreement between the University of Alaska at Fairbanks and NASA for operation of the ASF DAAC

- Memorandum of Agreement between the University of Colorado at Boulder and NASA for operation of the NSIDC DAAC
- Memorandum of Agreement between the U. S. Department of Energy and NASA for operation of the ORNL DAAC (Draft)
- Memorandum of Understanding between LaRC and NASA for operation of the LaRC DAAC (Draft)
- Memorandum of Understanding between MSFC and NASA for operation of the MSFC DAAC (Draft)
- Earth Observing System Blue/Red Team Report
- Initial Scientific Assessment of the EOS Data and Information System (EOSDIS), Science Advisory Panel for EOS Data and Information, EOS-89-1, dated March 1989
- Version 0 EOSDIS Implementation Plan, dated November 9, 1990
- The Earth Science Data and Information System (ESDIS) Project, Level 2 Requirements, Volume 5: Version 0, dated January 1993
- The Science Data Plan for the EOS Data and Information System covering EOSDIS Version 0 and Beyond, dated June 1994
- The DAAC Strategic/Management Plan, dated March 22, 1995
- Annual Work Plans for each DAAC

Management control weaknesses were identified and are described in detail in the Observations and Recommendations section of this report.

AUDIT FIELD WORK

Audit field work was conducted during the period of December 1994 through September 1995 at the EDC, GSFC, NSIDC, ASF, ORNL, MSFC, LaRC, SEDAC, and JPL DAACs. In addition, audit work

was conducted at the GSFC ESDIS Project Office, and the NASA Headquarters Office of MTPE. During the course of our audit, we identified a condition related to the EDC DAAC that warranted management's immediate attention. As a result, we issued a Rapid Action Report (RAR) (No. GO 95-008, dated September 15, 1995), which addressed concerns with the EDC DAAC facility addition. A RAR is issued when the significance or nature of an observation warrants immediate reporting to management for prompt corrective action during the audit. This RAR is presented in its entirety as Attachment III to this report.

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OBSERVATIONS AND RECOMMENDATIONS

OVERALL EVALUATION

During the audit, we were unable to make an assessment as to whether the DAACs will be fully utilized for processing EOS and non-EOS scientific data, due to the early stages of development of the EOSDIS. Such a determination cannot be made until the EOSDIS is fully developed. The audit did show that (1) the current configuration of EOSDIS DAACs needs to be reevaluated, (2) the DAACs plan to acquire ADP equipment in excess of needs, and (3) NASA funds may have been used inappropriately to construct or expand DAAC facilities. The audit also showed that some EOS data holdings may be outside the area of expertise of a particular DAAC.

Six recommendations are being made to management which, if implemented, will ensure that the EOSDIS DAACs are operated in an efficient and effective manner, and could also result in cost savings and funds put to better use of $58.1 million.

1. CURRENT CONFIGURATION OF EOSDIS DAACs NEEDS TO BE REEVALUATED

NASA has not performed a detailed evaluation of the current configuration of nine EOSDIS DAACs, even though the EOS Program has experienced significant changes during the last four years. Specifically, although the overall EOS Program budget has been reduced from $17 billion in FY 1991 to $7.25 billion in FY 1994:

- The EOS Program cost was reduced, including spacecraft, instruments, data systems, and science.
- The number of EOSDIS DAACs increased from 7 to 9.
- NASA has allowed some DAACs to expand facilities through new construction or leasing.
- Funding for the DAACs has increased approximately 16 percent.

This condition has occurred because NASA has performed only limited reviews of the DAAC configuration, one of which concluded that up to $55 million in savings could be achieved by closing three DAACs. As a result, NASA program funds may not be expended or budgeted in the most economical manner. In addition, the current configuration of the DAACs may not be the most efficient.

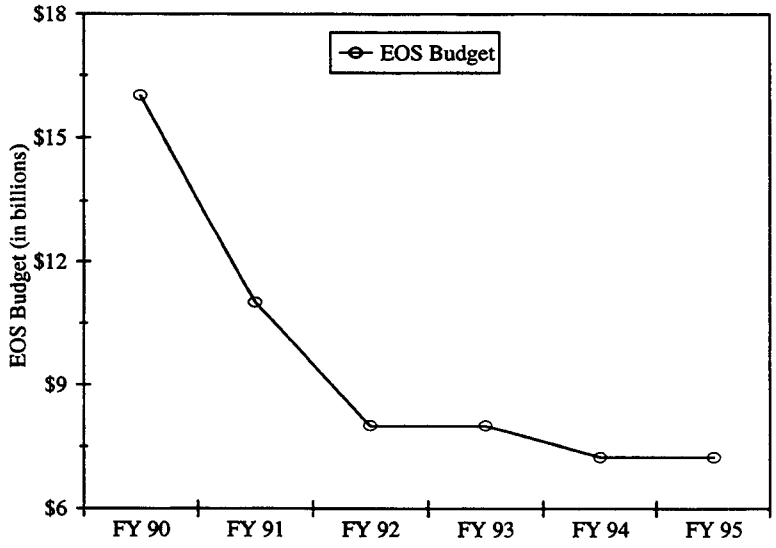
EOS PROGRAM RESTRUCTURINGS HAVE RESULTED IN SIGNIFICANT BUDGET REDUCTIONS

As a result of several restructurings, the EOS Program's budget has been significantly reduced. The program's original budget was $17 billion from FY 1991 through FY 2000. As a result of three program restructurings, the overall EOS Program budget was reduced from $17 billion in FY 1991 to $7.25 billion in FY 1994, a total of $9.75 billion, or approximately 57 percent.

The EOS Program was first restructured in response to a 1991 congressional appropriations committees' directive. The committees directed that the total program cost be reduced from $17 billion to $11 billion through FY 2000. In 1992, the NASA Administrator directed that the EOS Program again be restructured, with a goal of further reducing program costs by 30 percent through FY 2000. As a result of this restructuring, the EOS Program's budget through FY 2000 was reduced from $11 billion to $8 billion.

In 1994, the EOS Program's budget was further reduced from $8 billion to $7.25 billion through FY 2000. The following graph illustrates the reductions in the EOS Program's budget from FY 1990 through FY 1995.

Progression of EOS Program Reductions
Fiscal Year 1990 - Present



RESTRUCTURING HAS RESULTED IN REDUCTION OF SPACECRAFT, INSTRUMENTS, AND DATA SYSTEMS

Because of several EOS Program restructurings, NASA has also (1) descoped the program's science focus from the broad global change issue to specifically global climate change, and (2) reduced the total program cost including spacecraft, instruments, data systems, and science. NASA made the following three program reductions that affected the EOS spacecraft, scientific instruments, and data systems.

1. EOS AM-1 Spacecraft

The EOS AM-1 spacecraft, scheduled to be launched in 1998, was originally intended to carry 16 scientific instruments. As a result of the restructuring and subsequent budget reductions, the spacecraft's size has been reduced, and will now carry only five scientific instruments. The cost of the spacecraft contract was reduced from $726.6 million to approximately $560 million.

2. EOS Scientific Instruments

NASA originally planned to have 30 EOS instruments flown on two large spacecraft platforms. However, as a result of the restructuring and budget reductions, NASA reduced the number of instruments to 24 that will now be flown on 21 small and medium sized spacecraft platforms.

3. EOS Data Systems

NASA has reduced the amount of scientific information that will be obtained from the EOS spacecraft. NASA also plans to consolidate the EOS Data and Operation System at the White Sands Complex near Las Cruces, New Mexico.

ESTABLISHMENT OF THE DISTRIBUTED DATA HANDLING FUNCTIONS

Initially, NASA planned to locate all EOSDIS data handling operations at GSFC. In the early phase of the EOS Program, studies performed by two separate contractors showed that the most efficient and least costly configuration for the EOSDIS was to centralize it at GSFC. However, NASA decided to distribute the data handling functions to various geographic areas, based on recommendations of the Science Advisory Panel for EOS Data and Information. It was the advisory panel's opinion that centralizing data handling operations at GSFC was not the most efficient. Also, the advisory panel suggested that EOSDIS development be linked to existing earth science and data center expertise distributed throughout the United States (U.S.).

Based on the advisory panel's recommendation, NASA established a total of seven DAACs, located at various institutions, to accomplish

data handling operations. NASA selected individual DAACs based upon the host institution's (1) earth science expertise, (2) scientific research expertise, (3) infrastructure, and (4) long-term commitment to support science data processing, archival, and distribution functions.

GAO STATES THAT INITIAL SEVEN DAACs WERE SELECTED WITHOUT AN OBJECTIVE ANALYSIS

In Report No. GAO/IMTEC-91-67, "Earth Observing System-Information on NASA's Selection of Data Centers," dated September 1991, the U.S. General Accounting Office (GAO) stated that even though NASA applied criteria in selecting the DAACs, the selections were decided informally, and without an objective analysis.

The GAO report states that:

"the number of DAAC sites, their location, and their assigned scientific specialties for the EOS Program were all decided upon informally, without systematic or objective analyses of potential sites against the stated criteria. Instead, (NASA) program officials relied upon their own experience and knowledge of the capabilities at potential sites in determining where DAACs should be located."

The report also states that NASA had no plans to increase the number of DAAC sites from the seven selected. At the time of the GAO report, the EOS Program had a projected budget through FY 2000 of $17 billion.

DAACs INCREASE IN NUMBER, SIZE, AND FUNDING

During the same time that the EOS Program was being restructured and its budget reduced, the DAACs increased in number, size, and funding. For example, NASA increased the number of DAACs from seven to nine, even though program funding was reduced from $17 billion to $7.25 billion. Specifically, during the EOS Program restructure, both the Oak Ridge National Laboratory (ORNL) and the Socio-Economic Data and Application Center (SEDAC) were selected as DAACs. Although NASA selected these two DAACs using the same criteria as with the seven selected in 1991 (i.e., existing earth science and scientific research expertise, infrastructure, etc.), they were selected without a systematic or objective analysis of potential sites against the stated criteria. In addition, ORNL and SEDAC are two of the three DAACs (ASF DAAC is the other one) that will not perform data handling functions for the EOS Program. The following provides the events that led to NASA's establishment of the ORNL and SEDAC DAACs.

ORNL DAAC

NASA selected ORNL to host a DAAC because of its experience, and visibility of the Carbon Dioxide Information Analysis and Atmospheric Radiation Measurement Internal Environmental Data Centers. Before becoming a DAAC, ORNL did not archive or distribute any NASA related data. NASA established the ORNL DAAC to serve as the primary repository for ground-based biogeochemical dynamics data. In establishing this DAAC, NASA transferred biogeochemical dynamics related data sets, that were previously archived and distributed by data centers located at Ames Research Center, GSFC, and JPL.

SEDAC DAAC

The SEDAC DAAC originated from Public Law 101-144, which mandated that NASA broaden the work planned for EOS by tasking the Consortium for International Earth Science Information Network (CIESIN), to study analytical tasks and policy questions related to EOS. A week after its formation in 1989, NASA provided funding for EOS related work, at which time, CIESIN was designated as an Affiliated Data Center (ADC). ADCs are non-EOS data centers that provide special access to non-EOS data or special non-EOSDIS services required by the EOS Program. The SEDAC DAAC was established by Congress in 1994 through the FY 1994 VA-HUD-Independent Agencies appropriation bill. The bill language specified that:

> *"The committee of conference concurs with the agreement reached in the Senate on the CIESIN project that makes available $5,000,000 of fiscal year 1994 funds to establish CIESIN as a Distributed Active Archive Center (DAAC) for socioeconomic activities within the EOSDIS program."*

NASA assigned the SEDAC DAAC to generate, archive, and distribute data sets supporting policy-making decisions regarding human dimensions of global change. SEDAC is the only DAAC that will not receive data sets directly from scientific instruments.

DAAC FACILITIES EXPANDED EVEN THOUGH ONE CRITERIA FOR SELECTION WAS EXISTING INFRASTRUCTURE

Several DAACs have expanded their facilities, primarily at NASA's expense, even though one of the criteria for selection was existing host institution infrastructure. In addition, legislative history shows that Congressional intent suggests that "facility costs should be borne by non-NASA agencies directly." ESDIS Project Office personnel informed us that they have always anticipated that institutions hosting DAACs would require some augmentations to their facilities in order to accomplish NASA's data handling requirements. However, facility expansion by seven of the nine DAACs may be excessive, especially when considering the significant budget reductions that have occurred in the EOS Program.

Seven of the nine DAACs either have or will expand facilities through construction or leasing in order to accomplish NASA's data handling tasks. These costs for construction or leasing have either been fully or partially borne by NASA. The chart below shows the total square footage of each DAAC's original and expanded facilities, and whether such expansion has been or will be accomplished by leasing or construction.

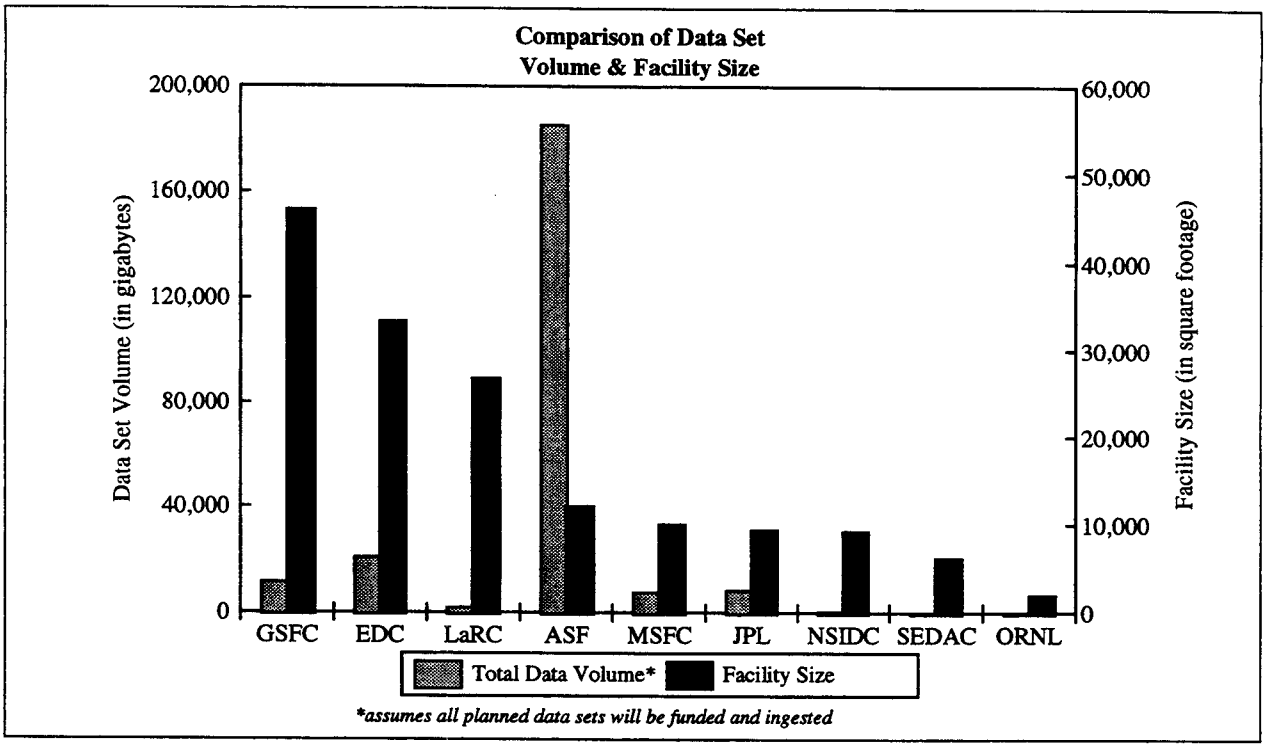
DAAC Facility	Square Feet dedicated to DAAC before facility expansion	Square Feet dedicated to DAAC after facility expansion	Increase/ (decrease) in square feet after facility expansion	Method of expansion
ASF	4,872 (Gross)	12,012 (Gross)	7,140	Lease
EDC	4,000 (Gross)	33,250 (Gross)	29,250	Construction
GSFC	6,329 (Net)	45,943 (Net)	39,614	Construction
JPL	6,500 (Net)	9,366 (Net)	2,866	Lease
LaRC	6,769 (Net)	26,758 (Net)	19,989	Construction
MSFC	7,000 (Gross)	10,000 (Gross)	3,000	Lease
NSIDC	3,512 (Net)	9,203 (Net)	5,691	Lease
ORNL	2,000 (Net)	2,000 (Net)	No change	N/A
SEDAC	6,201 (Net)	6,201 (Net)	No change	N/A

Notes: The DAACs square footage are approximate figures. These figures were provided by either the DAACs or ESDIS Project Office personnel. The square footage was provided in net or gross space.

As shown in the chart, seven DAACs have or will expand their facilities through leasing or construction. Two of the DAACs, however, plan no changes to their existing facilities in order to accommodate NASA's data handling requirements. (NASA's funding of DAAC facility costs is discussed in detail in Observation 3 of this report, and in the Rapid Action Report (No. GO-95-008) that is presented in its entirety as Attachment III to this report.)

Facility expansion by seven of the nine DAACs may be excessive, especially when considering the significant budget reductions in the EOS Program. In addition, our audit showed that there are some

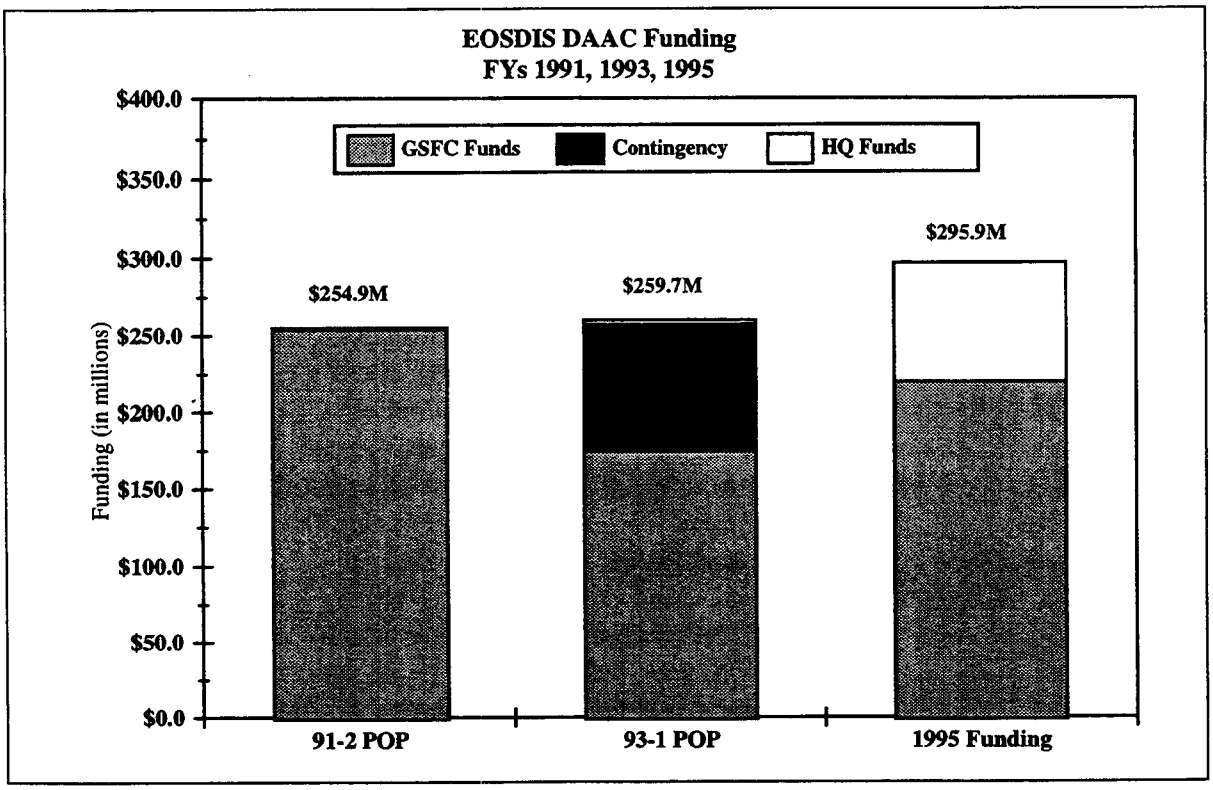
disparities between the amount of data a particular DAAC may be processing and its square footage requirements. These disparities are shown in the following chart.



Although we are unable to make a determination as to the amount of facility space required by each DAAC, it appears that there is no correlation between the amount of data processed and facility space. When compared, there are significant differences.

DAAC FUNDING INCREASES

While the EOS Program's budget was being reduced by $9.75 billion or 57 percent between FY 1991 and FY 1994, DAAC funding increased. Specifically, between FYs 1991 and 1995, total DAAC funding increased from $254.9 million to $295.9 million, a 16 percent increase. From FYs 1993 to 1995, funding increased from $259.7 million to $295.9 million, a 13.9 percent increase. The following chart shows the DAAC total cumulative funding for FYs 1991, 1993, and 1995.



Notes: The 93-1 POP funding of $259.7 million consisted of $175.7 million from GSFC, $83 million from EOSDIS Contingency funds and $1 million from NASA Headquarters Office of Mission to Planet Earth (OMTPE). The 1995 funding of $295.9 million consisted of $221.4 million funding from GSFC and $74.5 million funding from NASA Headquarters OMTPE

As shown in the chart, funding for the DAACs was increased during the same period that the overall EOS Program budget was being decreased as a result of the restructurings.

NASA HAS CONDUCTED LIMITED REVIEWS OF DAAC CONFIGURATION

NASA has performed two reviews of the configuration of the DAACs. However, neither of the two reviews encompassed all of the DAACs, nor did they result in a reduction of the number of DAACs. The first review was conducted in 1992 as part of the overall Blue and Red team study directed by the NASA Administrator. The second review was performed in July 1994 as part of the Investigator's Working Group Payload Panel Meeting.

Blue and Red Team Review

In May 1992, the NASA Administrator established "Blue" and "Red" teams to review the content, schedule, and cost of the EOS Program. The Administrator set a 30 percent reduction in the budget target to act as a stimulus for the teams to reassess the program's content and configuration. As part of the EOS Program review, the teams addressed what was at the time, an eight DAAC configuration. The teams considered reducing the number of DAACs through consolidating data bases and science management operations. They projected that this action would result in cost savings of $2 million per year for every two DAACs consolidated. The teams concluded, however, that these savings could be offset by reduced effectiveness of EOSDIS services. Further, they believed that the scientific data management expertise at the consolidated DAACs would be inadequate to cover the wide range of scientific disciplines. As a result, the teams decided against reducing the number of DAACs through consolidation.

The teams acknowledged that their review of the eight DAAC configuration was based upon (1) an assessment of only four DAACs, and (2) a lack of quantitative understanding of the user community, and the preliminary understanding of the rescoped science product and algorithm requirements.

Investigator's Working Group Payload Panel Meeting

In July 1994, the ESDIS Project Office made a presentation to the to the Investigator's Working Group Payload Panel Meeting outlining proposals to reduce ESDIS costs. Attendees at the conference included NASA personnel and representatives of the Investigator Working Group (IWG). The IWG is comprised of EOS-funded investigators chartered by NASA Headquarters with recommending wide-ranging strategies for Earth Sciences and EOSDIS priorities. An overall assessment of the need for nine DAACs was not addressed as part of the ESDIS Project Office's presentation. However, one item proposed was closing the JPL, NSIDC, and MSFC DAACs, and transferring their functions to other DAACs. The ESDIS Project Office estimated that NASA could achieve $55 million in cost savings by closing the three DAACs. The IWG opposed this action because of the potential loss of expertise. Furthermore, the IWG believed that the participation of those three organizations has contributed significantly to the EOSDIS V0 development and science user support.

SUMMARY

In summary, as a result of three different restructurings between FY 1991 and FY 1994, the EOS Program's budget has been reduced from $17 billion to $7.25 billion through FY 2000. These budget reductions resulted in rescoping the program's science focus, and reduced the total program cost through smaller spacecraft, less scientific instruments, data systems, and science. However, despite these restructurings and subsequent budget reductions, the total number of DAACs increased from seven to nine, DAAC facilities were expanded primarily at NASA's expense, and DAAC funding increased during this same period. The audit showed that NASA has performed only two limited reviews of the current DAAC configuration. However, these reviews were not detailed and ultimately resulted in NASA deciding against reducing the number of DAACs. The Associate Administrator for Mission to Planet Earth should request that the current DAAC configuration be independently evaluated in light of the significant program and budget reductions, to determine whether opportunities for consolidation or closure exist. Any such consolidations or closures could potentially result in significant cost savings as evidenced by a previous ESDIS Project Office review which concluded that $55 million in savings could occur by consolidations and closures.

RECOMMENDATION 1

The Associate Administrator for Mission to Planet Earth should request that an independent evaluation of the current DAAC configuration be performed to determine whether opportunities for consolidation or closure exist.

MANAGEMENT'S RESPONSE

Concur. The Office of Mission to Planet Earth (OMTPE) basically agrees with this recommendation, although the potential cost savings are yet to be determined. In fact we are already beginning the process to close the MSFC DAAC in March of 1997 as result of the Zero-Based Review Team. Our initial estimates for this closing save about $7 million dollars through the year 2000. This past summer we were prepared to perform a peer review of all the DAACS, based on a recommendation of the EOS Payload Panel. However, the National Academy of Sciences Board on Sustainable Development (BSD) has made several recommendations related to work currently performed by the DAACs as a result of a workshop in July. These recommendations call for competitively selecting a Federation of information service providers (i.e. DAAC like) who would perform the necessary services for the OMTPE. This will have significant implications for EOSDIS including the existing DAAC structure. The OMTPE is now responding to those recommendations, and while

it is too early to give a time schedule for implementation, it seems very likely that the OMTPE will proceed with these recommendations. Although it is not clear that the answer will be fewer service providers (i.e. DAACS) as suggested in your report, the idea of a competitive selection process will help to ensure the best solution within a constrained EOSDIS budget.

EVALUATION OF MANAGEMENT'S RESPONSE

The actions planned are considered responsive to the intent of the recommendation. We will, however, remain in the concurrence cycle for closure of this recommendation in order to evaluate the OMTPE's response to or implementation of the recommendations of the National Academy of Sciences Board on Sustainable Development.

2. DAACs PLAN TO ACQUIRE ADP EQUIPMENT IN EXCESS OF NEEDS

Six of the nine EOSDIS DAACs plan to obtain ADP equipment in excess of their needs for the EOSDIS V0 prototype system. This condition has occurred because the ESDIS Project Office has not adequately reviewed the planned ADP equipment procurements included in the Annual Work Plans (AWP) submitted by the DAACs. As a result, NASA could acquire approximately $3.1 million ($3,095,404) of ADP equipment that is not warranted for operation of the EOSDIS V0 system.

The DAAC Strategic Management Plan states that "the ESDIS Project Office is responsible for planning, budgeting, oversight, and management of activities of the DAACs." As part of these responsibilities, the project office requires each DAAC to submit an AWP detailing:

- Past years accomplishments
- Current and future goals
- Operations, data sets, and staffing projections
- Current and future year budget projections (including a separate equipment line item)

The ESDIS Project Office uses the AWPs to plan DAAC budgets for both the current and future fiscal years.

DAACs WILL RECEIVE ADP EQUIPMENT IN THREE PHASES

The DAACs will receive ADP equipment in three phases, referred to as EOSDIS V0, V1, and V2. EOSDIS V0 is a prototype system established to demonstrate the functionality of data processing, archiving, and distribution of the EOSDIS Core System (ECS). The EOSDIS V1 will begin the phase-out of the V0 system at GSFC, MSFC, LaRC, and EDC. The V2 system will complete the phase-out of the V0 system at NSIDC, EDC, ASF, and JPL. The V2 system will be completed before the 1998 EOS AM-1 spacecraft launch. Refer to the Background section of the report, pages 9 to 11, for a more detailed description of these versions.

Under agreements with each DAAC, NASA augmented existing data systems with new ADP components for each V0 system. Beginning in 1993, NASA procured new computer components that provide product generation system, information management system, and archive and distribution systems functions. The ESDIS Project

Office declared the V0 system fully operational in August 1994. Currently, all nine DAACs are processing, archiving, and distributing data to a variety of users through an interconnected electronic network that forms the V0 system. The V0 system phase-out will begin in mid-1996. This phase-out will continue until data migration to the V1 and V2 systems is completed before the 1998 launch of the EOS-AM spacecraft.

The EOSDIS V1 system will be delivered in mid-1996 with the ECS contractor's procurement of new ADP equipment for the GSFC, MSFC, LaRC, and EDC DAACs. The V0 data at these DAACs will migrate to the V1 system and remain available to the user community. Additionally, the V1 system will interoperate with the V0 system at the remaining DAACs so that communication between DAACs remains in tact. The V1 equipment will replace V0 equipment with new components. Although DAAC officials have indicated some V0 components will remain as "DAAC-unique" extensions, no equipment has been identified by the ESDIS Project Office.

The EOSDIS V2 system will complete the phase-out of the V0 system. The ECS contractor will deliver new ADP equipment to the ASF, EDC, JPL, and NSIDC DAACs beginning in late 1996. The V0 data at these DAACs will migrate to the V2 system to remain available to the user community. Additionally, the V2 system will operate with the V1 system to form the first ECS release. The ORNL DAAC will be connected to the ECS with new software interfaces to its current V0 system. The SEDAC DAAC will be connected to the V2 with new software and hardware procured under a separate contract with NASA. Operations and data migration to the V2 system will be completed in time to support the launch of the EOS-AM spacecraft in 1998.

DAACs CANNOT SUPPORT ADP EQUIPMENT BUDGETS FOR VERSION 0

For FYs 1995 through 2000, six of the nine DAACs budgeted approximately $3.1 million ($3,095,404) for V0 ADP equipment procurements that are not supported. This amount includes more than $1.5 million for equipment in FYs 1999 and 2000, even though the EOSDIS V0 system is planned to be phased out beginning in 1996. The following chart shows the total budgeted amount of ADP equipment procurements that are not supported.

DAAC	Total budget	Unsupported	Supported
ASF	$1,670,000	$1,163,000	$507,000
GSFC	934,000	626,000	308,000
LaRC	1,032,000	582,404	449,596
MSFC	491,157	299,000	192,157
EDC	100,000	100,0000	0
NSIDC	325,000	325,0000	0
JPL	424,000	0	424,000
SEDAC	1,446,284	0	1,446,284
ORNL	0	0	0
TOTALS	$ 6,422,441	$3,095,404	$3,327,037

An explanation of each DAACs unsupported ADP equipment budget is provided below:

ASF DAAC The ASF DAAC could not support $1,163,000 of its FY 1995 through 2000 ADP equipment budget. According to the DAAC Project Manager for ASF, only the current year budget needs to be justified and out year budgets are considered "placeholders" for future years. The DAAC Project Manager for ASF stated that the ASF DAAC has been requested to submit an itemized list of equipment to be procured in FY 1996. However, no such request has been made for FY 1997 through 2000. According to the ASF DAAC manager, the ASF equipment budget is necessary for desk top computers and work-station-type equipment which is required due to increases in staffing. However, when asked to provide support for the staffing increases, ASF management responded:

> *"ASF cannot provide accurate staffing increases for any year beyond 1995. We anticipate having a slightly larger staff in FY 1996 assuming no budget cuts. For FY 1997 and beyond, we have been told to expect budget cuts, and do not know what the numbers will be."*

GSFC DAAC The GSFC DAAC provided support for $308,000 of its total $934,000 ADP equipment budget. The amount supported is to procure new hardware to test software updates, process future data attributed to the SeaWIFS satellite, and improve information management system and database performance. The DAAC Manager informed us that this would be the last major procurement of EOSDIS V0 equipment. The DAAC provided no support for the remaining $626,000 budgeted.

LaRC DAAC The LaRC DAAC provided justification for $449,596 of its $1,032,000 ADP equipment budget. The DAAC provided justification for $285,750 worth of ADP hardware and software to support increased processing and archiving of new data. The DAAC also provided justification for equipment with a value of $163,846 to support expected staff increases. The DAAC's support for the remaining $582,404 is based on an unspecified, miscellaneous hardware need that is not driven by increased staffing or data volume.

MSFC DAAC The MSFC DAAC provided partial justification for $192,157 of its total $491,157 ADP equipment budget. These funds will be used to update the information management system (which will enable the DAAC to meet baseline requirements through 1998), and support new data set ingestion, processing, and archival. To support the remaining $299,000, DAAC management stated they plan to update the V0 system every two years with state-of-the-art technology. This justification appears questionable since the V0 system will begin to be phased out in 1996.

EDC DAAC The EDC DAAC could not provide any justification for its ADP equipment budget of $100,000 for FY 1995. According to DAAC management, the equipment budget is only an estimate, and could be changed if the DAAC needs more equipment in the future.

NSIDC DAAC The NSIDC DAAC could not provide any justification for its $325,000 ADP equipment budget. DAAC management informed us that the amounts budgeted were only estimates. Further, the budget can be changed to reflect increases or decreases in need with the submission of future AWPs.

JPL, SEDAC, and ORNL DAACs The JPL and SEDAC DAACs provided support for planned ADP equipment budgets of $424,000 and $1,446,284 respectively. The ORNL DAAC's AWP showed no planned budget for ADP equipment for FY 1995 through FY 2000. According to ORNL management, instead of procuring new ADP equipment, the DAAC will sustain the V0 system with $325,000 worth of hardware and software maintenance through FY 2000.

VERSION 0 IS NOT AN OPERATIONAL VERSION OF EOSDIS

The V0 EOSDIS Implementation Plan states that:

"Version 0 is not an operational version of EOSDIS . . . it is instead, a very good prototype to address technical issues that EOSDIS will be addressing."

As such, the system was established to ***demonstrate*** the functionality of data processing, archiving, and distribution of the ECS. [emphasis added]

The overall system requirements for EOSDIS V0 are stated in the Earth Science Data and Information System (ESDIS) Project, Level 2 Requirements, Volume 5. These requirements are separated into baseline, full service, and ideal-DAAC requirements. The baseline requirements have the highest priority for implementation, while full service and ideal requirements are to be implemented only if resources are available, and only at selected DAACs. As of May 1995, the DAACs have completed all baseline requirements applicable to their system, and fulfilled some full service and ideal-DAAC requirements. Currently, every DAAC maintains an operational V0 system, while completing as many of the remaining full service and ideal-DAAC requirements as possible.

The ESDIS Project Office initially stated that no V0 ADP equipment would be used to complete the V1 or V2 systems. According to the managers in the project office, the ECS contractor will deliver new computer equipment to every DAAC except ORNL and SEDAC. The ORNL DAAC will interface with the V2 system using the current ADP equipment. The SEDAC DAAC will interface to the V2 system using new equipment procured from a separate NASA contract. The project office also recently indicated that some equipment is being considered for use as EOSDIS V0 "DAAC-unique extensions." These extensions, however, are supported solely by the V0 system and do not contribute to the processing, archiving, and distribution of EOS data.

Since the V0 system is currently fully operational, and has demonstrated the functionality of data processing, archiving, and distribution of the ECS, planned future equipment purchases should be closely reviewed by the ESDIS Project Office. Our position is further supported by current plans to begin phasing out the EOSDIS V0 system in 1996.

DAACs NOT REQUIRED TO SUPPORT BUDGET LINE ITEMS

The AWPs are reviewed by the ESDIS Project Office and approved by the DAAC Project Manager. The DAAC Project Manager stated that detailed justifications are not required to support budget line items past the current fiscal year budget, and that the ESDIS Project Office maintains a policy of not "micromanaging" the DAACs. In following this policy, each DAAC has authority to procure ADP equipment without approval from the project office. The project office monitors ADP equipment procurement by reviewing total purchases to ensure individual DAAC budgets are not exceeded. Justifications are required for any procurement that exceeds a DAAC's budget, or that appear excessive to needs presented in the AWP. In instances where the budget will be exceeded, the project office and the DAAC "negotiate" to determine if an adequate need exists, and if the EOSDIS V0 budget can support the procurement.

SUMMARY

The ESDIS Project Office needs to more closely monitor ADP equipment plans at the budget item level past the current fiscal year, and not only when the approved budget line is exceeded. As the audit indicates, there are already significant planned equipment procurements in the current budget that are not supported. Following the current procedure of reviewing only current year budgets and procurements that exceed the budget could result in future procurements of equipment with a value of approximately $3.1 million ($3,095,404) that are not justified, since the EOSDIS V0 system is a prototype and will be replaced with the V1 and V2 systems. These funds could potentially be put to other uses by the ESDIS Project Office. Therefore, the ESDIS Project Office should reduce each DAACs V0 budget for equipment not adequately supported.

RECOMMENDATION 2

GSFC's ESDIS Project Office should require each DAAC to submit a detailed justification for equipment budget requests, including any planned procurements of equipment between the phase-out of the EOSDIS V0 prototype system and delivery of the EOSDIS V1 and V2 systems.

MANAGEMENT'S RESPONSE

Partially Concur. We currently require DAACs to submit sufficient justification for equipment requests. In addition, our management practices require us to continuously improve procedures; and we will ensure the intent of this recommendation is reflected in our procedures updates.

EVALUATION OF MANAGEMENT'S RESPONSE

The actions planned are considered responsive to the intent of the recommendation. We will, however, remain in the concurrence cycle for closure of this recommendation in order to evaluate any improvements or updates to procedures for requesting equipment.

RECOMMENDATION 3

GSFC's ESDIS Project Office should reduce each DAAC's V0 budget for equipment not adequately justified or supported. (This recommendation could potentially provide the project with approximately $3.1 million ($3,095,404) in funds hat can be put to other uses.)

MANAGEMENT'S RESPONSE

Partially Concur. We currently require DAACs to submit sufficient justification for all purchases, and in particular for V0. Since all DAAC Automated Data Processing Equipment (ADPE) acquisitions planned for the current funding year are reviewed and approved as supportable prior to purchase, no funds are expended on unsupportable ADP equipment. Our discussion on subsequent pages of this response provides additional information, in particular concerning planning for future ADPE purchases. Although we currently cannot estimate the full amount of savings, we believe that the approach we use, which takes advantage of cost savings by annually reviewing planned purchases against requirements and technology maturity, meets the intent of this recommendation.

EVALUATION OF MANAGEMENT'S RESPONSE

The actions planned are considered responsive to the intent of the recommendation. We will, however, remain in the concurrence cycle for closure of this recommendation in order to evaluate any improvements or updates to procedures for justifying equipment purchases.

Requiring a justification for all equipment purchases and review of that justification, should ensure that only necessary equipment is purchased by the DAACs. We estimate that approximately $3.1 million ($3,095,404) in funds that can be put to better use could accrue to the project through implementation of this recommendation.

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3. NASA FUNDS MAY HAVE BEEN USED INAPPROPRIATELY TO CONSTRUCT OR EXPAND DAAC FACILITIES

Institutions hosting EOSDIS DAACs are using NASA funds to construct or lease expanded facilities. Congressional intent suggests that all DAAC facility costs should be borne by the host institutions, and that NASA funds should not be used for the construction of non-NASA facilities. This condition has occurred because of a lack of oversight by the ESDIS Project Office, and its uncertainty as to whether the Congressional intent applied to leases. As a result, NASA may have expended DAAC operations funds and incurred excessive facility costs contrary to Congressional intent.

The FY 1994 Congressional Conference Report for the Appropriations for the Departments of Veterans Affairs, Housing and Urban Development, and Sundry Independent Agencies, Boards, Commissions, Corporations and Offices, dated October 4, 1993, states that:

> *"NASA is directed, however, to provide* ***no funds for the construction of non-NASA facilities*** *including the reimbursement of construction costs through annual data archive center operation budgets. The conferees further agree that all prior interagency agreements that would have permitted this are considered null and void and* ***that facility costs should be borne by non-NASA agencies directly."*** (highlighting added)

The July 1994 EOSDIS Science Data Plan states that "NASA DAACs were selected based on their existing institutional earth science discipline and research expertise, **infrastructure**, and commitment." (highlighting added)

Seven of the nine EOSDIS DAACs have used NASA funds to either construct or lease expanded facilities. Two of the seven, LaRC and GSFC, constructed new DAAC facilities using NASA Construction of Facilities funding appropriated by the Congress. The construction or leasing at the remaining five DAACs (ASF, EDC, JPL, MSFC, and NSIDC) may be in conflict with Congressional intent.

EDC DAAC CONSTRUCTS FACILITY ADDITION

NASA DAAC operations funds may have been used to augment the construction of a facility addition at EDC, a U.S. Department of Interior (DOI) activity. Specifically, EDC may have already expended more than $600,000 of FY 1994 NASA funds for purposes other than appropriated. The EDC plans on expending an additional $4.2 million of NASA funds during FY 1995 through FY 1998.

The original estimated cost to complete the 60,000 square foot addition to EDC's existing facility in Sioux Falls, South Dakota was $12.6 million, which was requested in DOI's FY 1994 budget. However, the DOI's Appropriation Legislation for FY 1994 authorized only $9 million for construction of the EDC facility addition, which was $3.6 million less than the $12.6 million requested. Language was included in the DOI appropriation which stated the $9 million **"represents a 'bare bones' approach to the new facilities, but is deemed sufficient for total construction"** [emphasis added]. Despite the $3.6 million reduction in construction funding and the appropriation language stating the $9 million was sufficient for total construction, EDC's management decided to maintain the facility addition's original structural design. They did, however, decide to scale back completion of the facility's interior.

In 1993, EDC management requested NASA funds for power supplies, communications, computer and archive room heating, ventilation, and air conditioning, and finished office space for the EDC facility addition. NASA agreed to provide EDC approximately $4.8 million of FY 1994 through FY 1998 funds to finance these items that were included in DOI's original $12.6 million cost of construction estimate. In EDC's opinion, these items could not be accommodated within DOI's $9 million funding limitation. The items for which NASA funds either have or will be used constitute items that would normally be considered as part of the cost of construction. Therefore, we believe that using NASA funds for these items is in violation of the Congressional Conference Report language which prohibited the use of NASA DAAC operations funds to finance the construction of non-NASA facilities. This issue is discussed in detail in Rapid Action Report (No. GO-95-008) that is presented in its entirety as Attachment III to this report.

MSFC AND ASF DAACs OBTAINED NEW LEASED FACILITIES IN 1994

The MSFC and ASF DAACs used DAAC operation funds to obtain new leased facilities in 1994. This occurred even though the ESDIS Project Office was uncertain as to whether the language in the Congressional Conference Report was applicable to NASA's funding of lease costs for new facilities. Allowing DAACs to lease expanded facilities may not only be in conflict with Congressional intent, but may also result in NASA paying a disproportionate share of leasing costs for both the ASF and MSFC DAACs. In addition, existing infrastructure was one of the criteria for originally selecting the DAACs.

MSFC DAAC FACILITY LEASE

In September 1994, the MSFC DAAC moved off-site to a facility leased by the University of Alabama at Huntsville. The leased facility has approximately 40,852 total square feet. Present occupants include the MSFC DAAC (10,000 sq. ft.), the University of Alabama at Huntsville (5,000 sq. ft.), and other NASA activities (25,852 sq. ft.). The lease is for three years, with total annual costs of $1,057,700. The total annual costs include leasing ($455,091) and overhead costs ($602,609). The DAAC had occupied 7,000 square feet of space on-site at MSFC. This move off-site resulted in an increase of 3,000 square feet (43 percent).

In addition to moving from an existing facility, NASA is also paying a disproportionate share of the lease cost for the DAAC space. The following table shows the allocation of the annual $1,057,700 lease costs between the MSFC DAAC, other NASA activities, and the University of Alabama at Huntsville.

Activity	Square Feet	Annual Lease Cost	Overhead	Total
MSFC DAAC	10,000 sq. ft. (25%)	$120,000 (26%)	$230,000 (38%)	$350,000 (33%)
Other NASA	25,852 sq. ft. (63%)	$279,391 (62%)	$372,609 (62%)	$652,000 (62%)
University of Alabama at Huntsville	5000 sq. ft. (12%)	$55,700 (12%)	$0	$55,700 (5%)
Total	40,852 sq. ft.	$455,091	$602,609	$1,057,700

As shown in the table, the MSFC DAAC occupies 25 percent or 10,000 square feet of the building, but pays 33 percent of the leasing and overhead costs. The ESDIS Project Office should ensure the MSFC DAAC is assessed only its equitable share of the facility's lease cost. The MSFC OIG is currently evaluating the justification for the lease and the overhead costs. Any issues in this area will be addressed in a separate audit report.

ASF DAAC FACILITY LEASE

The ASF DAAC has also expanded its facilities through leasing. In September 1994, the University of Alaska-Fairbanks (ASF DAAC host institution) executed a lease for a 14,280 square feet off-campus office facility to house both the DAAC and university activities. The

DAAC portion of the facility occupies only 7,140 square feet or 50 percent of the total space. The ASF DAAC also continues to occupy 4,872 square feet of space in an existing on-campus facility, which increases the DAAC's total facility space to 12,012 square feet.

In addition to expanding facilities using DAAC operations funds, NASA may be paying a disproportionate share of the lease cost. Of the total annual lease cost of $301,593, the DAAC is assessed $150,796, or 50 percent. This charge is made directly to the NASA contract, which funds DAAC activities at the University of Alaska-Fairbanks. Office of Management and Budget Circular A-21, "Educational Institution Cost Principles," states that facility costs, including facility leasing costs, are generally considered to be indirect costs. Charging the lease costs directly results in NASA paying a disproportionate share of the cost. The GSFC contracting officer for the ASF DAAC contract should instruct the university to reclassify the leased facility costs as indirect costs. The Office of Naval Research is also currently researching this issue with the University of Alaska-Fairbanks.

NSIDC DAAC MAKES REQUEST FOR NEW LEASED FACILITIES

In 1994, the NSIDC DAAC informed the ESDIS Project Office and GSFC Program Procurement Division that they wanted NASA to provide DAAC operation funds for the leasing of a new facility, with approximately 23,709 square feet. Of the 23,709 square feet, the DAAC would occupy approximately 9,203 square feet. The new facility will house the entire NSIDC organization, which includes the NASA DAAC, the Arctic System Science Data Management section, and the Defense Meteorological Satellite Program Analog Data Archive section. The ESDIS Project Office has not approved the NSIDC's request to lease new facilities because they are uncertain as to whether language in the FY 1994 Congressional Conference Report applies to leasing of new facilities.

FUNDING RESCINDED FOR CONSTRUCTION OF CIESIN FACILITY

NASA's FY 1993 budget reflected a Congressional earmark of $42 million for constructing a state-of-the-art, 191,500 square foot facility at CIESIN, host organization of SEDAC. The NASA OIG, in audit report number LE-94-002, "Consortium for International Earth Science Information Network," stated the conditions had changed considerably since Congress originally considered these facility plans. Essentially, the OIG stated the justification supporting the earmark was outdated, and facility requirements should be re-evaluated, with the Congressional earmark adjusted accordingly. The funding for the CIESIN facility was eventually rescinded from NASA's FY 1995 appropriation.

SUMMARY

Construction and leasing of expanded facilities has occurred because of a lack of oversight by the ESDIS Project Office, which maintains a policy of not "micromanaging" the DAACs. Further, the project office's uncertainty about the applicability of the Congressional Conference report language has already resulted in NASA using DAAC operations funds to pay the MSFC and ASF DAACs lease costs. Unless resolved, DAAC operations funds could also be used to fund expansion of facilities at NSIDC, which plans to lease additional space. The NASA Headquarters Office of Mission to Planet Earth needs to obtain a determination as to whether the language in the FY 1994 Congressional Conference Report applies to leases.

RECOMMENDATION 4

GSFC's ESDIS Project office should ensure that the MSFC DAAC is assessed an equitable share of lease costs.

MANAGEMENT'S RESPONSE

Concur. We have reallocated $200,000 of facilities costs for FY 1995 through March 1997 to higher priority requirements. As stated in NASA Headquarters OMTPE letter of December 15, 1995, to the NASA Acting Deputy AIGA, we are in the process of closing the MSFC DAAC in March 1997.

EVALUATION OF MANAGEMENT'S RESPONSE

The actions planned are considered responsive to the intent of the recommendation. In addition, we consider this recommendation closed for reporting purposes.

RECOMMENDATION 5

The GSFC contracting officer for the ASF DAAC contract should instruct the University of Alaska-Fairbanks to reclassify leased facility costs as indirect costs.

MANAGEMENT'S RESPONSE

Partially Concur. We have delegated to the Administrative Contracting Officer (ACO), located at the Office of Naval Research (ONR), the responsibility for establishing indirect cost rates under this contract, as well as responsibility for determining the adequacy of the contractor's accounting system and compliance of the accounting system with applicable cost principles. The CO will request information and a recommendation from the ACO in order to determine whether leased facility costs should be reclassified. Upon receiving this information, the CO will take appropriate action.

EVALUATION OF MANAGEMENT'S RESPONSE

The actions planned are considered responsive to the intent of the recommendation. We will, however, remain in the concurrence cycle for closure of this recommendation in order to evaluate the results of the ACO's recommendation in determining whether the ASF DAAC's leased facility costs should be classified as an indirect cost.

RECOMMENDATION 6

The NASA Headquarters Office of Mission to Planet Earth should obtain a determination as to whether the language in the FY 1994 Congressional Conference Report applies to leases.

MANAGEMENT'S RESPONSE

Concur. The OMTPE agrees with the intent of this recommendation and has already requested clarification (FY 1994 operating plan update dated July 19). NASA has sought a finding concerning the interpretation of the report language assumed by the OIG in this recommendation. Since OMTPE has received no response indicating that our interpretation is incorrect, we will continue to assume that the language "construction of facilities" does not mean lease of facilities.

EVALUATION OF MANAGEMENT'S RESPONSE

The actions planned are considered responsive to the intent of the recommendation. We will, however, remain in the concurrence cycle for closure of this recommendation to review any finding provided to NASA concerning interpretation of the FY 1994 Congressional Conference Report and its applicability to leases.

4. OTHER MATTERS

During the audit, we identified the following issue which is presented for management's information and resolution:

Some EOS data holdings may be outside the scope of the DAAC's area of scientific expertise, which was one of NASA's criteria for originally selecting DAACs. For example, the NSIDC DAAC has notified NASA that the GSFC and EDC DAACs will process, archive, and distribute EOS data holdings that are within NSIDC's area of scientific expertise. NSIDC personnel reviewed the planned EOS data holdings and found that both the GSFC and EDC DAACs will process, archive, and distribute snow cover, sea ice, glacier, and polar related data products. These data products will be obtained from the Moderate-Resolution Imaging Spectrometer, Advanced Spaceborne Thermal Emission and Reflection Radiometer, and Geoscience Laser Altimeter Systems scientific instruments from the EOS AM-1, EOS PM-1, and Altimetry missions. Having DAACs process, archive, and distribute data holdings outside their area of scientific expertise may not be efficient.

GSFC Management Response

National Aeronautics and
Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

Reply to Attn of: 201

FEB 12 1996

TO: 190/Audit Director, Office of Inspector General (OIG), GSFC

FROM: 100/Director

SUBJECT: GSFC Response to OIG Draft Report on Earth Observing System Data and Information System (EOSDIS) Distributed Active Archive Centers (DAACs), A-GO-95-001

Enclosed is our response to the subject draft audit report dated November 2, 1995. As you requested, we are responding to OIG recommendations 2, 3, 4, and 5. NASA Headquarters Office of Mission to Planet Earth responded to OIG recommendations 1 and 6.

If you need additional information or followup related to this response, please call Ms. JoAnn Clark, Goddard Audit Liaison Officer, at 301-286-7977.

Joseph H. Rothenberg

Enclosure

Attachment
Management's Response

GODDARD SPACE FLIGHT CENTER (GSFC)

RESPONSE TO

OFFICE OF INSPECTOR GENERAL (OIG)

DRAFT AUDIT REPORT A-GO-95-001

DATED NOVEMBER 2, 1995

ON

EARTH OBSERVING SYSTEM DATA AND INFORMATION SYSTEM (EOSDIS)
DISTRIBUTED ACTIVE ARCHIVE CENTERS (DAAC)

Date FEB 12 1996

ENCLOSURE

Attachment
Management's Response

Introduction

We are in basic agreement with the OIG about the need to take continuing steps to ensure that the DAACs are managed in the most effective and efficient manner possible. We believe that some of the OIG observations reinforce actions independently established and implemented by the Earth Science Data and Information System (ESDIS) Project. As discussed with OIG staff at the August 24, 1995, exit conference and in subsequent meetings, our response presents ongoing management activity that attends to these issues and important related considerations. Our response also addresses management's expectation of lower estimated cost savings than those suggested in the OIG report. Overall, we believe that we are expending an appropriate level of effort on the recommended management practices, or have plans to do so at an appropriate future date.

We and our colleagues at the DAACs are fully committed to obtaining the most scientific value possible from limited budgets. We welcome ongoing evaluation and constructive suggestions for increasing our efficiency.

Attachment
Management's Response

I. GSFC Summary Response to OIG Recommendations

The OIG makes six recommendations and identifies an estimated $58.1M of potential cost savings associated with recommendations 1 and 3. Our response to the six recommendations and the estimated savings are addressed below.

OIG RECOMMENDATION 1: (OIG estimated savings of $55 million)
The Associate Administrator for Mission to Planet Earth should request that an independent evaluation of the current DAAC configuration be performed to determine whether opportunities for consolidation or closure exist.

GSFC RESPONSE TO RECOMMENDATION 1:
NASA Headquarters Office of Mission to Planet Earth (OMTPE) letter of December 15, 1995, to the NASA Acting Deputy Assistant Inspector General for Auditing (AIGA) addresses NASA action that responds to this recommendation and to potential cost savings. As stated in the Headquarters response, OMTPE basically agrees with this recommendation, although potential cost savings are yet to be determined. Initial estimated savings relating to the Marshall Space Flight Center (MSFC) DAAC closing may approach $7 million through the year 2000. National Academy of Sciences Board on Sustainable Development (BSD) recommendations call for competitively selecting a federation of information service providers. This will have significant implications as well. OMTPE is now responding to those recommendations. See comments in Section II, subsection 1 of our response, explaining analyses to date.

OIG RECOMMENDATION 2: ($0)
GSFC's ESDIS Project Office should require each DAAC to submit a detailed justification for equipment budget requests, including any planned procurements of equipment between the phase-out of the EOSDIS Version 0 (V0) prototype system and delivery of the EOSDIS Version 1 (V1) and Version 2 (V2) systems.

GSFC RESPONSE TO RECOMMENDATION 2: ($0)
We partially concur with this recommendation. We currently require DAACs to submit sufficient justification for equipment requests. In addition, our management practices require us to continuously improve procedures; and we will ensure the intent of this recommendation is reflected in our procedure updates. We therefore suggest this item be closed.

OIG RECOMMENDATION 3: (OIG estimated savings of $3.1 million)
GSFC's ESDIS Project Office should reduce each DAAC's V0 budget for equipment not adequately justified or supported.

GSFC RESPONSE TO RECOMMENDATION 3 ($0)
We partially concur with this recommendation, as for recommendation 2. We currently require DAACs to submit sufficient justification for all purchases, and in particular for V0. Since all DAAC Automated Data Processing Equipment (ADPE) acquisitions planned for the current funding year are reviewed and approved as supportable prior to purchase, no funds are expended

on unsupportable ADP equipment. Our discussion on subsequent pages of this response provides additional information, in particular concerning planning for future ADPE purchases. Although we currently cannot estimate the full amount of savings, we believe that the approach we use, which takes advantage of cost savings by annually reviewing planned purchases against requirements and technology maturity, meets the intent of this recommendation. The implementation of this recommendation is ongoing, and we suggest it be closed.

OIG RECOMMENDATION 4: ($0)
GSFC's ESDIS Project Office should ensure that the Marshall Space Flight Center (MSFC) DAAC is assessed an equitable share of lease costs.

GSFC RESPONSE TO RECOMMENDATION 4: ($200,000)
We concur with recommendation 4. We have reallocated $200,000 of facilities costs for FY95 through March 1997 to higher priority requirements. As stated in NASA Headquarters OMTPE letter of December 15, 1995, to the NASA Acting Deputy AIGA, we are in the process of closing the MSFC DAAC in March 1997. We suggest this recommendation be closed.

OIG RECOMMENDATION 5: ($0)
The GSFC Contracting Officer (CO) for the Alaska Synthetic Aperture Radar (SAR) Facility (ASF) DAAC contract should instruct the University of Alaska-Fairbanks to reclassify leased facility costs as indirect costs.

GSFC RESPONSE TO RECOMMENDATION 5: ($0)
We partially concur with recommendation 5. We have delegated to the Administrative Contracting Officer (ACO), located at the Office of Naval Research (ONR), the responsibility for establishing indirect cost rates under this contract, as well as responsibility for determining the adequacy of the contractor's accounting system and compliance of the accounting system with applicable cost principles. The CO will request information and a recommendation from the ACO in order to determine whether leased facility costs should be reclassified. Upon receiving this information, the CO will take appropriate action.

ACTION OFFICIAL:	GSFC/215/R. Ragusa
CLOSURE OFFICIAL:	GSFC/215/R. Kirk
CONCURRING OFFICIAL:	GSFC/210/R. Keegan
PROJECTED CLOSURE DATE:	September 30, 1996

OIG RECOMMENDATION 6: ($0)
The NASA Headquarters Office of Mission to Planet Earth should obtain a determination as to whether the language in the Fiscal Year 1994 (FY94) Congressional Conference Report applies to leases.

GSFC RESPONSE TO RECOMMENDATION 6:
NASA Headquarters OMTPE letter of December 15, 1995, to the NASA Acting Deputy AIGA addresses NASA actions in response to this recommendation.

Attachment
Management's Response

II. GSFC Clarification of Key Issues

This section summarizes the important facts and considerations necessary for understanding the GSFC response to the OIG report. It provides both background information not provided in the OIG report, as well as factual clarifications of the OIG's observations. It pulls together facts and clarifications by major topic, whereas the next section of our response addresses each observation in the order presented by the OIG.

1. Configuration of the DAACs

The OIG report is concerned with the number of DAACs and suggests that we should reduce the number. These suggestions were based on observations from high-level analyses of DAAC configurations conducted by the ESDIS Project. The management analyses concluded that some savings could be achieved by closing DAACs. However, these same analyses also noted that there would be many intangible losses. Our advisors, including the EOS Investigator Working Group (and its Payload Panel), EOSDIS Panel, and individual DAAC User Working Groups, were extremely concerned about the loss of science discipline expertise in the management of data if data were transferred to a DAAC with a different focus. The loss of a strong experience base within a given discipline was considered by both the advisors and the ESDIS Project to outweigh marginal savings.

EOSDIS must be built at minimum cost, and it must be effective. In addition to the concerns about discipline expertise, we and our advisors are concerned that increased centralization would suppress innovation and reduce the quality of user support. Having the proper distribution of responsibility creates smaller DAACs that are more flexible in responding to the unique research needs of their segment of the science community and provides more avenues for the introduction of new ideas for innovation.

However, budget constraints and science community review can influence decisions regarding the number of DAACs. In fact, the NASA Zero Base restructuring led to a decision to close the MSFC DAAC in March 1997. The configuration of the remaining DAACs may be changed by peer reviews or by a recertification process. Such a process will be addressed once we have responded to current National Research Council (NRC) recommendations for restructuring the DAACs. These recommendations may actually increase the number of institutions supporting MTPE data sets.

2. Amount of funding allocated to DAACs.

The OIG report suggests that the amount of funding allocated to the DAACs is inconsistent with the restructuring of the EOS Program, that is, that the DAAC budgets have not decreased in proportion to the overall EOS Program funding. However, as discussed in Section III of our response in comments addressing page 21 of the OIG report, the EOS Program changes have not decreased the number of instruments to be flown; the amount of data to be processed, distributed,

and archived; or the size of the science community to be supported by the DAACs. In fact, the ESDIS Project determined that the initial DAAC funding plan was inadequate given the number of data products and the volume of data that will be produced by EOS spacecraft. Some programmatic restructurings have actually increased the requirements on the DAACs.

3. Amount of funding allocated by DAACs for ADPE, e.g., computers and peripherals

The OIG report suggests that DAAC budgets for acquiring ADPE are not fully supported. The OIG's observations are largely based on the fact that DAACs cannot provide detailed make-and-model lists of equipment for the entire budget planning cycle, i.e., out years. However, the ESDIS Project's strategic planning process looks at long-term objectives and near-term detailed plans; and this process is the most effective and efficient manner for dealing with these budgets. The process requires detailed justification for all acquisitions and labor categories during the target year in annual DAAC work plans and reasonable projections in less detail for the full budget period. Currently, these annual work plans cover a budget period that encompasses EOSDIS V0, V1, and V2.

The Project (this year also the EOSDIS Panel) reviews in detail these work plans for the current year, and in much less detail for the out years. Purchases must be explained prior to the DAAC obtaining funding for the current year. Project advice is also given for the out years, and DAACs are required to change any out-year numbers that deviate significantly from those derivable by reasonable estimating techniques. However, DAACs do not usually create itemized lists of ADPE for out years, as this would not be effective considering the evolution of information technology. Better projections are derivable by metrics developed through experience, such as market predictions, equipment life-cycles, requirements analysis, etc. Once the ESDIS Project has approved the work plans, the DAACs can act on the current year's plans, subject to any contractual procedures.

DAACs that are under contract are also required to submit justification for each hardware procurement, including source evaluations. Both the CO and the Contracting Officer's Technical Representative (COTR) review these requests, and their determination is required before a purchase can be made. For DAACs hosted by government agencies (including NASA DAACs), the latter approval authority is usually delegated to a civil servant at the host institution, if that purchase is specified in an approved annual work plan.

Equipment acquired by DAACs for V0 is for supporting data sets acquired by pre-EOS missions. For V1 and V2, DAACs will acquire equipment primarily, but not exclusively, via the EOSDIS Core System (ECS) contract to support additional data products. The ECS equipment will primarily support standard data products from EOS missions. As the DAACs transition from one version of EOSDIS to another, they retain responsibilities to support the scientific data sets

previously acquired. V1 and V2 include DAAC-unique extensions to ECS that support the specific requirements of each DAAC's science users, as well as data sets that may not be transferred to the ECS (although they are available through V1 and V2).

DAAC requirements are not static. Supported requirements continue to be allocated, or reallocated, to meet the highest priority scientific needs with limited funding. DAAC User Working Groups, who meet approximately twice a year, and other advisory groups advise each of the DAACs, the ESDIS Project, and the OMTPE on these requirements.

4. DAAC Infrastructure

The OIG report suggests that DAAC facilities should not require expansion. These suggestions are based on the OIG's observation that existing infrastructure was a major consideration in selecting DAACs. However, DAAC infrastructure includes management, existing business practices and procedures, ongoing programs, knowledge of user support requirements, etc., in addition to buildings. It means there is a way to support an expanding requirement, not that rooms are empty and waiting to be occupied. DAACs cannot commit the Government to supporting the construction of a building, but they can charge the Government the reasonable and allowable expense of a contract.

The primary factor in the infrastructure evaluations was the proven experience of the organization in managing, distributing, and supporting Earth science data. The global mapping nature of the EOS spacecraft will produce a data volume equal to the total current holdings every 46 days. It would not be realistic to expect an organization to have unused space to handle growth of that scale.

To meet the DAAC requirements per contracts or interagency agreements, institutions may use existing space, lease, or construct facilities. However, these decisions cannot commit the Government in any way; the institution must fully accept all risks associated with acquiring additional space, given the potential for NASA funding cuts. Audit controls on contracts or at government facilities ensure that costs are reasonable.

5. Facility space needed by the DAACs

The OIG report suggests that DAAC facility expansions are inconsistent with EOS Program restructuring and actual requirements. The OIG is concerned that the facilities requirements are not being reduced as the EOS Program funding is reduced. In addition, the OIG suggests a linear relationship between facility requirements and data storage requirements. It is important to note that data storage requirements have not significantly changed with the EOS Program budget. Also, the relationship between facility requirements and data storage requirements is not a linear function. A number of other variables need to be considered, for example:

a. Type of media used to store data (Older technology magnetic tapes take a lot more room than newer technology helical scan tapes and optical disks. [Note that a CD-ROM can hold about 600 Megabytes (MB) of data; a digital audio tape (DAT) 5 Gigabytes; an 8-mm tape 8 Gigabytes; though the 9-track tapes held only approximately 125 MB.] ASF's use of high density digital tape requires less storage space than equivalent data volume at the other DAACs. These tapes are good for ASF data that are accessed infrequently and for processing long data blocks. However, this tape does not support more-frequent access patterns typical of other data types stored by other DAACs. In addition, some DAACs have historical data on physical media such as paper and photos. These require additional storage space.)

b. Staffing (determined by what functions need to be performed manually, such as system administration, quality assurance, tape handling, packing and shipping, etc.)

c. Processing units (determined by how much data needs to be ingested, how much needs to be distributed, how much processing needs to be performed, how many different products are produced)

The DAACs and the ECS contractor are working together, with ESDIS Project oversight, to appropriately size the facility for the staff and equipment expected in the future to meet new requirements. These undergo both a paper/document review and a formal presentation review, including ESDIS Project, the DAACs, scientists expecting to use the system, and other experts specifically invited by the project or the program offices.

6. Relationship between ECS and other equipment at the DAACs

The OIG report suggests that ECS equipment will completely replace existing DAAC equipment, and DAACs will no longer need to acquire equipment. Clarification of the components of EOSDIS may be helpful. The ECS is just one part of EOSDIS. EOSDIS is made up of ECS, EDOS (EOS Data and Operations System), DAAC-unique extensions to ECS, EBnet (EOSDIS Backbone Network), etc. These parts are provided via several different contracts or agreements with other Government agencies. DAAC-unique extensions may be completely new developments or reengineered or "as-is" V0 components.

EOSDIS V1 incorporates ECS software and equipment at Earth Resources Observation System (EROS) Data Center (EDC), MSFC (originally planned; now changed as a result of NASA Zero Base restructuring), Langley Research Center (LaRC), and GSFC. It will become operational in 1997 following ECS Release A delivery and successful check-out of all interfaces. Once V1 is operationally available, DAACs with ECS installations may begin migrating data sets to new equipment. ECS V2 incorporates more equipment at the original DAACs, plus adds equipment at National Snow and Ice Data Center (NSIDC), Jet Propulsion Laboratory (JPL), ASF, and Oak Ridge National Laboratory (ORNL).

V1/V2 equipment consists of both equipment transitioned from V0 and equipment provided by the ECS contractor. It is not required that V0 equipment be replaced with ECS equipment. The transition of any particular equipment from use during V0 to use for V1/V2 is evaluated on its cost effectiveness. If the equipment is so old that it is costly to maintain, then it is replaced. If it is fairly new, then other considerations need to be taken into account, such as performance, engineering costs, etc.

7. V0 Operational Capabilities and Phase Out

The OIG report suggests that V0 is not an operational version of EOSDIS. However, EOSDIS V0 is a **working** prototype **with some operational elements.** It has a very important role in dealing with existing data and providing services to users. It is currently supporting an average of over 10,000 distinct users per month and distributing an average of over 1 Terabyte of data per month.

V0 phase-out begins when V1 is operational, in 1997, but only at those DAACs with ECS components. The fact that ECS is interoperable with V0 allows V1 to provide access to data sets supported by either ECS equipment or V0 or other DAAC-unique equipment. Data migration will continue for up to 2 years after V2 becomes operational. With future releases, additional migration is likely, as with any system, to replace aging and inefficient components.

During V1/V2, the ECS will not replace the V0 hardware to support Radarsat processing at ASF. That V0 hardware will become part of V1. Similarly, Socio-Economic Data and Applications Center (SEDAC) and ORNL will not be receiving much, if any, ECS equipment. Other V0 equipment at DAACs will be retained as it is cost effective. Those decisions will be made at the appropriate time. In addition, all existing data will continue to be supported by V0 until they are successfully migrated.

The first priority for new equipment during V1/V2 is to support new requirements imposed by new data sets derived from newly-launched spacecraft. The fact that DAACs must support these new data do not relieve them of requirements to support data acquired during V0.

III. Detailed Corrections and Clarifications

The following detailed comments are provided to match paragraphs of the OIG report. (The paragraph references are to full paragraphs, i.e., the first full paragraph on the referenced page is numbered as one, the second full paragraph as two, etc.)

1. p 2 para 2 & 3 - Please refer to Sections I and II of our response.

2. p 3 para 1 - The budget for EOS went from $17B to $7.4B between FY91 and FY94. This is shown correctly in the OIG report on page 18 and should be corrected on pages 3, 19, and 33.

3. p 3 para 1 - The ESDIS Project's budget increase for the DAACs corresponded to an increase in requirements legislated by Congress and by a transfer of work from NASA Headquarters. Additional information is provided in comments addressing pages 29 through 31 of the OIG report.

4. p 3 para 2 - Please refer to Section II, subsection 1 of our response, concerning configuration of the DAACs, and to our comments addressing page 21, paragraph 3 of the OIG report.

5. p 4 para 1 - See comments addressing pages 35 through 45 of the OIG report for information concerning NASA actions relating to ADPE planning and acquisition.

6. p 4 para 2 - NASA's understanding of the Congressional intent of the "construction" clause in its 1994 Conference Report was that NASA was not to fund facility construction at the DAACs (in particular at EDC) or pay direct lease charges that would refund the costs of such construction (again, in particular at EDC). The understanding, further, is that the "construction" restriction does not apply to the costs of outfitting a facility to meet DAAC-specific requirements or to the indirect costs on our contracts with the universities or other institutions hosting DAACs.

The institutions may choose to use existing space, lease, or construct facilities to meet the DAAC requirements; and our continuing advice to DAACs is that their decisions cannot commit the government in any way and that they must fully accept all risks associated with acquiring additional space, given the potential for NASA funding cuts. We have ensured that NASA does not incur excessive facility costs.

7. p 5 rec 1 - As noted in Section 1 of our response, NASA Headquarters OMTPE letter of December 15, 1995, to the NASA Acting Deputy AIGA addresses NASA action that responds to OIG recommendation 1 and to potential associated cost savings.

8. p 5 rec 2 & 3 - Please refer to comments addressing pages 35 through 45 of the OIG report, as well as Sections I and II of our response, for clarification of issues associated with planning, approval, and funding of DAAC ADPE and our response to OIG recommendations 2 and 3.

Attachment
Management's Response

9. **p 6 rec 4** - Please refer to comments addressing pages 49 through 51 of the OIG report, as well as Section I of our response, for discussion of the MSFC DAAC lease issue and our response to OIG recommendation 4.

10. **p 6 rec 5** - Please refer to comments addressing page 51 of the OIG report, as well as Section I of our response, for discussion of the ASF DAAC costs and our response to OIG recommendation 5.

11. **p 6 rec 6** - As noted in Section I of our response, NASA Headquarters OMTPE letter of December 15, 1995, to the NASA Acting Deputy AIGA addresses NASA action in response to OIG recommendation 6.

12. **p 7 para 2** - The scope of the ESDIS Project is broader than implied by the OIG report. The ESDIS Project is responsible for the development of the EOSDIS, **including** planning, budgeting, oversight, and management of the DAACs.

13. **p 10 para 2** - Each DAAC contains computer components that provide **functions** for product generation, information management, archive, and distribution. Whether a separate system is provided for each function or not is a design decision, which may not be the same for each DAAC, and may not be the same for a DAAC in later versions of EOSDIS.

14. **p 10 para 2** - Information management functions provide "connections," not "directions," to external archives with which EOSDIS interoperates.

15. **p 11 para 2** - EOSDIS V0 is a **working** prototype **with some operational elements.** The additional information is important in the context of the OIG implications on pages 42 and 43.

16. **p 11 para 3 and p 12 Table** - The funding mechanisms referred to on page 11 and identified on the table on page 12 of the OIG report should not be identified only for V0. The funding mechanisms apply for all ESDIS-funded DAAC activities. See our comments addressing page 38, paragraph 1 of the OIG report.

17. **p 12 para 1** - The DAACs already provide operational capabilities for performing some of the functions listed here. See previous two comments.

18. **p 12 para 1** - EOSDIS V1 will become operational in 1997 following delivery and successful checkout of ECS Release A. This checkout will occur in early 1997, with expected availability to users in March 1997. V0 data cannot begin migration until V1 is operationally available, and then only at DAACs receiving ECS Release A. Note that V1 consists of both ECS Release A hardware and software components and some V0 hardware and software components. Some DAACs will have **no** ECS components for EOSDIS V1.

Attachment
Management's Response

19. **p 12 para 2** - "ECS is an integral part of EOSDIS V1," not the reverse implied. A Venn diagram of these relationships would not be as simple as implied. Also note that V1 supports Tropical Rainfall Measuring Mission (TRMM), for which there are no operational NASA command and control responsibilities.

20. **p 13 para 1** - For EOSDIS V1, ECS components were not planned for delivery at each DAAC, but only for delivery to MSFC, GSFC, LaRC, and EDC.

21. **p 13 para 2** - V2 implementation has started already, with an incremental design review for ECS Release B held in October 1995. The October 1997 date specified in the OIG report is the date when ECS Release B deliveries to DAACs begin. However, delivery of ECS Release B to a DAAC is not synonymous to V2 being operationally ready at a DAAC. Integration of DAAC-unique components and testing of the ECS deliveries across all DAACs are necessary before V2 will be declared operational.

Note also that EOSDIS V2 allows data migration to ECS components to begin at NSIDC, EDC, ASF, and JPL.

22. **p 16 para 1** - Note that the OIG was provided with the DAAC Work Plans for FY95.

23. **p 17 para 1 & 2** - Please refer to Sections I and II of our response.

24. **p 18 para 1** - We believe such an increase was appropriate, even with a declining overall budget. The previous DAAC funding plan was inadequate given the number of data products and the volume of data that will be produced by EOS spacecraft. Also, Congress specifically required and allocated funds for the SEDAC at a rate of approximately $6M per year.

25. **p 18 para 1** - Please refer to Section II of our response, subsection 2, that addresses DAAC funding levels in relation to EOS Program restructuring.

26. **p 18 para 2** - See comments addressing page 3, paragraph 2 of the OIG report for information about analyses that concluded that money could be saved by closing/consolidating DAACs.

27. **p 21 para 1 & 2** - The original EOS Program budget supported one EOS platform carrying 16 instruments. However, the current budget supports several, including EOS-AM1, EOS-PM1, CHEM, etc. For a more complete picture of restructuring, see the *1995 MTPE/EOS Reference Handbook*. As noted in comments below addressing page 28 of the OIG report, this change actually increases the requirements on the DAACs and definitely has not "reduced the amount of scientific information that will be obtained from the EOS spacecraft." Note that our current baseline includes 32 instruments to be flown on 13 spacecraft, not 24 to be flown on 21 spacecraft listed in the OIG report. The OIG report concludes that the EOS Program

restructuring has reduced the spacecraft instruments and data systems; however, the OIG findings do not take into account that NASA budget reductions were taken in a way that would maintain the scientific content of the program (i.e., the science data to be produced).

28. p 21 para 3 - We continue to believe that the suggestions of our science advisors concerning decentralized-versus-centralized DAAC configuration were significant considerations in decisions concerning the most effective site locations for the DAACs. See *Initial Scientific Assessment of EOSDIS* by the EOSDIS Science Advisory Panel (EOS-89-1). In addition, we would note the advice in NRC's *Panel to Review EOSDIS Plans*, National Academy Press, Washington, DC, 1994. The Program/Project and the users considered that the services provided by the DAACs were an important value to be preserved.

29. p 23 para 2 - This statement implies that NASA unilaterally made the decision to create a SEDAC, while a statement on the following page notes that this was a mandate of public law.

30. p 24 para 1 - The data transferred to the ORNL DAAC were previously held by organizations other than the DAACs. NASA actually reduced the number of data centers it had to fund, by creating the ORNL DAAC.

31. p 25 para 1 - NASA has assigned the SEDAC to generate, archive, and distribute data sets needed for applications of remote sensing and other earth science data in support of decision making (including policy making) regarding human interactions with the environment. Social scientists would argue that SEDAC data is created using scientific instruments, e.g., surveys, censuses, registries, and other reporting systems, although these are not remote sensing instruments.

32. p 25 para 2 - "Facility costs should be borne by non-NASA agencies directly" would further our contention that the Congressional Conference report was only addressing other government agencies, such as National Oceanic and Atmospheric Administration (NOAA), United States Geological Survey (USGS), or Department of Energy (DOE), not other host institutions such as Consortium for International Earth Science Information Network (CIESIN) or universities. Note also that there is more to infrastructure than buildings.

33. p 26 para 1 & 2 - It is not clear whether the argument is that NASA is funding facilities that it should not or whether the facilities NASA is funding are oversized, or both. For the first case, see discussion in comments addressing pages 4 and 25 of the OIG report. For the latter, note that the DAACs are working with the ECS contractor, with ESDIS Project oversight, to appropriately size the facility for the staff and equipment expected. These undergo both a paper/document review and a formal presentation review, including ESDIS Project, the DAACs, scientists expecting to use the system, and other experts specifically invited by the project or the program offices. See also our comments addressing page 29 of the OIG report.

Attachment
Management's Response

34. **p 26 para 1 and p 27 Table** - The NSIDC facility has not yet been expanded as might be indicated by the title on the table. The MSFC DAAC expanded because it had TRMM responsibilities. JPL and NSIDC are currently planning to acquire required space by outfitting existing facilities, not by constructing or leasing new facilities. DAACs not planning expansion are able to meet requirements with current space. All growth estimates are subject to change pending further detailed design.

35. **p 28 para 1** - It is not correct to tie facility sizes to top-level program budgets, but rather to requirements. Facility requirements are tied to data storage and processing requirements, which have not significantly changed with the budget. Our Figure 1 compares the data storage requirements for the ECS at the beginning of the contract and as of today. Note that this figure does not include the archival of Landsat data at EDC (approximately 140 Gigabytes per day).

36. **p 28 Chart and p 29 para 1** - The DAAC data volumes indicated are the expected volumes to be stored in July 1998 (from the *1994 EOSDIS Science Data Plan*). This is just after the launch of the AM-1 platform and only a few months after the launch of TRMM, before the large volume of new data has had much of an impact on the archives of the DAACs. Also note that numbers quoted are for storage, not "processing" as indicated in the text. See the table at the end of this section for a breakdown of additional data planned for each DAAC. (Note that this table does not include approximately 140 Gigabytes per day of Landsat data that will be archived at the EDC DAAC nor does it reflect the MSFC DAAC Zero Base restructuring.)

Use of both "net" numbers for some DAACs and "gross" numbers for others supports our concerns about the invalidity of the comparison being made by this graph.

37. **p 29 para 1** - The correlation between facility size and data volume is not necessarily a linear function of the number of bytes of data stored, as implied by the OIG report. Other variables need to be considered, such as those identified in Section II, subsection 5 of our response.

38. **p 29 para 2 & p 30 Chart** - It would be beneficial for the OIG report to explain that requirements that were not well defined in the POP 91-2 were pulled back into contingency in the POP 93-1 and itemized as specific DAAC liens until the requirements could be more fully understood. The OIG lists two different values for the 1995 funding, $295.98 million (correct) and $295.5 million.

39. **p 30 Chart** - We suggest that this chart be retitled to "DAAC Funding Provided by the ESDIS Project," since it lists only funds provided through the ESDIS Project and does not include funds provided directly by NASA Headquarters.

In both the chart and the notes, the total 1995 funding should be $295.98, consistent with previous figures cited by the OIG report.

The part of the chart labeled "HQ funds" is actually a combination of two items:

a. ASF funds for requirements transferred to the ESDIS Project, but which were previously managed and, therefore, budgeted at NASA Headquarters (prior to POP 94-1) and

b. SEDAC funds legislated by Congress.

The label "HQ funds" in both the chart and the notes is misleading. Since technically all ESDIS Project funds are provided by HQ, the label "HQ funds" should probably be changed to "New requirements from HQ." Without these new requirements, the ESDIS Project's DAAC budget was actually reduced by 13 percent for a fixed set of requirements.

40. **p 31 para 1** - As noted earlier, funding increased to match an increase in requirements assigned to the ESDIS Project.

41. **p 31 para 2** - The meeting referenced as the "IWG Panel Conference" in July 1994 is the Investigator's Working Group's Payload Panel Meeting.

42. **p 32 para 1** - The DAACs not addressed in the Blue and Red team reports were GSFC, EDC, ASF, SEDAC, and ORNL. GSFC and EDC are the two largest DAACs in terms of data volume, and they could not be eliminated. ASF directly receives and processes SAR data because of its high latitude location, so its function could not be moved. ORNL was in the process of being added to provide access to DOE data. CIESIN was not yet hosting a DAAC. Therefore, the teams did not consider that "assessment of only four DAACs" created a shortcoming in their conclusions.

43. **p 32 para 2** - As noted in our comment addressing page 31, paragraph 2 of the OIG report, the name of the meeting in July was the "IWG Payload Panel Meeting."

44. **p 33 para 1 & 2 and p 34 para 1** - At the Payload Panel meeting, an option was presented to close JPL, NSIDC, and/or MSFC DAACs and transfer functions to one or more remaining DAACs, potentially saving $55M. However, as explained in Section II, subsection 1 of our response and our comments addressing page 21, paragraph 3 of the OIG report, it should be noted that this option was not chosen because both the ESDIS Project and the advisors felt that this would cause a major negative impact to the program. NASA Headquarters OMTPE letter of December 15, 1995, to the NASA Acting Deputy AIGA describes NASA action relating to DAAC configuration and determination of related potential cost savings.

45. **p 33 para 2** - As discussed in the previous several comments (addressing pages 29 through 33 of the OIG report), the summary does not follow from the facts. DAAC funding and facilities are a function of requirements on the DAACs, few of which have changed. The major such change at the DAACs has been to reduce the hours of operation during V1/V2 operations, but

this only shows up in the ECS contract operations costs at this time, not the DAAC operating budgets. Also see facility discussion in comments addressing pages 25 through 29 of the OIG report.

46. p 34 para 1 - Our management practice embraces the ideas of continuous improvement. We do not believe that it is cost effective to make a detailed analysis of an option after it has proven to be inappropriate, unless, of course, conditions change; only if the review suggested that a more detailed analysis is warranted would one be performed.

Our review concluding that $55M might be saved by consolidating certain DAACs was not without cautions. Both we and our advisors decided that the problems outweighed the benefits, as referred to earlier.

47. p 34 para 1 - OMTPE letter of December 15, 1995, addressed NASA actions in response to OIG recommendation 1.

48. p 35 para 1 - NASA and the DAACs are not acquiring, nor planning to acquire, ADPE in excess of needs. The ESDIS Project has an effective process in place to adequately review DAAC equipment acquisitions. Each year, the ESDIS Project (this year also the EOSDIS Panel) reviews in detail the work plans for each DAAC. The separate line for equipment (hardware and Commercial Off-the-Shelf software) is reviewed in detail for the current year, and in less detail for the out years. Purchases must be explained prior to the DAAC obtaining funding for the current year. ESDIS Project advice is also given for the out years, and DAACs are required to change out-year numbers that deviate significantly from those derivable by reasonable estimating techniques. This process ensures that the DAACs acquire only ADPE that is required.

Also note that the budgets reviewed by the OIG auditors were not for V0 only.

For additional understanding of the management planning and approval process and the basis for that process, please refer to Section II of our response, subsection 3, on funding allocated by DAACs for ADPE.

49. p 36 para 1 - V0 is a working prototype with some operational elements. With the availability of V2, the DAACs can start phasing out V0 equipment no longer useful. The availability of V2, however, does not "complete" the phase-out as implied by the statements in the OIG report. Also note in comments below (addressing page 37 of the OIG report), that not all V0 equipment will be phased out during V2.

50. p 36 para 2 - With the current architecture and a more detailed design, the ECS descriptions no longer specify different "systems" for information management, data archive and distribution, and product generation functions. For purposes of this discussion, we suggest that the OIG report only reference these functions without referring to how they might be implemented, which could be different for each DAAC or other institution using ECS.

51. p 36 para 2 - V0 phase-out cannot begin until V1 is operational in 1997. Data migration from V0 equipment to ECS equipment does not need to be complete before the launch of EOS AM-1. The fact that ECS is interoperable with V0 allows V1 to provide access to data sets supported by either ECS equipment or V0 or other DAAC-unique equipment. Data migration will continue for up to 2 years after V2 becomes operational. With future releases, additional migration is likely, as with any system, to replace aging and inefficient components.

52. p 37 para 1 - V1 equipment consists of both equipment transitioned from V0 and equipment provided by the ECS contractor. It is not required that V0 equipment be replaced with ECS equipment. (It is important to understand the distinction between ECS and V1. The ECS is only one of many parts of V1.) The transition of any particular equipment from use during V0 to use for V1/V2 is evaluated on its cost effectiveness. If the equipment is too old to maintain cost effectively, then it should be replaced. If it is fairly new, then other considerations need to be taken into account, such as performance, engineering costs, etc.

53. p 37 para 1 - V1 "interoperates" with V0 at all of the DAACs. The use of the term "operates" does not fully convey the requirement for two-way communications.

54. p 37 para 1 - The ESDIS Project identified to the OIG that the equipment at ASF, ORNL, and SEDAC will be retained as DAAC-unique extensions to ECS. During V1/V2, the ECS will not replace the V0 hardware to support Radarsat processing at ASF. That V0 hardware will become part of V1. Other equipment will be retained as it is cost effective. Those decisions will be made at the appropriate time. In addition, all existing data will continue to be supported by V0 until they are successfully migrated.

55. p 37 para 1 - We also wish to clarify that the purpose of V1/V2 equipment is not to explicitly replace V0 equipment as implied by the OIG report. The first priority for new equipment during V1/V2 is to support new requirements for new data sets derived from newly launched spacecraft. The fact that DAACs must support these new data does not relieve the DAACs of requirements to support data acquired during V0.

56. p 37 para 2 - The sentence "V2 system will operate with the V1 system to form the first complete ECS release" does not accurately convey the plan. The ECS components delivered during V2 will augment V0 and V1 equipment to support requirements in the V2 era. Similarly, the sentence "The ORNL DAAC will be connected to the ECS with new software interfaces to its current V0 system" does not convey the fact that ORNL DAAC-unique extensions to ECS will be part of V2. Again, data migration is not required before launch.

"Complete ECS Release" seems to imply more than is true. It is "complete" in the sense that all DAACs have some components of ECS. However, that does not mean V0 equipment has been replaced or become obsolete.

Attachment
Management's Response

57. **p 38 para 1** - The budget identified by the OIG is not only a "V0" budget. It is a budget for 1995 to 2000 and includes all DAAC-related purchases for V0, V1, and V2. Purchases in 1999 and 2000 will be phased out on a reasonable life-cycle, as are all components of all versions. V0 Phase out begins in 1997 after V1 is operational, not in 1996 as is stated in the report. The process continues through 2 years of V2.

Also note that of the $1.4 million that the OIG believes to be unsupported for 1999-2000, nearly 40 percent must be allocated to ASF requirements. ASF has significant requirements not supported by ECS. (The percentage could be higher; we do not have a yearly breakdown of "unsupported" equipment from the OIG.)

58. **p 38 Table** - Our budget shows a 1995-2000 hardware budget of $1.1M, not $1.4M, for SEDAC. This corresponds to CIESIN's contract proposal.

59. **p 38 Table** - We believe that the DAAC ADPE budgets are adequately supported. The OIG conclusion that the ADPE budgets are not completely supported may have resulted from confusion between the OIG and the DAACs regarding the context of information requested. In some cases, the DAACs understood the auditors to be requesting detailed "make-and-model" lists to substantiate the equipment budget, even for the year 2000. As stated in our other comments, detailed equipment lists beyond 1 year are not useful given the rate of change in information technology. (See comments addressing page 35 of the OIG report.)

60. **p 39 para 1** - DAACs must submit proposed budgets based on what they think it will cost to meet requirements. The Project evaluates each DAAC's proposal and decides on funding to be provided. This is typically less than a DAAC proposes. DAAC proposals, especially for out years, cannot be regarded as committing budgets. The Project maintains a multi-year budget that is held within overall ESDIS guidelines. When ESDIS budgets are cut (or are less than what the DAACs propose), requirements have to be prioritized, usually with external advice from the DAAC's user working group or the ESDIS science advisors. Some things proposed by the DAACs cannot be done. It seems that two different issues are combined in this paragraph: What the ASF DAAC thinks it would take to meet the requirements, versus what the ASF DAAC feels is the reality of the budget situation.

61. **p 39 para 1** - The ADPE budget for the ASF DAAC supports both the acquisition of equipment needed by new staff and the replacement of aging equipment.

62. **p 39 para 1** - As explained previously, it is reasonable to review detailed acquisition plans for the current year, and less detailed budget estimates for the out years.

63. **p 39 para 2** - With respect to the $626,000 that the OIG suggests is not supported for the GSFC DAAC ADPE budget, we would like to assure the OIG that the amount is supported based on projected needs to replace obsolete computers, data archives, and peripherals.

64. p 40 para 1 - The OIG implies that "increased staffing or data volume" are the only reasons for which equipment might need to be added or replaced. There may be other reasons, however. For example, additional processing (or reprocessing) will likely drive needs for additional processors without especially increasing the volume of data. Also, hardware at the end of its useful lifetime needs to be replaced.

65. p 40 para 2 - The ESDIS Project would not approve updating the MSFC DAAC V0 equipment or any other system every 2 years with state-of-the-art technology without justification. Two years is too short a life-cycle, even if we did not consider other issues. For information about V0 phase-out, see comments addressing pages 36 and 37 of the OIG report.

66. p 40 para 2 - As clarification of the point being made by the MSFC DAAC Manager, note that the hardware platform vendors release major upgrades of their operating systems approximately every 2 years. These new operating systems usually cannot be supported by the old platforms, and the old operating systems are eventually not supported by the vendor. These facts must be considered in planning our ADPE budgets, although they do not imply a 2-year life-cycle for ADPE. We discussed this with the MSFC DAAC Manager, who indicated that she did not mean to imply that equipment would automatically be replaced every 2 years.

67. p 41 para 2 - To elaborate on the information provided by the NSIDC DAAC management, note that DAAC User Working Groups typically meet twice a year. Advice given during these meetings may suggest adjustments to how the ESDIS Project and the DAAC prioritize existing budgets. Budgets are not static; they are allocated, or reallocated, to meet the highest priority needs.

68. p 42 para 1 - For clarification, note that the quoted *V0 EOSDIS Implementation Plan* (page 2-1), as well as a number of other documents, including *ESDIS Project, Level 2 Requirements, Volume 5*, and the *1995 MTPE/EOS Reference Handbook*, state that "Version 0 will be defined as a working prototype with some operational elements." To further clarify, we quote the same sentences in context:

> *"This version will be built using existing systems as an evolutionary starting point. Version 0 must continue to serve the users of the existing systems with no impact on their present services. While an absolutely necessary requirement, this constraint puts a damper on the speed and ability of Version 0 to introduce change. A significant portion of available resources must be dedicated to continuing current service. In addition, it is often more expensive to modify an existing system than to build new services. While Version 0 will be a tremendous learning experience, a key technical point to make is that evolution is a slower process than creation. Thus it should be clear that Version 0 is NOT an operational version of EOSDIS. It is, instead, a very good prototype for the technical issues that EOSDIS will be addressing, while supporting and improving existing operational services."* (page 3-7)

The sentence in the next paragraph in the quoted document provides more insight into the author's point:

> *"Version 0 will be in the genre of a prototype, where some aspects provide full operational capabilities and some do not."*

The OIG interpretation of this implies that V0 is a "throw-away system." V0 has a very important role in dealing with existing data and providing services to users. In addition, note that V0 is a prototype of the science data processing, archival, and distribution components of EOSDIS, not just the ECS components.

69. p 42 para 3 - The ESDIS Project Office stated that no V0 ADPE would be used to complete ECS releases. This is not the same as saying that no V0 ADPE will be used to complete V1/V2. ECS is part of V1/V2.

70. p 42 para 3 - The distinction between V1 and ECS does not seem to be clear in the OIG report and, therefore, may incorrectly imply a contradiction. V1 is a combination of ECS and DAAC-unique extensions. Those extensions may be completely new developments or reengineered or "as-is" V0 components. (Hughes, at Project direction, has looked at V0 equipment for re-use by ECS, but determined, with Project concurrence, that this was not the most effective approach.) The ECS contractor only delivers the ECS components of V1.

71. p 42 para 3 - Since ORNL has only recently purchased equipment, it is reasonable to expect that this equipment can be effectively maintained through the year 2000. We are concerned about the OIG implication that the other DAACs should also do this. This is not the most cost-effective solution at all of the DAACs.

72. p 43 para 1 - EOSDIS has a purpose beyond EOS data. It is true that the V0 components that are transferred to V1 will probably not be used to manage EOS data; however, NASA still has a responsibility to manage its other MTPE archives even after EOS instruments are producing data. And NASA has decided to meet that responsibility with EOSDIS.

73. p 43 para 1 - "Fully operational" does not indicate that enhancements are not needed to meet new requirements or correct performance problems. In other words, we will continue to need sustaining engineering for components still in operation. Of course, we must trade off the costs of meeting those requirements with DAAC-unique extensions rather than ECS, and with the urgency of the needs. In addition, each DAAC's User Working Group will appropriately continue to recommend additional data sets not in the current baseline for support by the DAAC. The EOSDIS is not a static system. It needs to continue to evolve to meet requirements to support data collected by NASA's programs under MTPE.

74. p 43 para 1 - As noted elsewhere in this response, phase-out of some V0 components begins in 1997 and does not end until late 1999.

75. p 43 para 2 & p 44 para 1 - While we have a policy of not "micromanaging" the DAACs, we assure that the DAAC resources are managed efficiently. We perform thorough annual reviews of the DAAC work plans, as mentioned in comments addressing page 35 of the OIG report. The DAACs are required to report in several categories, and if the funding requested in a category is not reasonable from our own experiences or not appropriately supported, additional discussion is initiated. No money is sent until the Project is satisfied that the funding is supported. Once we have approved the work plans, the DAACs can act on the current year's plans, subject to any contractual procedures.

76. p 44 para 1 & p 45 para 1 & 2 - Comments addressing pages 35 through 39 of the OIG report document in-place procedures that prevent DAACs from procuring equipment that is not justified. Please refer to Section I of our response for the GSFC summary response to OIG recommendation 3 and OIG-estimated cost savings of $3.1M.

77. p 46 para 1, p 47 para 2, & p 48 para 1 - For a discussion of the funding issues surrounding EDC DAAC facilities, please see the attached June 22, 1995, response provided by NASA Headquarters to the OIG's May 12, 1995, rapid action report.

78. p 46 para 1 - We do not agree that it was Congressional intent that all facility costs should be borne by the host institutions. We have properly overseen use of funds by the DAACs and do not have doubts about whether Congressional intent applied to our dealings with DAACs.

79. p 46 para 2 - Existing "infrastructure" at a DAAC is more than buildings. Infrastructure includes management, existing business practices and procedures, ongoing programs, knowledge of user support requirements, etc. It means there is a way to support an expanding requirement, not that rooms are empty and waiting to be occupied. We are not allowing the DAACs to commit the government to supporting the construction of a building; however, we are allowing DAACs to charge the government the reasonable and allowable expenses of a contract.

80. p 46 para 2 - Note that the primary factors in the infrastructure evaluations were the proven experience of the organization in managing, distributing, and supporting Earth science data. The global mapping nature of the EOS spacecraft will produce a data volume equal to the total current holdings every 46 days. We expect DAACs to allocate additional space to handle this growth.

81. p 46 para 2 - We believe the referenced paragraph applies to other government agencies, such as NOAA, DOE, and USGS. In addition, it applies only to leases utilized as reimbursement of facility costs, not to leases in general.

82. p 49 para 1, p 50 para 1, p 50 Table, & p 51 para 1 - We do not consider the proportions of the lease and other overhead at the MSFC DAAC to be a problem. These proportions were based upon an estimate made before the transfer to the off-site location, and both we and MSFC expected that these estimates would be adjusted per actual experience.

Regarding FY95, FY96, and FY97 funding for the MSFC DAAC, please refer to Section I of our response, recommendation 4.

83. p 49 para 1 - Please see our comment addressing page 46, paragraph 1 of the OIG report.

84. p 49 para 2 - The MSFC DAAC needed to expand to meet requirements. The relocation was the method of meeting this need, as well as other needs of the MSFC DAAC. The space was not increased because of the relocation. MSFC was appropriately planning to receive and begin testing ECS Interim Release 1 in November 1995, and Release A soon after that. The space at the previous site was not adequate for this.

85. p 51 para 3 - ASF received a letter from ONR advising as to the appropriate categories for direct and indirect costs. However, a final ruling has not been made pending additional investigation by the ACO and the extenuating circumstances at ASF. Section I of our response describes our planned action in response to OIG recommendation 5.

86. p 52 para 1 - The following clarifications are offered as a more accurate and historically-complete picture of the NSIDC DAAC lease situation.

a. The NSIDC request was not for approval of leases, but an inquiry about the proper characterization of a future contract cost (direct or indirect). GSFC responded on May 16, 1995. For the moment, the lease option is no longer being considered by the university. Current plans are for the expanded space needed for the DAAC to be provided by outfitting, at NASA and university expense, of existing space within the building currently housing the NSIDC. This was a university decision, not a NASA decision. The university reserves the right, with NASA's encouragement, to continue evaluating other options, should they be more cost-effective than the current proposed solution.

b. NSIDC was not (and is not) requesting to direct charge for the lease of the entire new facility, or even the entire expanded DAAC facility. The NSIDC was only requesting to direct charge for that portion of the facility required to house ECS personnel provided under NASA's contract with Hughes, not through the university. Facility space for the DAAC's personnel is provided through indirect costs.

c. Control of indirect costs of the NSIDC contract is effected through the university's accounting system and contract funding limits. The direct costs are controlled through the requirements of the subcontract consent clause (which would cover direct lease costs) and allowable cost principles.

d. When the university was considering the lease option, we estimated the NSIDC DAAC space needs as approximately 14,000 sq. feet. Since then, Hughes has continued to refine the design of the ECS, and the space needs have been reduced to approximately 9,000 square feet. The space needed by the entire NSIDC, not just the DAAC portion, is reduced accordingly.

87. p 53 para 1 - The OMTPE, ESDIS Project, and CIESIN were trying to abide by a reasonable interpretation of the Congressional earmarks. We assisted in clarifying requirements and, therefore, in obtaining the rescission.

88. p 53 para 2 - DAACs have not constructed or leased space that was not justified. Again, not "micromanaging" the DAACs does not mean that we have failed to provide adequate oversight of the DAACs. As explained in our comments addressing page 35 of the OIG report, we perform roles necessary to ensure a successful project.

89. p 53 para 2 - There was no ESDIS Project uncertainty about the applicability of the Congressional Conference report to the DAACs. NASA Headquarters has sought Congressional confirmation of NASA's interpretation, as indicated in the NASA Headquarters OMTPE letter of December 15, 1995, to the NASA Acting Deputy AIGA.

90. p 54 para 1 & 2 - Section I of this response addresses NASA planned action in response to OIG recommendations 4, 5, and 6.

91. p 55 para 2 - The allocation of products to the DAACs is performed at NASA Headquarters (DAAC program manager and program scientist in particular) with recommendations from the GSFC (EOSDIS Project Scientist and EOS Project Scientist in particular), DAACs (DAAC scientists in particular), and other advisors (EOSDIS Panel, Investigator Working Group, and the DAAC User Working Groups). Before the products were defined, allocations were made mostly by instrument (except Moderate-Resolution Imaging Spectrometer [MODIS] land products). As the product definitions become more firm, these decisions can be reviewed (though most are probably still appropriate) to ensure that they are appropriately assigned by discipline. However, when analysis indicates a significant cost tradeoff, we may make other arrangements. There is a configuration control process that is appropriate to address these issues. This process has assigned the appropriate Geoscience Laser Ranging System (GLAS) products to the NSIDC DAAC (See *EOS Project Plan*, 5/95). This process remains available for resolution of additional such issues.

92. Table of Acronyms - In the Table of Acronyms following the Table of Contents in the OIG report, ASF stands for "Alaska Synthetic Aperture Radar Facility."

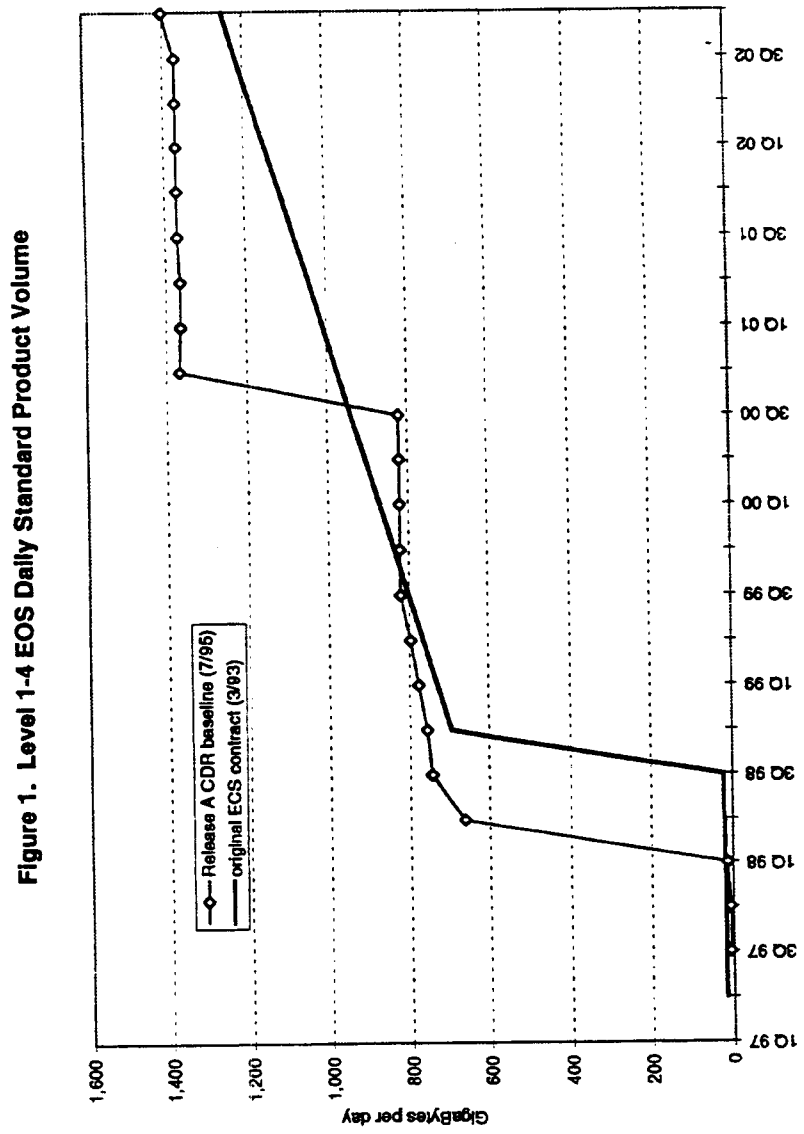
Figure 1. Level 1-4 EOS Daily Standard Product Volume
Release A CDR baseline (7/95)
original ECS contract (3/93)
GigaBytes per day
1,600
1,400
1,200
1,000
800
600
400
200
0
10 97
30 97
10 98
30 98
10 99
30 99
10 00
30 00
10 01
30 01
10 02
30 02

Attachment
Management's Response

Daily Data Volume by DAAC (L1 - L4 Standard Products)

GSFC/SPSO — Version 3.2 (Prepared 11/95)

Platform	Launch Date	Instrument	Daily Data Volume (GB/day) EDC	GSFC	JPL	LaRC	MSFC	NSIDC	Total (L1 - L4)
TRMM	Aug-1997	CERES				10.148			10.148
		LIS					1.925		1.925
		Total				**10.148**	**1.925**		**12.073**
AM-1	Jun-1998	ASTER	149.390						149.390
		CERES				18.319			18.319
		MISR				107.091			107.091
		MODIS	143.955	411.673				3.976	559.604
		MOPITT				0.166			0.166
		Total	**293.345**	**411.673**		**125.576**		**3.976**	**834.570**
METEOR 3	Aug-1998	SAGE III				0.018			0.018
FOO	TBD-1998	Color		6.497					6.497
ADEOS II	Aug-1999	SWS			4.368				4.368
ALT - Radar	TBD-1999	DFA			0.180			0.000	0.180
		AMR			0.002				0.002
		Total			**0.182**				**0.182**
FOO	TBD-1999	ACRIM				**0.046**			**0.046**
FOO	TBD-2000	CERES				**18.319**			**18.319**
PM-1	Dec-2000	AIRS		32.430					32.430
		AMSU-A		0.066					0.066
		CERES				18.319			18.319
		MHS		0.084					0.084
		MIMR					5.145	0.038	5.182
		MODIS	143.955	411.673				3.976	559.604
		Total	**143.955**	**444.253**		**18.319**	**5.145**	**4.013**	**615.685**
Space Station	TBD-2001	SAGE III				0.018			0.018
CHEM-1	Dec-2002	HIRDLS		0.819					0.819
		MLS		0.615					0.615
		TES				30.501			30.501
		Total		**1.434**		**30.501**			**31.935**
ALT - Laser	Jul-2003	GLAS						5.794	5.794
FOO	TBD-2003	SOLSTICE		0.097					0.097
ALT - Radar	TBD-2004	DFA			0.180			0.000	0.180
		AMR			0.002				0.002
		Total			**0.182**			**0.000**	**0.182**
AM-2	Jun-2004	CERES				10.148			10.148
		EOSP				0.500			0.500
		MISR				107.091			107.091
		MODIS	143.955	411.673				3.976	559.604
		LATI	No information available						
		Total	**143.955**	**411.673**		**117.739**		**3.976**	**677.343**

Note:
1. Data volume estimates are for at-launch and post-launch data products, excluding interim, special, and validation products.
2. All estimates do not include preprocessing, reprocessing, QC output and ancillary data.
3. Average data rate for Color was calculated, assuming L0 data volume of 30 Gbits/day as given by Color Project Manager in the SDR RID L1B volume was calculated, assuming 2-byte storage of data and adding 10% overhead. L2 and L3 volumes are based on the estimates for SeaWiFS products.

Attachment
Management's Response

National Aeronautics and
Space Administration

Headquarters
Washington, DC 20546-0001

JUN 22 1995

Y

TO: W/Inspector General

FROM: Y/Assistant Associate Administrator for Mission to Planet Earth (Program Integration)

SUBJECT: NASA Response to Office of Inspector General (OIG) Draft Rapid Action Report on EROS Data Center (EDC) Distributed Active Archive Center (DAAC) Facility Addition (A-GO-95-001, 5/12/95)

In response to the subject OIG draft report, which was issued from the Goddard OIG to the Goddard Acting Director, relating to the Earth Resources Observation System (EROS) Data Center, the staff working on the Earth Observing System Data and Information System (EOSDIS) Project at GSFC has reconfirmed that the items for which NASA funds have been expended in FY94 and FY95 are appropriate "facility outfitting" according to the NASA Facility Project Implementation Handbook (FPIH), NHB 7320.9B, and are not being used or planned for use for construction of the EROS Data Center (EDC) expanded facility. Therefore, these funds should remain obligated for this purpose. Recognizing the concerns raised by the OIG, the Office of Mission to Planet Earth (OMTPE) will review plans and budgeting of FY96 and FY97 funds to be spent at EROS Data Center to ensure that these funds are also used only for appropriate facility outfitting.

We agree that, while there is no corresponding language in the statute, the FY94 Appropriations Conference Report language includes the following:

> "...deletes language proposed by the Senate prohibiting the use of Earth Observation System Data and Information System funds for the construction of non-NASA facilities...NASA is directed however to provide no funds for the construction on non-NASA facilities including the reimbursement of construction costs through annual data archive center operation budgets...all prior interagency agreements that would have permitted this are considered null and void."

Although this language was deleted from the statute, given that funds for construction of the facility were added to the Department of Interior (DOI)/United States Geological Survey (USGS) budget, NASA and USGS interpreted the Conference Report to mean that, while the earlier agreement between NASA and USGS needed to be changed, construction of the facility would proceed. This led to the new agreement that USGS would pay all costs for construction

Enclosure to GSFC Response to
OIG Draft Audit Report A-GO-95-001

Attachment
Management's Response

of facilities and that NASA would pay costs for "unique ancillary systems and equipment" required to support the NASA Landsat 7 ground system and EOSDIS DAAC to be housed in the expanded facility.

The NASA Facility Project Implementation Handbook (FPIH) draws a clear distinction between "construction" and "outfitting." The FPIH defines "construction" as "alteration or repair of buildings, structures, or other real property" and "construction of facilities" as "a Congressional appropriation which provides contractual services for the repair rehabilitation, and modification of existing facilities; the construction of new facilities..." (page A-5).

The NASA FPIH defines "outfitting," on the other hand, as "the process of equipping a facility for its intended purpose with items that can be typically replaced or reconfigured many times over the life of the facility" (page A-14). Section 7.5 of the NASA FPIH (page 7-6) states that "projects or tasks associated with facility outfitting are not properly funded from the CoF appropriation but should be funded from either R&D or SFCDC appropriation. Facility outfitting begins when: The construction of a facility project or a portion of a facility, such as a work package or a specific area, is complete and has been accepted by the government. [and] Beneficial or joint occupancy is taken of the facility or a portion of a facility." Further, "Facility outfitting includes: data systems installation, systems furniture installation, telephone installation, furniture and equipment move-in, personnel move-in, maintenance services start-up."

Since the Conference Report limits its restriction on the use of NASA funding to "construction," it is our judgment that GSFC may properly fund facility outfitting required by GSFC at the new EDC facility (i.e. to support the Landsat 7 ground system and the EOSDIS DAAC). We believe that all of the items funded in FY94 and FY95 are in this category and are allowable as facility outfitting.

EDC (Memorandum from Donald T. Lauer, Chief of the EROS Data Center, dated June 2, 1995) describes the FY94 and FY95 expenditures of the GSFC funds as including:

FY 94: UPS (Uninterruptible Power Supply) Cabling/Switchgear, NASA Computer/Communications Room Conditioning	$345K
PBX (telephone) system for NASA area	$254K
Total:	$600K
FY 95: Raised Flooring, Signal Reference Grid	$265K
Additional Air Conditioning/Cooling	$325K
Communications Cabling/Equipment	$437K
Cable Trays	$23K
Modular Office Equipment/Furniture for NASA space	$154K
Total:	$1200K

Attachment
Management's Response

All of the items listed meet the definition of "outfitting" or are items that, once purchased, can be installed as a part of "outfitting." Several are mentioned explicitly in the FPIH, e.g., telephone (PBX) system and data systems (which include communications equipment and systems furniture) and the others are consistent with the examples given in the FPIH.

All of these items are needed to meet NASA requirements. The NASA systems require the communications equipment. NASA RMA (reliability, maintainability, and availability) requirements for the NASA systems to be installed in the EDC facility require the UPS back-up power system. The raised flooring is customary furnishing for computer system spaces and has to be specifically configured to provide airflow and cable pass through for equipment to be installed.

All of the listed items could be readily and repetitively reconfigured as needed. It is clear that some of the actual installation of these items is proceeding prior to completion of the construction, but any of the items could as well have been installed after construction was completed. Given the tight overall schedule for the facility and the opportunity to minimize installation costs by doing some installation in parallel with construction, to do so is clearly reasonable and desirable.

We believe NASA's funding of these items is consistent with the Appropriation Bill language and intent. MTPE management will work with ESDIS Project to ensure that FY96 and FY97 funds are used only for appropriate facility outfitting and remain in compliance with the Congressional direction. If the OIG report recommendation is changed to focus on NASA ensuring appropriate "outfitting" expenditures, we would be able to concur in full. Otherwise, our response to the OIG's current specific recommendations is as follows:

OIG RECOMMENDATION 1:

GSFC's ESDIS Project Office should recover any funds already expended by EDC to augment construction of the facility addition.

NASA RESPONSE TO RECOMMENDATION 1: NON-CONCUR

The funds expended to date were required to provide the specific power, communications, and cooling needed to support the NASA computer systems in the EDC-provided facility. This was therefore outfitting, not a construction augmentation of the EDC facility addition and need not be recovered.

OIG RECOMMENDATION 2:

GSFC's ESDIS Project Office should take immediate action to reverse its decision to provide $4.2 million to augment the construction of the EDC DAAC facility addition.

Attachment
Management's Response

NASA RESPONSE TO RECOMMENDATION 2: NON-CONCUR

As has been the case to date, future funding will only be supplied to the extent required to continue to provide the power, communications, and other outfitting needed to support the NASA systems in the EDC facility. OMTPE and the ESDIS Project will carefully review all expenditures and will only approve those that are outfitting required in support of NASA missions. The ESDIS Project will ensure that no funds are expended to augment construction of the facility addition.

OIG RECOMMENDATION 3:

GSFC's ESDIS Project Office should immediately notify management at the EDC DAAC that NASA funds in the amount of $4.2 million are no longer available to augment the construction of the EDC facility addition.

NASA RESPONSE TO RECOMMENDATION 3: NON-CONCUR

Consistent with NASA Response 2 above, the funds will be provided subject to the review described, and we will notify EDC management accordingly.

Douglas R. Morton

cc:
JX/Mr. H. Ellis
JX/Mr. W. Brubaker
LB/Ms. B. Cherry
YD/Mr. A. Montasser
GSFC/100/Mr. J. Rothenberg
GSFC/201/Ms. J. Clark
GSFC/OIG/190/Mr. D. Samovisti

Code Y Management Response

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

Reply to Attn of: YM

DEC 15 1995

TO: W/Acting Deputy Assistant Inspector General for Auditing

FROM: Y/Assistant Associate Administrator for Mission to Planet Earth (Program Integration)

SUBJECT: Draft Audit Report "EOS Data and Information System (EOSDIS) Distributed Active Archive Centers (DAACs)

We have reviewed recommendations one and six of the Draft Audit Report "EOS Data and Information System (EOSDIS) Distributed Active Archive Centers (DAACs) dated November 2, 1995. We are already performing detailed planning required to implement what we believe to be the intent of recommendation one and that work will be presented to the Board on Sustainable Development of the National Research Council on January 23, 1996. The clarification of Congressional language as called for in recommendation six was done on July 19, 1995.

Our specific comments to Recommendations Number 1 and 6 are as follows:

(1) The Associate Administrator for Mission to Planet Earth should request that an independent evaluation of the current DAAC configuration be performed to determine whether opportunities for consolidation or closure exist.

The Office of Mission to Planet Earth (OMTPE) basically agrees with this recommendation, although the potential cost savings are yet to be determined. In fact we are already beginning the process to close the MSFC DAAC in March of 1997 as result of the Zero-Based Review Team. Our initial estimates for this closing save about $7 million dollars through the year 2000. This past summer we were prepared to perform a peer review of all the DAACs, based on a recommendation of the EOS Payload Panel. However, the National Academy of Sciences Board on Sustainable Development (BSD) has made several recommendations related to work currently performed by the DAACs as a result of a workshop in July. These recommendations call for competitively selecting a Federation of information service providers (i.e. DAAC like) who would perform the necessary services for the OMTPE. This will have significant implications for

Attachment
Management's Response

EOSDIS including the existing DAAC structure. The OMTPE is now responding to those recommendations, and while it is too early to give a time schedule for implementation, it seems very likely that the OMTPE will proceed with these recommendations. Although it is not clear that the answer will be fewer service providers (i.e. DAACs) as suggested in your report, the idea of a competitive selection process will help to ensure the best solution within a constrained EOSDIS budget.

(6) The NASA Headquarters Office of Mission to Planet Earth should obtain a determination as to whether the language in the FY 1994 Congressional Conference Report applies to leases.

The OMTPE agrees with the intent of this recommendation and has already requested clarification (FY 1994 operating plan update dated July 19). NASA has sought a finding concerning the interpretation of the report language assumed by the OIG in this recommendation. Since OMTPE has received no response indicating that our interpretation is incorrect, we will continue to assume that the language "construction of facilities" does not mean lease of facilities.

Douglas R. Norton

cc:
YD/Mr. R. Krieder

ATTACHMENT III

GO-95-008

AUDIT REPORT

RAPID ACTION

EROS DATA CENTER (EDC) DISTRIBUTED ACTIVE ARCHIVE CENTER FACILITY ADDITION

GODDARD SPACE FLIGHT CENTER

SEPTEMBER 15, 1995

National Aeronautics and Space Administration

OFFICE OF INSPECTOR GENERAL

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

SEP 15 1995

Reply to Attn of: W

TO: Y/Associate Administrator for Mission to Planet Earth

FROM: W/Acting Deputy Assistant Inspector General for Auditing

SUBJECT: Rapid Action Report on EROS Data Center (EDC)
Distributed Active Archive Center Facility Addition
Assignment No. A-GO-95-001
Report No. GO-95-008

The NASA Office of Inspector General (OIG) is conducting an audit of the Earth Observing System Data and Information System (EOSDIS), Distributed Active Archive Centers (DAACs). The objectives of the audit are to determine whether:

(1) All DAACs will be fully utilized for processing EOS and non-EOS scientific data.

(2) The DAACs computer system acquisitions are properly justified and whether alternative approaches could have been used.

(3) Facility requirements are properly justified and supported.

The audit showed that EDC, a U.S. Department of the Interior (DOI) activity, appears to be augmenting construction of its new facility addition with NASA funds. However, Congressional intent is to prohibit the use of NASA funds to finance the construction of non-NASA facilities. NASA's adherence to restrictions expressed in the legislative history may result in potential cost recoveries of $600,000 and potential cost avoidances of $4.2 million. Due to the dollar significance and the time sensitivity of this issue, we are providing this report containing recommendations for your immediate attention.

A draft report was issued to GSFC management on May 12, 1995, requesting written comments to the audit recommendations. The Agency's official response was signed by your office and dated June 22, 1995. The response is included after each recommendation and is presented in its entirety as an Attachment to the report. The response indicates that management nonconcurs with each of the report's three recommendations, and plans no corrective actions.

The OIG's evaluation of your response is included after the recommendations. As detailed in this evaluation, we continue to find that the items for which NASA funds either have or will be used constitute items that would normally be considered as part of the cost of construction.

We request that you reconsider your position on recommendations 1, 2, and 3, and notify us within 20 days of the specific actions you intend to take. In addition, because of our continued concerns in this area, and NASA management's stated position, we have coordinated with the DOI OIG in conducting an audit of the entire EDC facility addition construction project. This audit will include a detailed accounting of the use of $1.8 million in NASA funds during FYs 1994 and 1995.

If you have questions, please contact Mr. Daniel Samoviski, OIG Center Director, GSFC, at (301) 286-5561 or me at 358-1232.

Carroll S. Little

Enclosure

cc:
B/A. Holz
Y/B. MacDougall
JMC/P. Chait
GSFC/100/J. Rothenberg
GSFC/201/J. Clark
W/D. Samoviski

INTRODUCTION

The NASA Office of Inspector General is conducting an audit of the Earth Observing System Data and Information System (EOSDIS), Distributed Active Archive Centers (DAACs). During the audit, we identified a condition related to the Earth Resources Observation System Data Center DAAC located in Sioux Falls, South Dakota. Because of the cost significance, and time sensitivity of this condition, we are providing this report which contains three recommendations for your immediate attention.

The EOS Program was proposed by the President and authorized as a new start in Fiscal Year (FY) 1991. The EOS Program is the centerpiece, and largest part of NASA's Mission to Planet Earth (MTPE), and a major part of the comprehensive United States Global Change Research Program. The overall goal of the EOS Program is to advance the scientific understanding of the entire earth system on a global scale. The EOSDIS is a component of EOS and serves as the mechanism for generating, archiving, and distributing NASA's earth science data and other source related data to a worldwide pool of users.

The NASA Headquarters Office of MTPE (Code Y) is responsible for the overall EOS Program. GSFC's Mission to Planet Earth Office is responsible for the development of the EOSDIS. GSFC's Earth Science Data and Information System (ESDIS) Project Office is responsible for planning, budgeting, oversight, and management of the DAACs.

The DAACs are one component of the EOSDIS, and are located at institutions or facilities that have expertise and on-going research in specific earth science disciplines. These institutions and facilities also have a long-term institutional commitment to support science data processing, archival, and distribution functions. Nine DAACS have been selected by NASA to carry out the responsibilities for processing, archiving, and distributing EOS and related data and for providing a full range of user support. These DAACs ensure that data will be available indefinitely in an easily usable form. The nine DAACs, their location, and area of expertise are as follows:

- Earth Resources Observation System Data Center (EDC) DAAC; Sioux Falls, South Dakota - Land Processes Imagery.

- Goddard Space Flight Center (GSFC) DAAC; Greenbelt, Maryland - Upper Atmospheric Dynamics, Global Biosphere, and Geophysics.

- Jet Propulsion Laboratory (JPL) DAAC; Pasadena, California - Ocean Circulation and Air-Sea Interaction.

- Langley Research Center (LaRC) DAAC; Hampton, Virginia - Radiation Budget, Aerosol, and Tropospheric Chemistry.

- Oak Ridge National Laboratory (ORNL); Oak Ridge, Tennessee - Biogeochemical Dynamics.

- Alaska Sea, Ice, Polar Processes Imagery Facility (ASF); University of Alaska at Fairbanks, Fairbanks, Alaska - Sea, Ice, and Polar Processes.

- National Snow and Ice Data Center (NSIDC) DAAC; University of Colorado, Boulder, Colorado - Snow and Ice Processes.

- Marshall Space Flight Center (MSFC) DAAC; Huntsville, Alabama - Hydrology.

- Socio-Economic Data and Applications Center (SEDAC), Consortium for International Earth Science Information Network; Saginaw, Michigan - Socio-economic information processing.

The EDC is a research field center of the Department of the Interior's, United States Geological Survey (USGS), National Mapping Division. The EDC's mission is to archive, process, and distribute land remotely sensed data acquired from civil satellites and to develop new applications for this data. The EDC DAAC will process, archive, and distribute land processes imagery data.

The EDC DAAC is responsible for the day-to-day management and operation of the DAAC to ensure that data and information services are provided to users. The EDC DAAC is also responsible for managing funds provided by NASA. For FYs 1994 through 2000, the EDC DAAC has a projected total budget of $26,562,000.

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OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVES

The objectives of the audit are to determine whether:

(1) All DAACs will be fully utilized for processing EOS and non-EOS scientific data.

(2) The DAACs computer system acquisitions are properly justified and whether alternative approaches could have been used.

(3) Facility requirements are properly justified and supported.

SCOPE AND METHODOLOGY

The audit was performed in accordance with generally accepted government auditing standards and included such examinations and tests of applicable records, documents, and internal controls as were considered necessary in the circumstances. Specifically, we reviewed available records and documents pertaining to the EDC DAAC facility addition. In addition, interviews and discussions were held with representatives of the NASA Headquarters Office of MTPE, the ESDIS Project Office, EDC, and the EDC DAAC.

INTERNAL CONTROLS REVIEWED

The following significant internal controls related to the EDC DAAC facility addition were identified and tested for compliance:

- FY 1994 Congressional Conference Report for the Appropriations for the Departments of Veterans Affairs, Housing and Urban Development, and Sundry Independent Agencies, Boards, Commissions, Corporations and Offices, dated October 4, 1993.

- Memorandum of Understanding between the Department of Interior's USGS and NASA.

- EDC DAAC facility expansion architectural and engineering design interagency contract.

- DAAC Strategic/Management Plan.

- EDC DAAC Proposed FY 1995 Work Plan.

AUDIT FIELD WORK

Audit field work was conducted from December 1994 through July 1995 at the GSFC, EDC, and NASA Headquarters Office of MTPE.

OBSERVATIONS AND RECOMMENDATIONS

INTERIM RESULTS OF AUDIT

The audit has shown that EDC appears to be augmenting construction of its new facility addition with NASA funds. However, Congressional intent is to prohibit the use of NASA funds to finance the construction of non-NASA facilities. NASA's adherence to restrictions expressed in the legislative history may result in potential cost recoveries of $600,000 and potential cost avoidances of $4.2 million. The results of our audit are detailed in the following paragraphs.

NASA FUNDS MAY HAVE BEEN USED TO AUGMENT CONSTRUCTION OF NON-NASA FACILITY

NASA DAAC operations funds may have been used to augment the construction of a facility addition at EDC, a U.S. Department of Interior activity. This condition has occurred because of an agreement between the Chief of the EDC and the Director of the NASA Headquarters Office of MTPE, Operations, Data, and Information Systems Division. Congressional intent is to prohibit the use of NASA DAAC operations funds to finance the construction of non-NASA facilities. However, EDC may have already expended more than $600,000 of FY 1994 NASA funds for construction of non-NASA facilities. The EDC plans on expending an additional $4.2 million of NASA funds during FYs 1995 through 1998.

EDC FACILITY ADDITION WAS ORIGINALLY ESTIMATED TO COST $12.6 MILLION

In June 1991, NASA provided the EDC, through an interagency contract, $900,000 to contract for an architectural and engineering design study for the new NASA designated DAAC facility at EDC. EDC had already performed an in-house definition study and determined that the NASA DAAC operations would be contained in a separate facility adjoining its existing facility. The EDC and the architectural contractor developed a two-level DAAC facility design adjoining the existing EDC facility. The design provided for 60,000 square feet of finished, net usable floor space for the DAAC functions. The main level design contained 50,000 square feet of the net usable space and consisted of a lobby, executive waiting rooms, conference rooms, a 300-seat auditorium, cafeteria, offices, and computer center. The lower level design contained space to house DAAC-related mechanical, electrical and communication support equipment, and archival storage. The estimated cost to complete the project was $12.6 million.

INTERAGENCY AGREEMENT ESTABLISHES NASA FUNDING REQUIREMENTS

On December 3, 1992, NASA and the USGS entered into a Memorandum of Understanding (MOU) for participation in the EOSDIS. This interagency agreement addressed the relationship between NASA and USGS for planning, implementing, and operating the EDC DAAC in Sioux Falls, South Dakota. The agreement stated that NASA would fund facility lease costs for the life of the project. Specifically, the "Implementation Approach" section of the agreement stated that:

> -USGS will construct and/or lease facilities, as required, with lease and facility maintenance expenses included in annual DAAC operation and maintenance cost over the life of the EOS Project, in accordance with NASA and USGS funding responsibilities defined earlier.

INTERAGENCY AGREEMENTS PERMITTING NASA FUNDED DAAC FACILITIES ARE NULL AND VOID

The legislative history of the FY 1994 appropriations act shows Congress' disapproval of the approach, in the MOU, for NASA to provide funds for construction. The FY 1994 Congressional Conference Report for the Appropriations for the Departments of Veterans Affairs, Housing and Urban Development, and Sundry Independent Agencies, Boards, Commissions, Corporations and Offices, dated October 4, 1993, states that:

> -NASA is directed, however, to provide no funds for the construction of non-NASA facilities including the reimbursement of construction costs through annual data archive center operation budgets. The conferees further agree that all prior interagency agreements that would have permitted this are considered null and void and that facility costs should be borne by non-NASA agencies directly. (highlighting added)

FUNDING PROVIDED IN DEPARTMENT OF INTERIOR'S FY 1994 APPROPRIATION

The Department of the Interior (DOI) requested $12.6 million to complete the EDC facility addition. The DOI's Appropriation Legislation for FY 1994 authorized only $9 million for construction of the EDC facility addition, $3.6 million less than the $12.6 million initially requested. Language was included in Report number 103-158 of the House Committee on Appropriations, 1994 Department of the Interior and Related Agencies Appropriations Bill, which stated the $9 million:

> -represents a 'bare bones' approach to the new facilities, **but is deemed sufficient for total construction.** (highlighting added)

Despite the $3.6 million reduction in construction funding and the language stating the $9 million was sufficient for total construction, EDC's management decided to maintain the facility addition's original structural design. They did, however, decide to scale back completion of the facility's interior. Specifically, EDC management decided to forgo completion of items such as the 300 seat auditorium and finishing various office space.

NASA FUNDS MAY HAVE AUGMENTED CONSTRUCTION OF EDC DAAC FACILITY ADDITION

In 1993, EDC management requested NASA funds for power supplies, communications, computer and archive room conditioning, and finished office space for the EDC facility addition. NASA's Office of MTPE, Operations, Data, and Information Systems Division agreed to provide EDC approximately $4.8 million between FYs 1994 and 1998. This money was to fund these items, which had been included in the original $12.6 million cost of construction estimate but in EDC's opinion, could not be accommodated within DOI's $9 million funding limitation. The agreement to use NASA funds for this purpose was reached between the Chief of EDC and the Director of the NASA Headquarters Office of MTPE, Operations, Data, and Information Systems Division. This agreement is discussed in a letter to the Director, Operations, Data, and Information Systems Division dated January 19, 1994 (see EXHIBIT 1), in which the EDC Chief states:

> -As you recall, you and I have agreed that these unique facility items would be funded by NASA using the funds previously allocated by NASA to cover annual DAAC lease costs.

GSFC ESDIS Project Office personnel stated they complied with the above agreement, even though they were aware of the Congressional Conference Report language restricting the use of NASA funds for construction of non-NASA facilities. Based on our review of the Congressional Conference report language, discussions with the EDC Chief, and available documentation, we conclude that most of the items for which NASA funds either have or will be used, constitute items that would normally be considered as part of the cost of construction. We therefore believe that using NASA funds for these items is contrary to the Congressional Conference Report language, which prohibited the use of NASA DAAC operations funds to finance the construction of non-NASA facilities.

OVER $600,000 MAY HAVE ALREADY BEEN EXPENDED CONTRARY TO CONGRESSIONAL LIMITATIONS

We believe that about $600,000 in FY 1994 DAAC operations funds may already have been expended contrary to the Congressional limitations. (We were unable to determine from NASA's records, the exact amount of FY 1994 expenditures to augment construction.) The potential exists that this amount may be even higher since at the time of this report, approximately three-fourths of FY 1995 has expired. We recommend that GSFC's ESDIS Project Office recover any funds already expended by EDC to augment construction of the facility addition.

EDC DAAC BUDGET CONTAINS $4.2 MILLION TO AUGMENT CONSTRUCTION OF FACILITY ADDITION

The EDC DAAC is presently budgeting $4.2 million to augment the construction of the EDC facility addition. The EDC DAAC budget indicates that this $4.2 million will be distributed in increments from FYs 1995 through 1998. The distribution of the $4.2 million by fiscal year is indicated in the chart below.

Fiscal Year	Funding Level
1995	$ 1,200,000
1996	1,200,000
1997	1,200,000
1998	600,000
TOTAL	$ 4,200,000

We recommend that GSFC's ESDIS Project Office take immediate action to reverse its decision to provide $4.2 million to augment the construction of the EDC DAAC facility addition. In addition, the ESDIS Project Office should immediately notify management at the EDC DAAC that NASA funds in the amount of $4.2 million are no

longer available to augment the construction of the EDC facility addition.

We make the following recommendations:

RECOMMENDATION 1 GSFC's ESDIS Project Office should recover any funds already expended by EDC to augment construction of the facility addition.

MANAGEMENT RESPONSE Nonconcur. The funds expended to date were required to provide the specific power, communications, and cooling needed to support the NASA computer systems in the EDC-provided facility. This was therefore outfitting, not a construction augmentation of the EDC facility addition and need not be recovered.

RECOMMENDATION 2 GSFC's ESDIS Project Office should take immediate action to reverse its decision to provide $4.2 million to augment the construction of the EDC DAAC facility addition.

MANAGEMENT RESPONSE Nonconcur. As has been the case to date, future funding will only be supplied to the extent required to continue to provide power, communications, and other outfitting needed to support the NASA systems in the EDC facility. The Office of MTPE and the ESDIS Project will carefully review all expenditures and will only approve those that are outfitting required in support of NASA missions. The ESDIS Project will ensure that no funds are expended to augment construction of the facility addition.

RECOMMENDATION 3 GSFC's ESDIS Project Office should immediately notify management at the EDC DAAC that NASA funds in the amount of $4.2 million are not available to augment the construction of the EDC facility addition.

MANAGEMENT RESPONSE Nonconcur. Consistent with NASA Response 2 above, the funds will be provided subject to the review described, and we will notify EDC management accordingly.

EVALUATION OF MANAGEMENT'S RESPONSE TO RECOMMENDATIONS 1, 2, AND 3

Code Y's response concerning the report's observations and recommendations is provided in its entirety as an Attachment to this report. The response states that Code Y does not concur with the report's recommendations. This nonconcurrence is based on the position that "the staff working on the EOSDIS Project at GSFC has reconfirmed that the items for which NASA funds have been expended in FY 1994 and 1995 are appropriate 'facility outfitting' according to the NASA Facility Project Implementation Handbook (FPIH), NASA Handbook 7320.9B, and are not being used or planned for use for construction of the EDC expanded facility." We continue to be of the opinion that NASA DAAC operations funds may have been used to augment the construction of the EDC facility addition. The basis for this position is presented in the following paragraphs.

Code Y's response states "since the Conference Report limits its restriction on the use of NASA funding to 'construction,' it is our judgement that GSFC may properly fund facility outfitting required by GSFC at the new EDC facility. We believe that all of the items funded in FY 1994 and 1995 are in this category and are allowable as facility outfitting." The response provides a listing of the following items for which NASA funding in the amount of $1.8 million was utilized in FYs 1994 and 1995.

FY 1994

Uninterruptible Power Supply Cabling/Switchgear, NASA Computer/Communications Room Conditioning	$346,000
PBX Telephone System	$254,000
	$600,000

FY 1995

Raised Flooring, Signal Reference Grid	$263,000
Additional Air Conditioning/Cooling	$323,000
Communications Cabling/Equipment	$437,000
Cable Trays	$23,000
Modular Office Equipment/Furniture for NASA Space	$154,000
	$1,200,000

Code Y's response does not contain adequate detail to provide an accounting of how NASA DAAC operations funds actually were expended. The response was based on a June 2, 1995 letter (see EXHIBIT 2) from the EDC Chief to GSFC's ESDIS Project Office

which explained for what the FYs 1994 and 1995 funds were expended. However, neither Code Y's response or the EDC Chief's letter make mention of the additional $3 million in FYs 1996 through 1998 DAAC operations funds, which EDC plans to use for the facility addition. Moreover, Code Y did not verify that the information provided by EDC was accurate concerning the reported use of NASA funds. For example, the Director of the NASA Headquarters Facilities Engineering Division informed us that he concurred with the items listed in the letter from the EDC Chief. His concurrence was made without visiting or contacting anyone at EDC to determine whether EDC actually used the funds for these items, or that they were legitimate "outfitting" items as described in the FPIH.

We do not agree with Code Y's position that all of the above items constitute facility outfitting as defined in the FPIH. In addition, most of the items which Code Y is now calling outfitting were originally included in the total EDC facility addition construction cost of $12.6 million, prior to the appropriation being reduced to $9 million. Further, the criteria for construction versus outfitting as described in the FPIH Section 7.5, "Facility Outfitting," states that facility outfitting begins when:

> "The construction of a facility project or a portion of a facility, such as a work package or a specific area, is complete and has been accepted by the Government."
>
> "Beneficial or joint occupancy is taken of the facility or portion of a facility."

As of August 1995, we were informed that the EDC facility addition has not been accepted by the Government, and further, will not be completed and ready for occupancy until February 1996. Despite the EDC facility addition not being completed, accepted, or ready for occupancy (which is the criteria for outfitting to begin), Code Y claims that funds from FYs 1994 and 1995 were used for facility outfitting.

In addition to the basic criteria for outfitting to begin (i.e. completion, government acceptance, occupancy) not being met, we also take exception that all of the items for which NASA funds were used in FYs 1994 and 1995, were for outfitting, and not construction. For

example, NASA's response states that the FY 1994 expenditures of $600,000 were for a:

> -PBX phone system ($254,000);
>
> -uninterruptible power supply cabling/switchgear, and NASA computer/communications room conditioning ($346,000).

The telephone system is clearly within the items allowed as facility outfitting. However, the uninterruptible power supply cabling/switchgear and NASA computer/communications room conditioning are items that, according to the FPIH, should be included in the cost of construction. Specifically, FPIH Section 3.9.8, states that the project's engineering estimate represents the costs for materials, labor, services coupled with contractor overhead, profits, etc., based on cost experience at a specific given point in time, and includes the following items:

> Architectural/Structural - costs normally associated with foundations, structural framing, floors, walls, roofing, finishes, and specialities.
>
> Mechanical - costs normally associated with mechanical building systems equipment such as heating, ventilating, and air conditioning (HVAC), and plumbing. Also includes built-in nonseverable mechanical research and development equipment.
>
> Electrical - costs normally associated with electrical building equipment such as transformers, motor starters and control centers, lighting systems, and communications systems. Also includes built-in electrical research and development equipment.

It appears that the FY 1994 expenditures for the uninterruptible power supply cabling/switchgear, and computer/communications room conditioning could be classified in either the mechanical or electrical categories, and, therefore, included in the cost of construction.

Of the FY 1995 expenditures of $1,200,000, only the modular office equipment and furniture ($154,000) is a legitimate outfitting item. For the Communications Cabling/Equipment ($437,000) and Cable Trays ($23,000), although these meet the general definition of outfitting items, FPIH Section 4.6.1 states that "in general, items such as these which are permanently affixed, are included in the construction cost estimate of the construction project." The remaining items appear to be for construction. For example, as mentioned above, air conditioning and cooling ($323,000) are considered as part of the "mechanical" costs. Raised Flooring ($263,00) is included in the engineering estimate under architectural/structural category of construction costs.

When the NASA OIG visited the EDC facility in February 1995, EDC management made clear its intent to use DAAC operations funds to augment the construction of the EDC facility addition by finishing office space within the facility. This position is reflected in the EDC's Facility Funding Proposal dated January 21, 1994 which states:

> "Funding for the construction of an addition to the existing EDC facility, required to house the DAAC systems and staff, is being provided by the DOI. Though these funds are sufficient to complete construction of the basic physical plant, they are not sufficient to provide all of the essential equipment, furnishings and finished space to support full DAAC operations. Additional DAAC funding at the $1.2 million level will still be required over several years to provide the additional equipment, furnishings, and finished space that could not be accommodated within the base DOI construction funds, but are essential to support full DAAC operations in the post-1998 timeframe."

As stated in the Observations and Recommendations section of this report, EDC requested DAAC operations funds for power supplies, communications, computer and archive room conditioning, and finished office space for the facility addition. This request was made after DOI's appropriation for construction was cut from $12.6 million

to $9 million, and EDC's management decided to maintain the facility addition's original structural design, but scale back completion of the facility's interior.

In light of the above, we reaffirm our position on each of the three recommendations, and request that NASA management reconsider their position and provide detailed and specific information and data that clearly supports their position.

We have requested the Office of Inspector General at the DOI to initiate an audit of the entire EDC facility addition construction project, to include a detailed accounting of the use of $1.8 million in NASA funds during FYs 1994 and 1995. The results of this audit should provide us more precise verification of NASA DAAC operations funds that were used to augment the construction of the facility addition at the EDC.

Management's Response

National Aeronautics and
Space Administration

Headquarters
Washington, DC 20546-0001

Reply to Attn of: Y

JUN 22 1995

TO: W/Inspector General

FROM: Y/Assistant Associate Administrator for Mission to Planet Earth (Program Integration)

SUBJECT: NASA Response to Office of Inspector General (OIG) Draft Rapid Action Report on EROS Data Center (EDC) Distributed Active Archive Center (DAAC) Facility Addition (A-GO-95-001, 5/12/95)

In response to the subject OIG draft report, which was issued from the Goddard OIG to the Goddard Acting Director, relating to the Earth Resources Observation System (EROS) Data Center, the staff working on the Earth Observing System Data and Information System (EOSDIS) Project at GSFC has reconfirmed that the items for which NASA funds have been expended in FY94 and FY95 are appropriate "facility outfitting" according to the NASA Facility Project Implementation Handbook (FPIH), NHB 7320.9B, and are not being used or planned for use for construction of the EROS Data Center (EDC) expanded facility. Therefore, these funds should remain obligated for this purpose. Recognizing the concerns raised by the OIG, the Office of Mission to Planet Earth (OMTPE) will review plans and budgeting of FY96 and FY97 funds to be spent at EROS Data Center to ensure that these funds are also used only for appropriate facility outfitting.

We agree that, while there is no corresponding language in the statute, the FY94 Appropriations Conference Report language includes the following:

> "...deletes language proposed by the Senate prohibiting the use of Earth Observation System Data and Information System funds for the construction of non-NASA facilities...NASA is directed however to provide no funds for the construction on non-NASA facilities including the reimbursement of construction costs through annual data archive center operation budgets...all prior interagency agreements that would have permitted this are considered null and void."

Although this language was deleted from the statute, given that funds for construction of the facility were added to the Department of Interior (DOI)/United States Geological Survey (USGS) budget, NASA and USGS interpreted the Conference Report to mean that, while the earlier agreement between NASA and USGS needed to be changed, construction of the facility would proceed. This led to the new agreement that USGS would pay all costs for construction

of facilities and that NASA would pay costs for "unique ancillary systems and equipment" required to support the NASA Landsat 7 ground system and EOSDIS DAAC to be housed in the expanded facility.

The NASA Facility Project Implementation Handbook (FPIH) draws a clear distinction between "construction" and "outfitting." The FPIH defines "construction" as "alteration or repair of buildings, structures, or other real property" and "construction of facilities" as "a Congressional appropriation which provides contractual services for the repair rehabilitation, and modification of existing facilities; the construction of new facilities..." (page A-5).

The NASA FPIH defines "outfitting," on the other hand, as "the process of equipping a facility for its intended purpose with items that can be typically replaced or reconfigured many times over the life of the facility" (page A-14). Section 7.5 of the NASA FPIH (page 7-6) states that "projects or tasks associated with facility outfitting are not properly funded from the CoF appropriation but should be funded from either R&D or SFCDC appropriation. Facility outfitting begins when: The construction of a facility project or a portion of a facility, such as a work package or a specific area, is complete and has been accepted by the government. [and] Beneficial or joint occupancy is taken of the facility or a portion of a facility." Further, "Facility outfitting includes: data systems installation, systems furniture installation, telephone installation, furniture and equipment move-in, personnel move-in, maintenance services start-up."

Since the Conference Report limits its restriction on the use of NASA funding to "construction," it is our judgment that GSFC may properly fund facility outfitting required by GSFC at the new EDC facility (i.e. to support the Landsat 7 ground system and the EOSDIS DAAC). We believe that all of the items funded in FY94 and FY95 are in this category and are allowable as facility outfitting.

EDC (Memorandum from Donald T. Lauer, Chief of the EROS Data Center, dated June 2, 1995) describes the FY94 and FY95 expenditures of the GSFC funds as including:

FY 94:	UPS (Uninterruptible Power Supply) Cabling/Switchgear, NASA Computer/Communications Room Conditioning	$345K
	PBX (telephone) system for NASA area	$254K
	Total:	$600K
FY 95:	Raised Flooring, Signal Reference Grid	$263K
	Additional Air Conditioning/Cooling	$325K
	Communications Cabling/Equipment	$437K
	Cable Trays	$23K
	Modular Office Equipment/Furniture for NASA space	$156K
	Total:	$1200K

All of the items listed meet the definition of "outfitting" or are items that, once purchased, can be installed as a part of "outfitting." Several are mentioned explicitly in the FPIH, e.g., telephone (PBX) system and data systems (which include communications equipment and systems furniture) and the others are consistent with the examples given in the FPIH.

All of these items are needed to meet NASA requirements. The NASA systems require the communications equipment. NASA RMA (reliability, maintainability, and availability) requirements for the NASA systems to be installed in the EDC facility require the UPS back-up power system. The raised flooring is customary furnishing for computer system spaces and has to be specifically configured to provide airflow and cable pass through for equipment to be installed.

All of the listed items could be readily and repeatedly reconfigured as needed. It is clear that some of the actual installation of these items is proceeding prior to completion of the construction, but any of the items could as well have been installed after construction was completed. Given the tight overall schedule for the facility and the opportunity to minimize installation costs by doing some installation in parallel with construction, to do so is clearly reasonable and desirable.

We believe NASA's funding of these items is consistent with the Appropriation Bill language and intent. MTPE management will work with ESDIS Project to ensure that FY96 and FY97 funds are used only for appropriate facility outfitting and remain in compliance with the Congressional direction. If the OIG report recommendation is changed to focus on NASA ensuring appropriate "outfitting" expenditures, we would be able to concur in full. Otherwise, our response to the OIG's current specific recommendations is as follows:

OIG RECOMMENDATION 1:

GSFC's ESDIS Project Office should recover any funds already expended by EDC to augment construction of the facility addition.

NASA RESPONSE TO RECOMMENDATION 1: NON-CONCUR

The funds expended to date were required to provide the specific power, communications, and cooling needed to support the NASA computer systems in the EDC-provided facility. This was therefore outfitting, not a construction augmentation of the EDC facility addition and need not be recovered.

OIG RECOMMENDATION 2:

GSFC's ESDIS Project Office should take immediate action to reverse its decision to provide $4.2 million to augment the construction of the EDC DAAC facility addition.

NASA RESPONSE TO RECOMMENDATION 2: NON-CONCUR

As has been the case to date, future funding will only be supplied to the extent required to continue to provide the power, communications, and other outfitting needed to support the NASA systems in the EDC facility. OMTPE and the ESDIS Project will carefully review all expenditures and will only approve those that are outfitting required in support of NASA missions. The ESDIS Project will ensure that no funds are expended to augment construction of the facility addition.

OIG RECOMMENDATION 3:

GSFC's ESDIS Project Office should immediately notify management at the EDC DAAC that NASA funds in the amount of $4.2 million are no longer available to augment the construction of the EDC facility addition.

NASA RESPONSE TO RECOMMENDATION 3: NON-CONCUR

Consistent with NASA Response 2 above, the funds will be provided subject to the review described, and we will notify EDC management accordingly.

Douglas R. Norton

cc:
JX/Mr. H. Ellis
JX/Ms. W. Brubaker
LE/Ms. B. Cherry
YD/Mr. A. Montasser
GSFC/100/Mr. J. Rothenberg
GSFC/201/Ms. J. Clark
GSFC/OIG/190/Mr. D. Samoviski

United States Department of the Interior

GEOLOGICAL SURVEY
EROS Data Center
Sioux Falls, South Dakota 57198

IN REPLY REFER TO

DC 1-4

January 19, 1994

Dr. Dixon M. Butler
Operations, Data and Information
Systems Division
NASA (Code YD)
300 E Street, S.W.
Washington, D.C. 20546

Dear Dixon:

As I explained to you in my last letter, dated November 16, 1993, we are aggressively moving forward with the new building addition at the EROS Data Center. Enclosed is a copy of the pre-solicitation notice which recently appeared in the Commerce Business Daily--we expect to release the Request for Bids (RFB) on January 25.

When I visited with Charles Kennel last month on the UCLA campus, I invited him to join us at the Data Center in a "ground breaking" ceremony tentatively scheduled for Monday, May 2, 1994. I hope both Dr. Kennel and you will be able to participate in this event. Senior personnel from the Department of the Interior (DOI) and the U.S. Geological Survey will also participate. I will keep you posted as we firm up our plans for the ceremony.

We have been working with Greg Hunolt on defining the "unique ancillary systems and equipment" items needed to transition the basic DOI funded building addition into a fully-equipped and furnished Land Processes Distributed Active Archive Center (LPDAAC). As you recall, you and I have agreed that these unique facility related items would be funded by NASA in the amounts of $600,000 in FY 1994 and $1,200,000 in FY 1995, FY 1996 and FY 1997, using the funds which had previously been allocated by NASA to cover annual LPDAAC lease costs. Beginning in FY 1998, facility funding requirements would be adjusted to reflect only the costs required for operations and maintenance (O&M) of the building addition which houses the LPDAAC. My concern at this time is that Greg has informed us that the $600,000 available this year is being drawn from Version 0 contingency funds rather than from the previously identified O&M line item in the EOSDIS budget. I hope that this does not mean that the O&M line item for the LPDAAC facility has been lost. I am aware that Greg is developing a multi-year plan to address long-term funding profiles for all DAACs, and I hope that a funding source for facility-related activity can be retained in that plan, so that these expenses need not be considered a drain on system-wide DAAC contingency funds.

At your convenience, I would like to discuss this issue with you further.

Sincerely,

Donald T. Lauer
Chief, EROS Data Center

Enclosure

Copies to: G. Hunolt
R. Thompson

Record number:1
CBD Issue:12/28/1993
KEYWORD:GEOLOGICAL SURVEY
Y -- BUILDING ADDITION SOL 4-5029 DUE 031494 POC Teresa M. Henninger, Contracting Officer, (303) 236-5900 PRE-SOLICITATION NOTICE. Project includes the construction of an approximate 65,000 sq. ft. main level addition to the existing facility, with lower level mechanical and building support areas and related site work. Main level construction will consist of: main computer room (approximately 14,000 sq. ft), office space, conference rooms, lobby and atrium-connection to existing building. Lower level construction will consist of electrical and mechanical support space and digital archive area. Performance time is 515 calendar days. Work is to be performed at EROS Data Center, Sioux Falls, SD. The estimated cost of the proposed procurement is between $5,000,000 and $10,000,000. Plans will be available for inspection without charge at several builders exchanges located in Sioux Falls, SD; Minneapolis, MN; Brooklyn Park, MN; Omaha, NE; Sioux City, IA; Fargo, ND; and Rapid City, SD, contact the Contracting Officer, in writing, to request additional information regarding these locations. A non-refundable fee of $150.00 is required for plans and specifications. Potential bidders must request IFB 4-5029 in writing, and include a check payable to DOI - U.S. Geological Survey. Your written request for plans and specifications should include a check, name and street address, solicitation number, and complete telephone number, telephone requests will not be accepted. Requests for the invitation for bids should be submitted no later than January 15, 1994. Tentative issue date on or about January 25, 1994 with bid opening date approximately 45 days thereafter. This solicitation is issued on an unrestricted basis pursuant to the ''Business Opportunity Reform Act of 1988.'' (0357)

U.S. [GEOLOGICAL SURVEY], Procurement and Contracts Section, Building 25, Box 25046, MS 204B, Denver Federal Center, Denver, CO 80225

United States Department of the Interior

GEOLOGICAL SURVEY
EROS Data Center
Sioux Falls, South Dakota 57198

IN REPLY REFER TO: OC 6-2

June 2, 1995

Mr. Greg Hunolt
DAAC Systems Manager
Earth Science Data and Information
Systems Project
National Aeronautics and Space Administration
Goodard Space Flight Center, Code 505
Greenbelt, Maryland 20771

Dear Greg:

We understand that the National Aeronautics and Space Administration (NASA) Inspector General's Office has raised some concerns regarding the expenditure of NASA Distributed Active Archive Center (DAAC) operations funds for non-Automated Data Processing (ADP) equipment items at the EROS Data Center (EDC). This memorandum attempts to clarify the circumstances under which these expenditures are being made.

In accordance with our agreement, we are not using any of the funds provided by NASA for the construction of facilities, nor do we plan to do so in the future. As you know, a Congressional appropriation to the Department of the Interior is the source of construction funds for the EDC building addition. Thus, the U.S. Geological Survey is funding, in the amount of $9 million over 2 fiscal years, the construction of the addition according to the agreements made with Congress at the time of the initial FY 1994 appropriation. Again, I want to make it clear that we are not using NASA DAAC operation funds to cover any construction costs. Instead, NASA funds are only being used, as we had previously agreed, to purchase ancillary systems, non-ADP equipment, furniture and fixtures that are critical to the conduct of DAAC operations. These items are uniquely required to support the EOSDIS Core System, the Landsat-7 ground system, and other DAAC operations; or augmentations to existing equipment required to meet DAAC capacity specifications.

A listing of actual and planned expenditures in FY 1994 and FY 1995 for the acquisition of these items is enclosed, including summary explanations. We believe it is evident that these expenditures are required to support DAAC-specific computing, communications, and staffing, and that none of these expenditures are directed in any way to facility construction.

Specific plans for any additional expenditures in FY 1995 and beyond will be included in the submission of the DAAC's FY 1995 Work Plan in July and will be governed by DAAC equipment delivery schedules and the implementation of the DAAC operations staffing plan. Our intent is to work closely with your office on these plans in order to minimize any additional expenditures.

We hope that the concerns expressed by the Inspector General's Office can be resolved with appropriate explanation. Please let us know where we can be of assistance in gathering or preparing any additional information or documentation on this matter.

Sincerely,

Donald T. Lauer
Chief, EROS Data Center

Enclosure

Copy to: D. Butler
J. Dalton
J. Sturdevant
R. Thompson
L. Oleson

EDC DAAC
Actual/Planned Non-ADP Equipment Expenditures

FY 1994 Expenditures (Actual, $K)

Communications:	
• PBX Phone System	$ 254
Computer/Comm. Room Conditioning:	
• UPS Cabling/Switchgear	$ 346
	$ 600

FY 1995 Expenditures (Planned, $K)

Communications:	
• Communications Cabling/Equip.	$ 437
• Cable Trays	$ 23
Computer/Comm. Room Conditioning:	
• Raised Floor Covering/Signal Ref. Grid	$ 263
• Additional Air Conditioning/Cooling	$ 323
Equip Office Space:	
• Modular Office Equip/Furniture	$ 154
	$1200

Descriptions of Required Equipment

Communications - Includes general local-area network connectivity, and distribution to individual DAAC offices, work areas, labs, conference rooms, and training facilities. This also includes expansions to the telecommunications equipment for both standard telephone and video teleconferencing systems, including augmentations to switching gear, wiring, and appliances. This involves extending Ethernet service and fiber optic cable to each office and lab area of the DAAC. This assumes that NASCOM will provide connectivity to the main EDOS facility, and that most internal computer room and archive networking requirements will be met by ECS development contracts. These components are directly attributable to current DAAC O&M staff estimates and planned system deliveries. These expenditures for new communications systems and equipment would not be pursued if they were not required to support DAAC operations.

Computer and Comm. Room Conditioning - Involves the acquisition and installation of special computer electrical, grounding, and cooling equipment and systems in the DAAC computer room and communications area in preparation for the delivery, installation, and operation of DAAC systems. This includes uninterruptible power systems, emergency power generator(s), and additional power distribution equipment.

Also included is the installation of raised floor covering, as an integral part of the signal reference grid, in the DAAC computer and communications rooms. These expenditures for computer and communications room systems and equipment would not be pursued if they were not required to support DAAC operations.

Equip Office Space - Equip and furnish DAAC office space and work areas. This includes outfitting not only personal office space but also work areas and support space such as computer operations areas, visiting scientist and user assistance areas, training rooms, conference rooms, and clerical support areas. USGS funding is being used to build walls, ceilings, paint/carpet, etc.. NASA funding will be used to purchase partitions for converting open bay areas into partitioned work areas, and to acquire necessary fixtures and furniture. These expenditures to support DAAC staff would not be pursued if they were not required to support DAAC operations.