United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

JUL 7 1988

Honorable Sidney R. Yates
Chairman, Subcommittee on Interior
and Related Agencies
Committee on Appropriations
House of Representatives
Washington, D.C. 20515

Dear Mr. Yates:

The Conference Report on the Fiscal Year 1988 Continuing Resolution covering the Department of the Interior (page 881) states that "The managers agree that the Geological Survey in conjunction with other interested parties should develop program alternatives for the EROS Data Center which address the continuing funding problems and viability of the Center and present them to the Appropriations Committees by May 1, 1988." On April 8, 1988, we sent a letter to you requesting an extension of the May deadline until July 1 to enable the Geological Survey program review team to finalize recommendations and present them to the Director of the Survey. Your letter to us dated April 11, 1988, granted us that extension.

Over the past several weeks, we have been working closely with the Office of Management and Budget, the National Oceanic and Atmospheric Administration, and the National Aeronautics and Space Administration, to incorporate comments and address concerns raised by these organizations. We have completed the report and are pleased to submit it to the Appropriations Committees.

An identical letter is being sent to the Honorable Robert Byrd, Chairman, Subcommittee on the Department of the Interior and Related Agencies, Committee on Appropriations, United States Senate.

Sincerely,

Rick Ventura
Assistant Secretary
Policy, Budget and Administration

Enclosure

United States Department of the Interior

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of the Interior and Related Agencies
Committee on Appropriations
United States Senate
Washington, D.C. 20510

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DEPARTMENT OF INTERIOR

U.S. GEOLOGICAL SURVEY

REPORT TO CONGRESS
ON PROGRAM ALTERNATIVES
FOR THE
EROS DATA CENTER

July 1, 1988

INTRODUCTION

In the Conference Report on the fiscal year (FY) 1988 Continuing Resolution covering the Department of the Interior, page 881, the Congress states

> The managers agree that the Geological Survey in conjunction with other interested parties should develop program alternatives for the EROS Data Center which address the continuing funding problems and viability of the center and present them to the Appropriations Committees by May 1, 1988.

This report has been prepared in response to the Congressional request.

In April 1987, the Director of the USGS requested an internal program review of the EROS Data Center (EDC), which is currently ongoing. At that time, EDC was faced with the possiblility of budget reductions for two reasons. First, EDC, in the past, has received approximately 40 percent of its funding ($6.7 million) from the National Oceanic and Atmospheric Administration (NOAA) for Landsat operations. Due to the commercialization initiative whereby Landsat operations are being turned over to a private company, Earth Observation Satellite Company (EOSAT), and given that Landsats 4 and 5 are not expected to continue operating after 1988, the President's Budgets for NOAA have not requested funding for EDC in FY 1987, FY 1988, or FY 1989. Second, a reduction of $1.5 million for EDC was proposed in the President's FY 1988 Budget in an effort to reduce Federal expenditures to control the Federal deficit. As the USGS program review was in progress, the immediate funding problem was solved for FY 1988 by Congressional action.and a National Oceanic and Atmospheric Administration (NOAA) reprogramming of funds for Landsat operations from which funding was transferred to the USGS However, these funds will no longer be provided beginning in FY 1989.

Much of the information and discussion in this report is derived from the activities of the program review team. The team consists of representatives from the USGS Director's Office, the divisions of the USGS, EDC, NOAA, the National Aeronautics and Space Administration (NASA), the Defense Mapping Agency (DMA), and is chaired by the

USGS Assistant Director for Programs. The team has conducted interviews and held discussions with numerous officials and scientists from the Department of the Interior bureaus, NOAA, NASA, and the Department of Defense (DOD) agencies, and others. The purpose of the discussions was to review the activities of EDC and ascertain their value to those organizations making use of its products and services.

BACKGROUND

The Department of the Interior established the Earth Resources Observation System (EROS) program in 1966 and placed management responsibility for the program in the USGS. The EROS Data Center was established in Sioux Falls, South Dakota, in 1971 to archive and distribute NASA land remote sensing satellite data and for applications development and training associated with Department of the Interior use of remotely sensed data. The present facilities outside Sioux Falls were completed in 1973. Under a 20-year lease-purchase agreement, the USGS will gain full ownership of the facility in 1993. In 1983, EDC was assigned organizationally to the USGS National Mapping Division and is now a major field center of that division.

In 1979, Presidential Directive (NSC-54) assigned to NOAA the management responsibility for civil operational land remote sensing activities in addition to its ongoing atmospheric and oceanic responsibilities. In FY 1983, responsibility for the management of Landsat Multi-Spectral Scanner data handling was transferred from USGS to NOAA with the understanding that EDC would continue to provide support services. Budget authority and sales revenues were also transferred to the Department of Commerce.

Land Remote Sensing Commercialization Act of 1984 (P.L.98-365)

Under the provisions of the Land Remote Sensing Commercialization Act of 1984 (P.L. 98-365) EDC has been receiving funds (as shown in Table 1) from NOAA to maintain, reproduce, and distribute Landsat data for EOSAT, the commercial operator of the Landsat system. Since 1986, EOSAT has received all revenue from the sales of data through USGS. EOSAT markets and sells Landsat data and receives approximately $8 million annually in sale revenue.

Since the establishment of the EROS Data Center in 1971, the programs and activities have become significantly broader and have expanded beyond the initial archiving and distribution of NASA land remote sensing satellite data. Currently, about one-third of the Center's resources are devoted to Landsat-related activities, while the remaining two-thirds are devoted to the production and distribution of earth-science data and other types of remotely sensed data, including research in remote sensing and spatial data analysis; applications development; and user education.

EDC produces and distributes specialized image map products and conducts research to improve data processing techniques and geographic information systems (GIS), which assist land managers in making land-use planning decisions. EDC accesses, archives, and distributes aircraft and civil satellite land remote sensing data, and provides analytical services to a wide variety of data users. Scientists and technicians at EDC carry out a broad program of research and development of advanced information systems employing remote sensing, cartographic, and digital earth science data.

In 1986, the USGS and NOAA signed Memoranda of Understanding (MOU) covering establishment at EDC of a National Satellite Land Remote Sensing Data Archive, called for by P. L. 98-365, and associated Federal research activities, and on March 16, 1988, USGS and NASA signed an MOU covering use of EDC for processing, distributing, and archiving land remote sensing data acquired by NASA's research and development and experimental activities. Implementation plans are now under development.

PRESENT SITUATION

Current Staffing and Funding Situation of the EROS Data Center

At the present time, personnel strength at EDC is about 50 Federal employees and about 260 contract employees. The mix of Federal and contract employees allows EDC to react with some degree of flexibility in responding to project needs, changes in priorities, and funding uncertainties.

Funding for EDC for Fiscal Year 1987, estimated for Fiscal Year 1988, and proposed in the Fiscal Year 1989 President's Budget is as follows (in millions):

Table 1

Funding for EROS

	FY 1987 (Actual)	FY 1988 (Enacted)	FY 1989 (Requested)
USGS	$8.9	$8.6	$7.1
Data Sales (non-Landsat data)	1.5	1.7	1.7
NOAA	6.7	5.2	0.0
Other Agencies	1.1	1.8	2.3
TOTAL	$18.2	$17.3	$11.1

Current Data Holdings and Sales

Currently, EDC has holdings of over 8 million frames of aerial and space photography in its archive, as well as 100,000 magnetic tapes of digital remote sensing, cartographic, and earth-science data. Sales of products from these holdings will account for approximately $1.7 million in FY 1988 and are growing at 5 to 10 percent annually.

Open Issues Affecting the Future of the EROS Data Center

There are several issues that are still pending and may have an impact on the future of the EROS Data Center. These items are discussed below:

FUNDING

The budget requested for the EROS program in FY 1989 is $1.5 million less than FY 1988; from $8.6 million down to $7.1 million. The FY 1988 President's Budget proposed a $2 million reduction which consisted of a redirection of $1 million to fund a program increase of $1 million for the Advanced Cartographic Systems, a high priority request of the USGS. An additional decrease of $1 million was proposed to defer lower priority applications, development, and research activities. Congress added $1.5 million above the President's budget request to the EROS program in FY 1988.

From FY 1983 through FY1988, EDC has received funds from NOAA as part of the commercialization called for in P.L. 98-365. The FY 1989 President's Budget for NOAA requests no funds for Landsat operations since Landsat 4 and 5 satellites have already exceeded their design life and it was assumed that they would cease operating in FY 1988. If Landsats 4 and 5 remain operational, the issue of funding will be considered at that time. The reduction in funding from FY 1988 to FY 1989 is a decrease of $5 million. Accordingly, if support is continued for the Landsat program, alternative sources of funding will have to be identified.

National Satellite Land Remote Sensing Data Archive

A second significant pending issue is the status of the National Satellite Land Remote Sensing Data Archive called for in P.L. 98-365. In May 1986, USGS and NOAA signed an MOU that provides for USGS to operate and maintain the archive if funding becomes available. NASA has subsequently agreed with this approach.
P.L. 98-365 delegates responsibility for the National Satellite Land Remote Sensing Data Archive to the Secretary of Commerce. A portion of the money transferred by NOAA from Landsat operations each year to EDC in support of Landsat data reproduction and distribution has been used to perform some basic archive-related activities.

The current USGS estimate to operate and purchase equipment for the archive is $4.0 million per year in the initial years. This figure would decrease in the outyears following initial systems

implementation. The cost to acquire desired data from EOSAT and other commercial sources in order to complete and continue the basic data sets for the archive will be determined by the amount of data the government decides to purchase.

It is anticipated that a General Accounting Office review of United States and international plans and activities associated with archiving environmental satellite data, scheduled for completion in the summer of 1988, will be of use in further evaluating and resolving the archive issue.

NASA's Experimental Remote Sensing Program

Also pending is USGS's role in participation with NASA in activities related to NASA's experimental remote sensing program. This issue is in the early stages of discussion and negotiation and has the potential for significant future funding and activity for EDC. It is worthy of brief discussion in this report.

Consistent with the NASA/USGS MOU signed March 16, 1988, NASA has proposed a short-term role in which EDC would archive NASA aircraft and shuttle data, including Airborne Visible and Infrared Imaging Spectrometer (AVIRIS), Thermal Infrared Multi-spectral Scanner (TIMS), and Synthetic Aperture Radar (SAR) aircraft data. Such activities would provide beneficial interaction and experience in preparation for handling similar data later in the mid-1990s.

The MOU outlines the possible USGS and EDC role in the planned Earth Observing System (EOS), which may be flown in conjunction with the NASA Earth Orbiting Space Station. Current preliminary discussions indicate that EDC activities could double by FY 1995 because of EOS-related efforts, including equipment to support EOS operations. The EOS sensors will work at very high data rates, and the resulting large volumes of land remote sensing data will require extensive processing and archiving capabilities. The USGS will have a significant role in assisting NASA in the design of the sensors needed for gathering the basic earth-science data sets. In addition to the equipment, potential exists for significant funding to support EOS operations at EDC. However, EOS is not an approved NASA program and will have to compete against other high priority NASA programs for funding resources.

Federal Global Change Program

An issue with broad implications is the future role of Federal agencies in developing the Federal global change program. Potential exists for EDC to have involvement in research and development of data base structures for the management, exchange, and analysis of large quantities of earth-observation data. Data will originate with the various agencies, with differing technical expertise. It will be stored in formats that can be retrieved and interpreted by others, and exchanged or used over long distances by scientists in many organizations worldwide. Landsat archival data, USGS earth-science data sets, EOS data, and global circulation models are examples of data that may be used in the program.

Although the EDC may be a resource in this effort, it should be noted that interagency planning for global change activities is in a very preliminary stage. The merit of EDC participation in the program will have to be considered in the context of the overall global change research, observation, and data management priorities.

Reimbursable Funding at EDC

A remaining issue is the level of involvement of other agencies including bureaus of the Interior Department, the DOD agencies, the Central Intelligence Agency (CIA), and the Agency for International Development (AID), among others with activities at EDC in terms of participation and funding. Table 2 reflects levels of reimbursable funding from various sources for FY 1986 and FY 1987 and projected estimates for FY 1988 and FY 1989.

Table 2

Reimbursable Funding at EDC

(Dollars in Thousands)

Source	FY 1986	FY 1987	FY 1988 Estimate	FY 1989 Estimate
DOI Bureaus	219	49	198	165
DOD/CIA	155	558	332	585
AID	--	18	1,015	1,000
NASA	--	--	77	50
NOAA	6,700	6,700	5,225	--
NOAA (AVHRR-related)	574	--	--	--
Receipts from non-Landsat Products	1,335	1,525	1,700	1,750
Other	228	346	386	330
TOTAL	9,211	9,196	8,933	3,880

OPTIONS FOR THE EROS DATA CENTER

Three principal options were considered for the future of EDC. These are derived from analysis of the findings of the internal program review. These options are as follows:

1) Establish and implement a well-defined multiagency activity in remote sensing and earth-science data archiving, data management, research, and data analysis, with EDC as an integral core participant.

2) Cover the funding needs of the EROS Data Center from within the current USGS budget.

3) Close the EROS Data Center and transfer those functions that are critical to USGS activities to other locations.

Discussions of Options

Option One

Establish and implement a well-defined multiagency activity in remote sensing and earth science data archiving, data management, research, and data analysis, with EDC as an integral core participant.

Under this option, EDC would continue and, in some cases, expand activities in information systems research and development, data management, archiving, product generation and analytical services for remote sensing, GIS, earth science, and cartographic data. We believe option one would provide the most benefit to the Federal government by providing the required support to those organizations involved in remote sensing and earth science activities. Under this option, the technological evolution of EDC would continue and its value to USGS and other clientele organizations, such as the land and resource management bureaus of the Department of the Interior, would continue.

In order to implement this option a number of organizations (including Department of the Interior, Department of Commerce, NOAA, NASA, DOD, AID, and other clientele organizations) would need to make a concerted and coordinated effort to determine the relative priority of this program vis a vis the other agency programs.

Option Two

Cover the funding needs of EDC from within the current USGS budget

Complete funding would call for redirection of funds ($7 million) from other programs within the USGS, many of which have been reduced in the recent past or have been proposed for reductions to meet deficit reduction targets. Financial support required from other programs would create management problems.

Further, the current activities of EDC, while considered important by a number of organizations, are not all directly supportive of USGS programs and would not be the highest priority for the USGS.

Option Three

Close the EROS Data Center and transfer those functions that are critical to USGS activities to other locations

Certain functions, such as research and development for advanced information systems, including geographic information systems (GIS) would be transferred to other mapping field centers. Aerial photography, archiving and dissemination activities, as well as data production functions, would be transferred. However, Landsat and other satellite data production, processing, and archiving would no longer be performed by USGS. In addition, land remote sensing research and applications activities, and most technology transfer activities would be discontinued if EDC was closed.

In addition to the elimination of these activities and services, the capabilities of the highly skilled EDC workforce would be lost to other organizations. The nature of the contract work force with its mix of talents, the modern and adaptable physical facility, and the state-of-the-art hardware available, provide management with considerable flexibility to respond to changes in technology and priority of the work to be done, as well as to respond to the needs of a wide variety of customers.

The personnel, services, and products of EDC are valuable to the USGS and other organizations, especially field level offices of the bureaus of the Department of the Interior with land or resource management responsibilities. Representatives from USGS and the other offices state that they anticipate making continuing use of the capabilities of EDC, and that it would be expensive and duplicative for them to establish in-house capability comparable to EDC.

COMPONENTS OF A MULTIAGENCY ACTIVITY

Although no final decisions have been reached with respect to EDC's future, USGS is pursuing the multi-agency approach. The EROS Data

Center already houses the basic activities that are the essential component of a multiagency activity. The program review has reaffirmed the value of EDC to many organizations. Closing EDC would either result in organizations losing capability in land remote sensing of spatial data analysis, or having to determine whether to develop their own in house capacity to perform the work now done in cooperation with EDC.

The multiagency activity, involving the support and participation of many different organizations, would build upon current EDC activities and capabilities. In general, these activities would include information systems research and development, applications development, data management, archiving, product generation, and analytical services for remote sensing, GIS, earth science, and cartographic data. EDC activities and capabilities would support the mission of the USGS and would be within the scope of USGS authority. The activities described below would represent an evolution and enhancement of the role EDC has had in working with the other organizations over the years.

U.S. Geological Survey

The following are representative of the activities at EDC that would continue to be conducted, and could be enhanced, in support of USGS programs:

- Aerial photography archiving, distribution, and information system support.

- Production digitizing of selecting National Digital Cartographic Data Base digital line graphs and thematic data for USGS GIS support.

- Image processing and image mapping research and development relating to the application of satellite and digital aircraft data to USGS earth science and cartographic activities.

- Software development and systems definition support for the development of cartographic and GIS data standards.

- Development of hydrologic applications of remote sensing and GIS techniques in cooperation with the Water Resources Division of the USGS.

- Development of computerized analysis techniques in support of and cooperation with the Geologic Division programs.

- Archiving and distribution of USGS earth science data sets.

- Development of prototype GIS systems.

- Operating the Advanced Very High Resolution Radiometer (AVHRR) data receiving, processing, and analysis system at EDC for providing research products to the scientific community that are specially related to land applications.

Other Department of the Interior Bureaus

The EDC has played a major role in the development, demonstration, coordination, and integration of remote sensing techniques and applications in the bureaus of the Department of the Interior. It is expected that EDC will continue to be the principal remote sensing facility and focal point for spatial data handling and processing for the bureaus of the Department.

Reimbursable revenue from work conducted in support of DOI bureaus is estimated at about $500,000 in FY 1990 and would likely remain relatively constant.

National Oceanic and Atmospheric Administration

The EDC would continue to work with NOAA and provide support for number of cooperative activities. These may include the following:

- Support for Landsats 4 and 5 (MSS and TM) data archiving, product generation, and distribution during transition to full commercial operations of the Landsat 6 system. The possibility exists that EDC could continue to fill customer orders for Landsat MSS data products after the demise of Landsats 4 and 5, if EOSAT elects to reimburse EDC for such services.

- The National Satellite Land Remote Sensing Data Archive could be continued at EDC as covered by the 1986 MOU between NOAA and USGS in response to the 1984 Act. The archive would be a repository for basic ongoing land remote sensing data sets. The issue is the relative priority of this program vis a vis other agency programs and how to fund this activity in times of constrained budgets.

- Participation in the Cooperative Land Remote Sensing Research Program at EDC established by MOU between NOAA and USGS in 1986. Since 1986, NOAA has placed one research scientist at EDC to participate in the program. The Soil Conservation Service joined the program in 1988 with one scientist, and there is potential for additional growth. The 1984 Act encourages Federal agencies to cooperate in remote sensing research programs.

In FY 1988, NOAA provided $5.2 million to USGS for EDC support for Landsats 4 and 5 data handling, product generation, and archiving.

National Aeronautics and Space Administration

A major initiative is under discussion with NASA that has the potential for providing significant funding, mostly in future years, for joint activities with EDC. This initiative involves cooperation in the design, development, and operation of the EOS data and information system.

Beginning as early as FY 1990, there is a possibility for NASA providing some support for development activities and handling of experimental aircraft and shuttle data leading to EOS in the mid-1990's. NASA has estimated that the land data elements of EOS activities may involve funding of equipment to be placed at EDC and annual support for operations.

It should be emphasized that the NASA-related activities discussed above represent significant potential for funding, but are dependent on the future of EOS as it is developed in the scientific and budgetary climates of the next few years.

Agency for International Development/Department of State

International development and assistance agencies have expressed a need for timely and accurate geographic and cartographic information describing the location, condition, and extent of resource assets, so that problems such as food shortages, drought, deforestation, can be rapidly assessed, remedial actions better managed, and development programs defined. In response to these agencies, EDC has and will continue to provide technical assistance in remote sensing and GIS applications for resource assessment and monitoring in less developed regions and countries. The ultimate

goal is to make the tools and techniques useful to the nations involved and to transfer them to those nations or to regional centers.

These activities are fully reimbursed by AID and other donor organizations. Funding is projected to be about $1 million in FY 1988 and FY 1989 and has the potential to increase in the future.

Department of Defense and Intelligence Community

EDC has the capability to provide expanded assistance to the defense and intelligence community for exploitation of civil land remote sensing satellite data and GIS technology for military and intelligence purposes. Assistance includes data acquisition, data cataloging and indexing, data processing, software development, product generation, data analysis, applications development, research and development, and training and technology transfer.

Reimbursable funding for these activities for FY 1988 is expected to be about $323,000 and could be higher in the future.

Other Federal Agencies

The approach to providing customer products, software services, and general support in remote sensing and GIS applications to other Federal agencies, such as agencies in the Department of Agriculture (Agricultural Research Service, Soil Conservation Service, and Forest Service) and would continue to be based on a case by case assessment of the mutual benefit to USGS and the other agency, the size and scope of the request and the resources available, and the potential for success. Reimbursable revenue from these sources is expected in FY 1990 to be about $500,000 and may grow to about $1 million in the future.

Private Sector/Commercial Support to EDC

The EDC could receive support from private industry for conducting certain activities at EDC and making use of EDC facilities. Some examples follow:

- EOSAT will continue to have the exclusive right to market Landsats 1-5 MSS data during the lifetime of Landsat 6. To the

extent that there is demand for these data, EOSAT may find it cost-effective to reimburse EDC for responding to requests for MSS data products under terms negotiated among NOAA, USGS, and EOSAT.

- The participation of industry in cooperative research programs, such as contemplated by the NOAA-USGS Cooperative Land Remote Sensing Research Program.

CONCLUSION

In summary, the USGS and the EROS Data Center are faced with a number of programmatic issues affecting EDC's future. These issues, include the responsibility and funding for the National Satellite Land Remote Sensing Data Archive; USGS participation in NASA's Earth remote sensing programs; involvement of other agencies with activities at EDC; and EDC's role in the Federal global change program. The resolution of these issues is dependent on the involvement and support of other organizations.

The USGS is working with the other agencies to address these issues. This will require careful coordination with those agencies, the Administration, and the Congress.

The USGS is working with these other agencies to develop, enhance and expand prospects for the ongoing multiagency activities previously described, as follows:

- Federal and State agencies who have utilized EDC capabilities in the past are being made aware of the human and technical resources now available to them at EDC and are being encouraged to expand their reimbursable activities there. In addition, an active outreach program is underway to make other non-traditional users aware of EDC technology transfer capabilities.

- The President's Science Advisor has established the Committee on Earth Science (CES) under the Federal Coordinating Council on Science, Energy, and Technology (FCCSET). CES is charged with coordinating all Federal earth-science programs and currently is actively engaged in pursuing this role with respect to a multi-agency Global Change Program. CES has tasked an Interagency Working Group concerned with data management to address the preservation of the environmental record as

contained in satellite and other remote sensing data. If the archive is continued, it could support U.S. climate efforts and be a resource for a broad spectrum of research efforts. The activities of CES can be expected to assist this process due to the Government-wide involvement of 11 agencies concerned with global change information, and this will clarify what role EDC may have in the Federal program.

- NASA and USGS signed the MOU for "Experimental Land Remote Sensing Data Processing, Distribution, Archiving, and Related Science Support" on March 16, 1988, and USGS has increased involvement in the NASA planning process. NASA aerial photography, Skylab data, shuttle photography, large format camera, Thermal Infrared Multi-Spectral Scanner (TIMS) and other NASA data already is at EDC. Preliminary discussions on NASA experimental aircraft data archiving and distribution have been held with NASA Headquarters, Jet Propulsion Laboratory, and Ames Research Center. USGS is a member of the RFP Technical Evaluation Panel for NASA's proposed EOS program, and is closely associated with the evolution of this planned program. If the EOS program becomes a reality in the 1990's USGS can be prepared to assume an active role in data management and science support as outlined in the 1988 MOU.

USGS is committed to fully explore the prospects for a multiagency activity at EDC, and the opportunities this approach offers for USGS/EDC to expand its traditional science mission. The key to the success of this approach lies in the support and involvement of other concerned agencies USGS is actively pursuing this support.