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Memorandum

To: Executive Committee
From: Chief, Office of Earth Sciences Applications
Subject: Briefing on the EROS Office, 9:00 a.m. March 26, 1981

On Thursday we will meet to discuss the future of the EROS Office, with particular emphasis on the future role of the EROS Data Center. The enclosed document is provided as background for our discussion.

Gene A. Thorley

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Enclosure

THE FUTURE OF THE EROS OFFICE

Background

The EROS Office was established within the Geological Survey by the Department of the Interior in 1966 to carry out and sponsor a broad range of activities related to the application of remote sensing technology to the inventory, monitoring, and management of the Earth's resources. In the early years (1966-1970), the office activities were concentrated on sponsoring research within the Department directed at the eventual operational use of conventional and space-acquired remote sensing data for satisfying resource managers' needs for information, and serving as the Departmental spokesman for consolidating inputs and requirements for the emerging experimental satellite remote sensing program within NASA.

From 1970 to 1975, the office assumed, with the creation of the EROS Data Center in Sioux Falls, South Dakota, major responsibilities for processing, archiving, and distributing large quantities of remote sensing data from NASA satellites (Landsat) and Interior-acquired and -held aerial mapping photography. In addition, the office carried out significant applications research and cooperative demonstration projects, trained and assisted Interior and other users in the use of remotely sensed data acquired from aircraft and spacecraft, became a major participant with the Survey's Topographic Division (now National Mapping Division) in the National

Cartographic Information Center (NCIC) program, and generally developed substantial expertise in the advanced computer data handling and analysis technology.

During the late 1970's (1975-1980) the EROS Data Center implemented digital data processing systems for satellite data and assumed an increasing portion of the Landsat ground system processing responsibilities. By 1980, some 75 percent of office personnel and 90 percent of EROS Congressional appropriations were being used at the EROS Data Center for ongoing data handling, applications research, and technology transfer activities, generally directed at Interior's needs, but also encompassing to a limited degree the needs of other Federal agencies, international users, and the general public. In FY 1980, the EROS Data Center had a total operating budget of over \$16 million annually, employed some 400 professionals and technicians, operated equipment and facilities costing over \$40 million, and had become nationally and internationally recognized in the field of remote sensing technology.

Another development important to the future role of the office and Center evolved from the Center's activities in handling remote sensing data. The Center is currently handling and using large quantities of other forms of digital data in addition to traditional remote sensing data. Significant research activities are underway in the use of spatial data bases and information systems that employ not only satellite data, but digital cartographic, geophysical, climatological, geographic, and other disparate data sets. The Center possesses considerable experience in the development, creation, and use of large digital data bases and

remote access technology that results from its work with Landsat data, the Main Image File and Image Inquiry Ordering and Accounting (INORAC) systems, and the NCIC remote terminal network.

In November 1979, the White House issued a Directive on Civil Operational Remote Sensing (NSC-54) committing the Nation to an operational system and assigning NOAA the management responsibility for such a system. Pursuant to Directive NSC-54, NOAA prepared and issued a "Transition Plan for Civil Operational Land Remote Sensing from Space." This plan called for the transfer of Landsat data archiving, processing, and public distribution functions from the EROS Data Center to the NASA Goddard Space Flight Center in Maryland in the FY 83-FY 84 time period. The plan further documented the NOAA and Interior agreed-upon position that the EROS Data Center would continue to be operated by Interior as an Interior User Facility, providing aircraft and satellite Earth resources information and data products, applications research, analytical services, training, and technical assistance to Interior bureaus and offices.

Current Situation

There is now, and for the immediate future will continue to be, some uncertainty as to the Nation's detailed implementation plan for civil satellite land remote sensing. This uncertainty involves FY 82 and FY 83 budget considerations, policy direction on system cost recovery and eventual private sector ownership and operation of the system.

What is clear is that, sometime in the 1980's, the EROS Data Center will give up the Landsat data archiving and public distribution functions to either NOAA, in the FY 83-FY 84 time period, or to a private sector owner/operator somewhat later in the decade.

The EROS Data Center currently dedicates \$3.3 million in direct costs of its total operating budget of \$16.5 million to the Landsat data handling and public distribution function. \$2.2 million of this sum is from reimbursable receipts from the public sale of Landsat products, and \$1.1 million is from Congressional appropriations to Interior. Approximately 45 contractor support personnel are devoted to this function at the Center.

The Future

The future role of the EROS Office is based on the increasing need of the Geological Survey and Department for efficient access and analysis of timely information about the Federal lands and resources necessary to making intelligent decisions concerning the value of these lands and their management for multi-purpose use, i.e., resource development and environmental protection/enhancement. The projected future role of the EROS Office also recognizes the developed expertise and capabilities of the Data Center in handling large quantities of digital data, in developing and implementing spatial information systems, in analyzing and extracting meaningful information from a variety of disparate data sources, and in telecommunications and remote access/data relay technology.

In the future, the EROS Office will increasingly concentrate on Interior's, and particularly the Geological Survey's, need for access to timely information in usable formats necessary to the effective management of the Nation's lands and resources. Specific responsibilities of the program will include the coordination and integration of Interior requirements for satellite remote sensing data and space technology; the collection, processing, and distribution of satellite and aircraft acquired remote sensing data to satisfy Interior's information needs; the research and development of techniques for applying remote sensing and other forms of spatially related data to Interior's information needs; the development and implementation of spatial information systems capable of integrating many forms of digital data with remote manipulation, analysis, and access capabilities; and providing analytical services, training, and technical assistance in support of Interior's use of remote sensing and other forms of spatially related data.

EROS Reston Office

Organizationally, the EROS Office in Reston will concentrate on program management, fiscal administration, interbureau coordination, and liaison with the other Federal agencies and governmental organizations. Research in the applications of remote sensing will be carried out in cooperation with EDC and EROS/Flagstaff.

EROS Data Center

The EROS Data Center and associated field personnel will carry out research, development, implementation, assistance, and technical support activities. The EROS Data Center will be operated to satisfy Interior, and particularly Geological Survey, needs as a user of remote sensing and other forms of spatially related digital data.

Remote Sensing Data Handling

EDC, as a centralized Interior support facility, will access the digital data stream from available satellite data processing sites and will use existing equipment and facilities to produce those unique data products required by Interior's bureaus and offices. EDC will continue to archive, maintain, and process Interior aerial photography, making copies available as required by Interior's bureaus and offices. EDC will also continue to make copies of the Interior aircraft data available to the general public via appropriate Freedom of Information regulations.

Research and Development, Technical Assistance, and Analytical Services.

Research and development will continue at the Center in cooperation with other bureaus and offices of the Department, addressing the information needs of those bureaus and offices. Training, user assistance, and other forms of technology transfer will, likewise, be directed at the bureaus of the Department. Analytical services will be provided to the bureaus and offices of Interior as needed.

Spatial Information Systems

In addition to the ongoing activities related to remote sensing data, the Center will, in cooperation with other Divisions of the Survey and bureaus of the Department, develop an efficient system for accessing, manipulating, and analyzing a variety of spatial data sets and data bases. The Interior and Geological Survey's expanding need for data and information about Federal lands and resources strongly supports the development of such a system. Advanced concepts in spatial data (image and nonimage) acquisition, mass storage, manipulation/registration, numerical analysis, communications/transmission, data display, and distributed processing, will provide opportunities to improve the efficiency of Survey and Interior operations in many Earth science areas.

More than 250 digital Earth resources data bases currently exist within the Geological Survey alone, including terrain and map data from the National Mapping Division; water data from the Water Resources Division; geophysical, geochemical, and geological data from the Geologic Division; and multispectral satellite and aircraft data from the Office of Earth Sciences Applications. The many resource managers and Earth scientists within the Survey and Interior frequently do not have knowledge of the existence of some of these data bases and currently have limited ability to access, merge, and analyze the disparate data sets.

The Center will, during the 1980's, develop and implement an Earth Resources Information Network (ERIN) to (1) allow USGS and other DOI field personnel to bring directly to their offices a variety of digital-spatial data of site specific

areas, and (2) allow these field personnel to perform numerical analyses of these data at a terminal in their offices with the assistance of more powerful computers within the network. The proposed network will be serviced from a central location and will provide access to a variety of resident and nonresident digital Earth resources data bases for operational use by field personnel. This network will act as a "broker" for these various data bases.

Upon request by USGS or other DOI Field Offices the Center will, for any site specific geographic area, acquire and reformat to a common base, disparate data types and register these data to a common geographic reference. Interior field personnel will have available low-cost terminals which not only will have the capability of displaying various data sets, but will be able to apply various processing algorithms to combine, analyze, and synthesize the available data. On demand, field personnel can task the central processing facility in the network to apply more complex processes to larger quantities of data with an output of hard copy products.

In addition, the Center, in cooperation with other Survey divisions, will (1) conduct research on advanced methods for handling and analyzing spatial data, and (2) engage in technology transfer activities to expedite the use of digital-spatial data in their appropriate programs.

The benefits to the USGS of the applications of the EROS Data Center's capabilities to access digital data bases, analyze digital-spatial data, and disseminate resulting products are in three areas: (1) the availability of a variety of types of digital-spatial data and an ability to analyze these data via remote

terminal/display stations will enhance the USGS's ability to cope with pressing national programs in energy, nonfuel minerals, water resource management, and regulation; (2) the implementation of a resource information network will greatly assist the USGS's advancement in information technology related to the Earth sciences; and (3) the network will bring together and make available a number of digital data bases already existing or being developed within the USGS, thus fostering greater interaction and responsiveness between the Divisions.