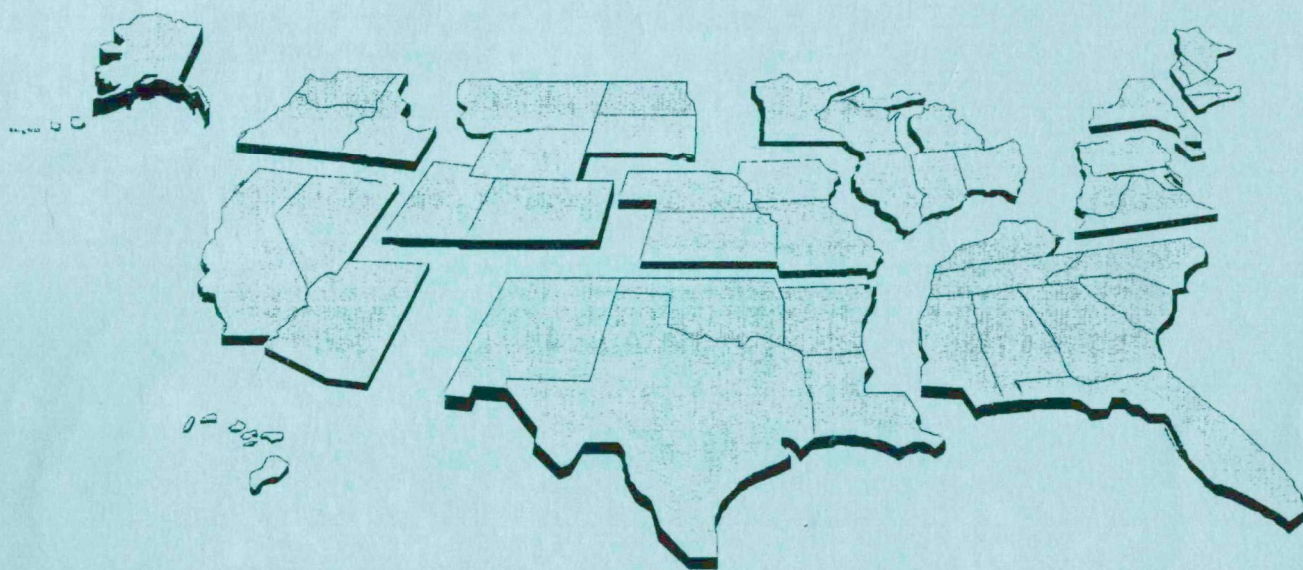




# Remote Sensing Program for EPA

## FY 2000 Program Summary



**Remote Sensing Program for EPA  
FY 2000 Program Summary**

**Environmental Photographic Interpretation Center  
(EPIC)**

**February 2001**

**U.S. Environmental Protection Agency  
Office of Research and Development  
National Exposure Research Laboratory  
Environmental Sciences Division  
Landscape Ecology Branch  
Las Vegas, Nevada 89193-3478**

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## **Notice**

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## **Foreword**

Since the mid-1970s, the Environmental Protection Agency (EPA) has employed aerial remote sensing technology as a method of assessing environmental condition and change. Aerial photographs along with other sensor images are used to assist Agency officials in assessing emergency response situations; for discovery and identification of new sites; and for analyzing and characterizing environments at site-specific to regional scales. In order to accomplish these processes, and to provide technical support to Agency Program and Regional offices, acquisition, processing, and interpretation of aerial photographs and other remote sensing data are conducted by the Environmental Sciences Division (ESD) of the Office of Research and Development (ORD) through the Landscape Ecology Branch, Environmental Photographic Interpretation Center (EPIC), and its remote sensing capabilities in Las Vegas and in Reston, Virginia.

In FY 99, EPIC initiated a new remote sensing research and development program. Research plans were prepared and underwent peer review. During FY 2000, reconciliation of the peer reviewer's comments was completed and research commenced in FY 2000.

In FY 2000, EPIC awarded a new 5-year (one base period, and four 1-year option periods) remote sensing support contract with an expanded scope of work for supporting the remote sensing requirements of the Agency. The new contract provides the traditional remote sensing technical support activities in aerial photographic data collection, processing, and analysis, but it also provides digital (airborne and spaceborne) remote sensing data collection and analysis support to EPA remote sensing researchers, Regional and Program offices, and laboratories.

This program summary is prepared annually to provide Agency managers with an overview of resource expenditures and program activities involved with both remote sensing technical support and research and development activities.

## **Superfund Program Support**

The Environmental Sciences Division (ESD) in Las Vegas, Nevada, of the Office of Research and Development, provides remote sensing support--aerial photograph acquisition and interpretation--for hazardous waste site investigations, assessments, and removal and remedial actions under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and under the National Contingency Plan. Support is provided by the ESD to each of the 10 EPA Regional offices and to the Office of Emergency and Remedial Response (OERR) of the Office of Solid Waste and Emergency Response (OSWER).

## **RCRA Program Support**

Since the passage of the Resource Conservation and Recovery Act in 1976, the EPA has employed aerial remote sensing techniques to assess waste sites. Aerial photographs and other sensor images are used to assist Agency officials in permit reviews, site operations monitoring, and general environmental assessments. Acquisition and interpretation of aerial photographs for this and other Agency programs are conducted by the ESD in Las Vegas, Nevada, to provide technical support to Regional offices, and to the OSWER.

## **ORD Program Support**

In FY 2000, EPIC provided remote sensing and Geographic Information Systems (GIS) support in the form of data base development, research, data acquisition, processing, analysis, and accuracy assessment activities for Environmental Monitoring and Assessment Program (EMAP), Advanced Measurement Initiative (AMI), and other research and development (R&D) programs and activities. EPIC continued developing GIS data and/or techniques for Eco-Pest/Tox; the Lower Colorado study, Little Miami River Basin, OH; the Neuse River Watershed, NC; Spring Valley munitions removal, Washington, DC; the Upper Accotink Watershed, VA; the Delaware/Catskill Watershed, NY; and general land use and land cover mapping in the Mid-Atlantic. EPIC also provided routine data management, film library, and archive support to the Agency to meet routine information needs and requests under the Freedom of Information Act.

EPIC also continued R&D projects in several new areas of multimedia technology to develop new and better means of providing remote sensing products and services to Agency users. These include the development of an interactive remote sensing training CD-ROM, the development of a display poster of EPIC products and services, both completed in FY 99, and research for the digital conversion of EPIC reports and archives. Also in FY 99, EPIC began developing a remote sensing website which became operational in FY 2000. The website contains a wealth of information on the fundamentals of remote sensing and the technical support products, services, and R&D activities of EPIC. The web address for the site is: <<http://lvord1.las.epa.gov:9876/epic/default.htm>>.

## **GIS Support**

During the past year, EPIC continued GIS data base development support for the Mid-Atlantic Integrated Assessment (MAIA) region; Eco-Pest/Tox; the Neuse River Basin; the Tensas River Basin; the Lower Colorado Basin; Spring Valley munitions removal, Washington, DC; the Upper Accotink Watershed, VA; the Delaware/Catskill Watershed, NY; and the Little Miami River Basin, OH, to support EMAP, Global Change Research Program (GCRP), North American Landscape Characterization (NALC), and other R&D efforts in these regions.

## **Film Metadata Support**

In FY 2000, EPIC continued exploring and developing the best way to manage its growing holdings of aerial and satellite film. EPIC's archive represents more than 25 years of data acquisitions and all metadata records are currently stored in hard copy format only. The goal of this effort is to create a searchable, softcopy metadata data base. After several internal investigations, the best digital method was determined to be a specialized World Wide Web page developed in cooperation with the USGS EROS Data Center (EDC). An Interagency Agreement between EPA/EPIC and USGS/EDC was initiated in FY 99. EDC will provide the EPA with metadata search and retrieval services based on the graphical

interface developed by EDC in their Earth Explorer (EE) system, formerly called the Global Land Information System (GLIS). This search and retrieval system will enable EPA users to quickly search for and determine the extent of aerial photographic and satellite image coverage retained in EPIC's archive for any location in the United States. Currently, EPIC's remote sensing support contractor is converting hand-drawn hard copy film plots to digital form and is generating the metadata format. This data is then transferred to EDC for ingestion into the EE system.

## **EPIC Library/Archive**

Previously, the archive was operated under EPIC's single remote sensing support contract. In order to make the archive and library data management task more efficient and to dedicate more resources to projects under development for the benefit and advancement of the archive, a new, separate library/archive contract was recompeted in FY 2000. Under the new contract, the library/archive will have a full time staff of 4 to 6 people and will have a greatly expanded mission. This will include bar coding the holdings and creation of inventory data bases, the analog-to-digital conversion of hundreds of thousands of records as well as the development of metadata products that will be input into and accessible from intranet-based computerized Federal records systems such as the USGS EE system.

## **EPIC Report - HTML Prototype**

In an effort to develop multimedia technical transfer technologies, EPIC initiated research for producing standard EPIC reports in interactive, digital format, delivered on CD-ROM media. A prototype was developed in FY 99 using the EPIC Report TS-PIC-9802237S, Aerial Photographic Analysis, Pavilion Avenue Field Study Area, Riverside, New Jersey. The report was reproduced in a HTML format utilizing web browser technology as the interface tool. Although definite technical problems remain, initial results were promising. Research continued on this in FY 99, and in FY 2000 an ArcView prototype was developed under the remote sensing contract. This prototype was completed for the EPIC Report TS-PIC-20004486S, Aerial Photographic Analysis Report for the Georgia-Pacific Corporation Hardwood Sawmill Site, Plymouth, North Carolina. The ultimate goal is to develop a user-friendly, digital version of the EPIC reports which can be produced cost-effectively.

## **Multimedia Training CD-ROM**

EPIC completed a project in FY 99 to develop a first-of-its-kind remote sensing training CD-ROM for environmental users. This CD-ROM, which was made available in FY 2000, presents the fundamentals of analog and digital remote sensing using text, graphics, animation, and sound to provide basic remote sensing training for EPIC customers. This project was initiated through an Interagency Agreement with the General Services Administration under the FAST program.

## **Advanced Measurement Initiative Support (AMI)**

EPIC continued to support two ongoing projects under the AMI program. EPIC provided remote sensing, photogrammetric, field data collection support to the AMI - Ray Mine, Arizona, project. EPIC continues to process a detailed digital elevation model and field spectral data collection for this project.

Under the AMI - Contaminated Mine Drainage (CMD) project (EPIC lead), three remote sensing and field data surveys were also accomplished in 1999. Digital Multi-Spectral Video (DMSV), field spectra, water quality, and bacterial data were collected at 12 CMD sites in central Pennsylvania. Additionally, two sets of Airborne Visible and Infra-Red Imaging Spectroscopy (AVIRIS) hyperspectral data were collected by the National Aeronautics and Space Administration (NASA) in support of this project. Research on this project continued in FY 2000.



## **Abstract**

The Environmental Sciences Division of the Office of Research and Development in Las Vegas, Nevada, provides remote sensing and aerial imagery acquisition and interpretation support to the Program Offices and each of the 10 Regional Offices of the Environmental Protection Agency. Support is provided for site-specific to regional environmental characterization and change analyses; emergency response to hazardous materials release situations; current site condition assessments; historical reviews of site developments; waste site inventories for large geographical areas; and topographic mapping of sites. Support is provided through the Division facilities of the Landscape Ecology Branch in Las Vegas, Nevada, and Reston, Virginia.

In FY 99, EPIC initiated a new remote sensing research and development program. Research plans were prepared and underwent peer review. At the close of FY 99, reconciliation of the peer reviewer's comments was underway, and research commenced for some projects in FY 2000. A description of these projects can be viewed on EPIC's new website at <http://lvord1.las.epa.gov:9876/epic/default.htm>.

This document describes program operations management procedures and types of projects conducted for requesting offices.

### **Superfund Program Support**

In FY 2000, work was conducted on 126 Superfund aerial survey projects covering more than 120 specific waste sites. Of these, two projects covering two sites were completed as emergency responses. Additionally, litigation support was provided to the Regions for three sites, and three overflights were completed to acquire new aerial photographs. Work on 22 of these projects was carried over into FY 2001.

Finally, two miscellaneous projects providing general support to Superfund activities, including data management and report/film archive maintenance and support, and Quality Assurance (QA) and Standard Operating Procedure (SOP) development were budgeted from CERCLA funds. It is anticipated that in FY 2001, operations will be conducted in much the same way as previous years.

### **RCRA Program Support**

In FY 2000, work was initiated on eight Resource Conservation and Recovery Act (RCRA) projects covering 12 RCRA sites. Almost all projects were in support of enforcement and compliance activities. All work on these projects was completed in FY 2000.



## **ORD Program Support**

In FY 2000, EPIC provided remote sensing and GIS support in the form of data base development, research, data acquisition, processing, analysis, and accuracy assessment activities for EMAP, NALC, AMI, and other R&D programs and activities. EPIC developed GIS data and/or techniques for Eco-Pest/Tox, the Lower Colorado study, the Tensas River Basin, and land use and land cover mapping in the Mid-Atlantic. EPIC also provided routine data management, film library, and archive support to the Agency to meet routine information needs and requests under the Freedom of Information Act.

EPIC also initiated R&D projects in several new areas of multimedia technology to develop new and better means of providing remote sensing products and services to Agency users. These include the development of an interactive remote sensing training CD-ROM, research for the digital conversion of EPIC reports and archives, and the development of a new EPIC remote sensing website.

The website was completed in FY 2000 and contains a wealth of information on the fundamentals of remote sensing and the technical support products, services, and R&D activities of EPIC.

## **GIS Support**

During the past year, EPIC continued GIS data base development support for Eco-Pest/Tox research; the Neuse River Basin; Valley Fills; the EMAP Western Landscape Ecological Assessment; the Delaware/Catskill Watershed, NY; and the MAIA Landscape GIS Coverage Database to support EMAP, GCRP, NALC, and other R&D efforts in these regions.

## **Film Metadata Support**

In FY 2000, EPIC continued exploring and developing the best way to manage its growing holdings of aerial and satellite film. EPIC's archive represents more than 25 years of data acquisitions and all metadata records are currently stored in hard copy format only. The goal of this effort is to create a searchable, softcopy metadata data base. After several internal investigations, the best digital method was determined to be a specialized World Wide Web page developed in cooperation with the USGS EROS Data Center (EDC). An Interagency Agreement between EPA/EPIC and USGS/EDC was initiated in FY 99. EDC will provide the EPA with metadata search and retrieval services based on the graphical interface developed by EDC in their Earth Explorer (EE) system, formerly called the Global Land Information System (GLIS). This search and retrieval system will enable EPA users to quickly search for and determine the extent of aerial photographic and satellite image coverage retained in EPIC's archive for any location in the United States. Currently, EPIC's remote sensing support contractor is converting hand-drawn hard copy film plots to digital form and is generating the metadata format. This data is then transferred to EDC for ingestion into the EE system.

## **EPIC Report - HTML Prototype**

In an effort to develop multimedia technical transfer technologies, EPIC initiated research in FY 98 for producing standard EPIC reports in interactive, digital format, delivered on CD-ROM media. A prototype was developed using the EPIC Report TS-PIC-9802237S, Aerial Photographic Analysis, Pavilion Avenue Field Study Area, Riverside, New Jersey. The report was reproduced in a HTML format utilizing web browser technology as the interface tool. Although definite technical problems remain, initial results were promising. Research continued in FY 99 and additional prototype reports were developed in FY 2000 in cooperation with the Office of Emergency and Remedial Response (OERR).

The ultimate goal is to develop a user-friendly, digital version of the EPIC reports which may be produced cost-effectively.

## **Multimedia Training CD-ROM**

EPIC initiated a project in 1998 to develop a first-of-its-kind remote sensing training CD-ROM for environmental users. This CD-ROM was completed in FY 99 and presents the fundamentals of analog and digital remote sensing using text, graphics, animation, and sound to provide basic remote sensing training for EPIC customers. This project was initiated through an Interagency Agreement with the General Services Administration under the FAST program.

## **Advanced Measurement Initiative Support**

In addition to participating in seven research proposals submitted under the Advanced Measurement Initiative (AMI) program, two projects were supported through the AMI program. EPIC provided remote sensing, photogrammetric, field data collection support to the AMI - Ray Mine project, Arizona. EPIC continues to process a detailed digital elevation model and field spectral data collection for this project.

Under the AMI - Contaminated Mine Drainage (CMD) project (EPIC lead), three remote sensing and field data surveys were also accomplished in 1999. Digital Multi-Spectral Video (DMSV), field spectra, water quality, and bacterial data were collected at 12 CMD sites in central Pennsylvania. Additionally, two sets of AVIRIS hyperspectral data were collected by NASA in support of this project. Research on this project continues in FY 2000.

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## Introduction

The Environmental Sciences Division (ESD) in Las Vegas, Nevada, of the Office of Research and Development (ORD), provides **remote sensing technical support** including aerial photograph acquisition and interpretation for site-specific to regional environmental characterization and change analyses. Support is provided by the ESD to EPA Program offices, ORD laboratories, and all 10 EPA Regional offices. This support is provided through the Landscape Ecology Branch and its remote sensing capabilities in Las Vegas, Nevada, and in Reston, Virginia.

In FY 99, EPIC initiated a new **remote sensing research and development** program. Research plans were prepared and underwent peer review. At the close of FY 99 and into FY 2000, reconciliation of the peer reviewers' comments was underway. Research on some of these projects commenced in FY 2000.

## Remote Sensing Technical Support

Analysis of airborne and spaceborne imagery is the most commonly used remote sensing technique for supporting the Spill Prevention Control and Countermeasures (SPCC), CERCLA, the Resource Conservation and Recovery Act (RCRA), and other EPA programs and investigations. The principal aerial photographic system used is the 9 inches by 9 inches mapping camera. While color film is most frequently used for photo analysis, black and white film is often used for mapping, and color infrared films are often used to enhance such features as surface water turbidity, soil moisture, and vegetation stress. Various types of aircraft are used at flight altitudes ranging from 1,000 to 25,000 feet above the ground. Archival aerial photographs provide a valuable source of information for the historical analysis of hazardous waste sites. Routine search and acquisition from these photographs from sources nationwide is a significant step in our analysis of sites. Finally, the image analysts who perform the interpretation of the aerial photographs are fully qualified to furnish advice and expert witness testimony on findings from the analyses in instances of litigation.

The most frequently applied spaceborne imagery is the Landsat Thematic Mapper for conducting broad area characterizations of environmental and natural resources and land use and land cover assessments and mapping.

ESD conducts four basic types of remote sensing technical support projects under the CERCLA, RCRA, and other programs. The highest priority projects are emergency responses to hazardous material release situations requiring rapid assessment of conditions at a site. When current information on a site is required, it is generally the practice to acquire new photographs for the specific purpose. Single-date analysis may be conducted on this new imagery or on historical imagery taken during a particularly significant period in the history of a site. Intensive site analysis projects are performed on selected sites to document changing conditions over a period of time and include analysis of both current and historical photographs. Finally, waste site inventories are surveys over large areas that are used to establish a baseline reference of possible sites.

A number of special-purpose products are produced from photographic data which are based on advanced technologies. Such products include topographic and flood-plain maps using photogrammetry, and digital elevation and GIS data. Surveys, aerial photography, and automated optical equipment are required to produce modern topographic maps. Such maps, at various scales, provide highly accurate representations of sites that include horizontal distances, building dimensions, volumes and dimensions of lagoons and landfills, and contours to provide elevational data throughout the mapped area. The maps are used to record site features, well sites, or any feature that needs to be accurately located. Other uses include planning, quantity estimates, and a variety of special purposes.

Sanborn Fire Insurance Maps are used to provide information about a site between approximately 1860 and the advent of regularly acquired aerial photographs in approximately 1930 and, later, to provide information not available from the photographs about ownership, occupancy, land and building layouts, and materials on-site.

## Technical Support Project Types

A summary of the following remote sensing technical support project types is presented in Table 1.

**Table 1. Remote Sensing Technical Support Projects, Products, and Average FY 99 Costs\*\***

Project Type	Application	Product	Turnaround	Approximate Cost/Site
Emergency Response	Hazardous Materials Release	Photos and Overlays, Annotated Maps, Interpretative Description	24 hours	\$6,000++
Single-Date Analysis	Current Information	Report with Photos, Maps, Overlays, and Interpretive Description	6 - 36 weeks	\$12,000++
Intensive Analysis	Chance Analysis	Report with Photos, Maps, Overlays, and Interpretive Description Using Historical and Current Data	4 - 12 months	\$11,000++
Area Inventory or Place-Based Analysis	Regional or Area Survey	Report with Photos, Maps, Overlays, and Interpretive Description	2 - 12 months	\$70/square mile
Photogrammetry	Mapping and Quantitative Analysis	Topographic Maps, Area and Volume Calculations	3 - 6 months	*
Floodplain Analysis	Flood Extent Prediction	Floodplain Contours	2 - 6 months	**\$13,500
Litigation Support	Intensive Witness Preparation	Specialized Analysis; Depositions; Photo/Map - Courtroom Exhibits, Affidavits, Expert Witness at Trial	2 weeks to designated appearance at trial	\$10,000 - \$15,000 including travel

\*NOTE: Average costs were calculated for projects completed in FY 99.

\*NOTE: Cost depends on contour intervals, size of site, population density, and on whether ground survey teams are required to wear protective gear while surveying the site. The larger sites will average out to lower cost per acre than the small sites. The costs have ranged from \$10 to \$1,300 per acre depending on the mapping requirement of each site. It is more cost effective to conduct the ground survey around the hazardous waste site and not require the survey team to suit up into protective gear.

\*\*NOTE: These figures are for planning purposes only. We have insufficient data at present to provide accurate cost. Call for cost estimate on specific sites.

### Emergency Response

Emergency requests are given top priority, and emphasis is directed toward rapid response. An aircraft that has aerial photographic capabilities is dispatched to the site as soon as possible, and emergency response procedures are put into effect in the photo processing laboratory. All personnel are prepared and are on call to work around the clock to process the photographs, analyze the film, document the analysis results, and ship the results to the requester as soon as possible.



Emergency requests, in response to a hazardous material release situation, require information on conditions at the site. Extent and location of a visible spill, vegetation damage, and threats to natural drainage and human welfare are typical of the types of information gathered from emergency response activities at a spill site. Typical products for an emergency response project include an immediate telephone report followed by photographic prints or positive film transparencies with interpretations annotated on overlays to the photographs, annotated topographic maps, and a short letter report describing results of the analysis. Scales for emergency photo coverage vary with condition and area coverage requirements. A response time from 1 to 5 days, depending on weather conditions and type of coverage required, is typical. On-scene support by photo analysts is provided as required. The following contacts are available for activating an emergency response:

Donald Garofalo	(703) 648-4285 (Work Telephone) (301) 869-8409 (Home Telephone)	7 a.m.-4:30 p.m. (ET) 24-hours
Phillips A. Arberg	(702) 798-2545 (Work Telephone) (702) 261-9911 (Home Telephone)	8 a.m.-4:30 p.m. (PT) 24-hours

### **Single-Date Analysis**

Projects in this category are conducted on a routine basis to acquire current information on a site or sites. These projects usually require acquisition of new aerial photography of a site, although recent (existing) photographic coverage of a site may suffice. Analysis of the photographs generally focuses on surface drainage conditions, evidence of leachate, vegetation damage, adequacy of containment features, and threats to sensitive environments. Final products normally include a report documenting the results of the analysis, with emphasis on the specific requirements of the requester. The report also includes photographs and maps with interpretation annotated on clear overlays to pinpoint the site locations and conditions. These routine projects can normally be conducted from 6 to 36 weeks after data collection; the length of time is dependent on the number, size, and complexity of the sites and on the detail of information required.

### **Intensive Site Analyses**

These projects are performed when the Regional or Program office requests an analysis of changing conditions at a site through time. They rely heavily on the availability of historical aerial photographs. However, the historical photographs may be augmented with current photo coverage when needed by the requester. Historical photographs that date back to the 1930s are available for many areas.

Photographs of a site prior to the existence of any hazardous waste processing and disposal activities or other man-made impacts are obtained when available. Later, photographs are used to monitor changes at the site over time. Special attention is paid to photographs taken on or near dates identified as critical by the requester.

Most historical photographs are panchromatic (black and white). Few color or color infrared photographs are available for the years prior to 1970. A major reference source for historical photographs is the Earth Science Information Center (formerly the National Cartographic Information Center) of the U.S. Geological Survey (USGS). The Center maintains an index of the imagery holdings of the Earth Resources Observations System (EROS) Data Center of the Department of the Interior and the Aerial Photography Field Office of the Department of Agriculture. The earliest photographs are

available from the National Archives and Records Administration. When photographs taken during a particularly significant period are not found in Federal archives, State and local governments and private sources are investigated.

In-depth analysis of historical photographs affords the opportunity to characterize conditions and to identify specific activities at different points in time. By characterizing conditions at a site for several dates, the sequence of events leading to the current conditions can be understood. Intensive studies have been performed to characterize environmental or ecological changes in surface drainage conditions; to identify the location of landfills, waste treatment ponds/lagoons, and their subsequent burial and abandonment; to detect and identify the burial of waste drums; to count the number of drums and to estimate the depth and horizontal extent of the burial pits; and to recommend drilling sites for sampling and for identification of the sources of the spillage and of the discharge of wastes.

Often photographs are not available for the location or time of interest. In these cases, Sanborn Fire Insurance Maps have proven to be a useful source of data for historical analysis. For more than a century, the Sanborn Map Company of Pelham, New York, has published maps and atlases of more than 12,000 U.S. cities and towns. These large-scale, highly detailed maps of commercial, industrial, and residential buildings are designed to provide accurate, current, and detailed information to fire insurance companies about the buildings they insure. The Sanborn Maps furnish information about ownership, occupancy, building layouts, and materials on-site that are used in chemical and other manufacturing processes.

The current collection of Sanborn maps comprises more than 700,000 single sheets in 50,000 volumes. The Library of Congress maintains this collection, and a published volume may be purchased from the cataloguing collection. Maps published prior to September 19, 1906, are available as photocopies or microfilm directly from the Library of Congress, Photo Duplication Division. Authorization to use Sanborn maps published after that date must be obtained from Sanborn on a case-by-case basis, and requests for that authorization must be presented to the Library of Congress before duplicates will be made.

Generally, an intensive site investigation requires 4 - 12 months to complete. However, the time required to complete any single project will depend largely on the number of available data sets that must be processed and analyzed. The photo analysis can be greatly enhanced when pertinent background information is made available by the requester. Helpful information includes known conditions or suspicions at specific points in time, drainage and ground water studies pertinent to the sites or general areas, detailed maps and sketches, and names of facilities and of operators associated with the site.

Products of intensive site investigations include a detailed report documenting the results of the photographic interpretation. The reports usually include photographs and maps with major observations annotated on clear overlays. Annotated photographic enlargements for field use or as courtroom exhibits are provided as required.

## **Waste Site Inventories**

ESD conducts general inventories over relatively large areas to detect and locate hazardous waste sites. The inventories are conducted by using archival, recent, or newly acquired aerial photographs and may be single-date or multi-date in nature. Site locations are annotated on map sheets or on overlays to maps and photographs. No detailed site analyses are provided. However, the interpreter will frequently flag those sites that appear to be particularly hazardous or threatening. The use of archival photographs offers the most economical and accurate method of compiling these inventories.

Should the requester desire current photographs, ESD can acquire them at specifications commensurate with the requester's information needs. The time required to complete an inventory will vary with the total square miles involved, the number of sites, the chronological range, and the analysis requirements.

## **Superfund Site Atlas**

Uncontrolled hazardous waste sites listed by the EPA as being eligible for remedial response actions under Superfund are documented in photographic volumes for each of the 10 EPA Regions. The atlas, intended as a reference document and planning guide for hazardous waste site cleanup under CERCLA, contains site location maps and color aerial photographs with photo overlays showing the boundaries of the site and the surrounding areas. Boundaries shown indicate the general location of the sites and are not intended to denote legal property lines or ownership. Also included are individual site descriptions. The atlas covers those sites designated as eligible on the National Priorities List as of September 1984. The ESD maintains an index to available aerial photographic data for these priority sites.

## **Removal and Remedial Action Documentation**

Aerial photographs are collected before, during, and following removal and remedial actions at selected sites. Such documentation provides a useful record of the effectiveness of the cleanup efforts.

## **Topographic Mapping**

ESD produces topographic and feature maps, generally at a small contour interval (usually specified at 2 - 10 feet; however, any interval can be used), using precision photogrammetry of a site on which control points have been established. This technique requires specialized equipment, complex computations, aerial photography, and field surveys. These maps are produced in conformance with National Map Accuracy Standards and EPA Photogrammetric Mapping Specifications.

A typical product from a topographic mapping project might include an orthogonally correct black-and-white, enlarged photograph of a site and reproducible stable base map sheet(s) containing highly accurate, detailed topographic and planimetric features. At a very large scale (for example, 1 inch equals 50 feet), the map may show buildings, roads, railroads, drainage features, bridges, culverts, fences, driveways, poles, sidewalks, individual trees, fire hydrants, manholes, catch basins, and other features of similar size. Map scales, contour intervals, and planimetric details can be varied to suit specific requirements.

There are several useful applications to topographic mapping in support of hazardous waste site assessments and removal or other remedial actions. Highly accurate topographic and planimetric details may be recorded without physically being at the site. This capability can be significant in overcoming

problems related to gaining access to private lands and related to protecting field personnel from hazardous conditions on-site. Maps may be useful in measuring the area, volume, and locations of the hazardous material to be handled such as contaminated soil; defining drainage patterns; determining the height and placement of containment berms, dikes, and impoundments; and determining the depth of waste pits. Topographic mapping techniques are also useful in support of geophysical monitoring or well monitoring in terms of establishing precise location and orientation data. In addition, changes in size, shape, and other physical characteristics of a waste site can be documented through sequential topographic mapping.

## **Remote Sensing Research and Development**

In FY 99, EPIC initiated a new remote sensing research and development program. Research and development involves the scientific evaluation of existing and developing air and spaceborne remote sensing systems and data in order to determine their utility for providing information at multiple scales about the earth, its ecological resources, and impacts on these resources through natural and human-induced processes. EPIC remote sensing scientists developed six research plans in FY 99. The plans were distributed for scientific peer review and most of the reviewers' comments were returned and reconciled in FY 2000. Research then commenced on reconciled projects in FY 2000. One of the projects (entitled the Evaluation of Various Remote Sensor Platforms for the Identification of Mountaintop Removal Mining Practices and Potential Environmental Impact) was determined unviable following preliminary research and numerous failed attempts to obtain critical data and information needed to support the research. Research on this project, therefore, has been suspended. The five remaining research projects are entitled:

- 1) Evaluation of the IKONOS 1 Satellite Remote Sensor for detecting, inventorying, and characterizing Animal Feeding Operations (AFO's)
- 2) Imaging Spectroscopy for detecting fugitive environmental contaminants
- 3) The Detection and Mapping of Impervious Surfaces: a Multi-date, Multi-scale, Multi-sensor Approach in a Mid-Atlantic Sub-Watershed
- 4) The Use of Thermal AVHRR Imagery to Construct an Estimator of Seasonal Heat Budgets for Large Lakes in North America
- 5) Imaging Spectroscopy for Determining Rangeland Stressors to Western Watersheds

Results of this research will be reported at scientific symposia, in appropriate reports, in scientific journals and other publications, and on EPIC's new remote sensing website at <http://lvord1.las.epa.gov:9876/epic/default.htm>.

## **Program Management**

### **General**

The Environmental Photographic Interpretation Center (EPIC), of the ESD's Landscape Ecology Branch (LEB), has staff in Las Vegas and at its headquarters' facility in Reston, Virginia, and is responsible for research and development and operational activities of the Branch's remote sensing program. The EPIC responds to routine Regional and Program office needs for remote sensing support upon receipt of a written request from the Regional Program office. This written request is sent to the attention of the director of the Environmental Photographic Interpretation Center, ESD. A concurrent telephone call and correspondence copy of the request may also be directed to the appropriate Regional Remote Sensing Coordinator. The EPIC director reviews the request and assigns it to an EPIC Work Assignment Manager (WAM) for action. The WAM works with the requester to identify the study objectives, the approach to be taken, the additional information required, the reports and data to be delivered, and the estimated completion dates. Appendix B lists EPIC's WAMs as well as other LEB contacts who are available to assist those in the Regional or other EPA Offices who request LEB support. When the requester's requirements are clear, a Work Assignment (WA) is prepared in which the scope of work, deliverables, estimated costs, and schedules are identified. Projects are generally performed through the Division's support contractors. In addition, within each Regional Office is an identified individual who acts as a Remote Sensing Coordinator. This person acts as a liaison between EPIC and the Region to accept Regional requests for EPIC support work, assist requesters in identifying their remote sensing requirements, and coordinate the flow of paperwork and project status information between the Region and EPIC. Appendix C lists the Regional Remote Sensing Coordinators who act as liaisons between Regional and Program offices requesting EPIC support and the EPIC WAMs. Remote Sensing Coordinators assist requesters by providing them with information on the type of support available through EPIC and the proper procedures to be used for initiating a remote sensing technical support work request.

For emergency responses, the initiating request may be made by telephone from the Regional Program office. The request is immediately coordinated with the requesting office, and, with their approval, a project is initiated.

Expenditures of funds supporting this program are tracked on a project-by-project basis for cost accounting and program management analyses. After receipt of a valid request, a work assignment is developed and sent, after approvals, to the EPA remote sensing technical support contractor who prepares a technical work plan and a completion schedule. Upon completion of a project, the requester is provided the required number of report copies; one file copy is maintained by the LEB remote sensing report library and archive.

As a part of an annual planning process to identify Regional remote sensing support needs for the upcoming year, LEB/EPIC WAMs work with Remote Sensing Coordinators and administrative and budget counterparts in the 10 regions. During this time, progress and problems are discussed, associated

with the funding of project assignments at LEB/EPIC, and strategies are developed for ensuring that Regional LEB support requirements and funding needs are met.

## **Contractor Support**

In support of EPIC, a professional contractor staff acquires photographs, develops film, provides aerial photographic interpretation, and prepares final written reports with photographic and other graphics displays. EPA scientists provide technical oversight of each project, prepare statements of work, and monitor progress toward completion. In FY 2000, a new remote sensing technical support contract was awarded. This is an off-site, nondedicated contract which was awarded for a 1-year base period, and four 1-year option periods.

## **Reorganization**

In FY 97, the Characterization Research Division (CRD-LV) reorganized and became the Environmental Sciences Division (ESD) and the former Monitoring Sciences Branch (MSB) under which EPIC is housed, became the new Landscape Ecology Branch (LEB). The LEB is responsible for conducting remote sensing research and development and technical support to EPA Headquarters, Regional, and Program offices. The mission of the LEB is to conduct research on, and perform assessments of, ecological health and trends at multiple scales. The Branch comprises teams of scientists that develop and apply ecological indicators and methods for collecting and integrating information on the health of our natural resources. Our focus is on the conduct of high quality peer reviewed science and the support and satisfaction of our customers within the EPA.

## **Quality Assurance**

New and more comprehensive Quality Assurance/Quality Control (QA/QC) procedures and SOPs were in place in FY 96 and revised and updated in FY 2000. The ESD has developed a Quality Management Plan. The EPIC support contractors are also required to prepare and submit to the EPA a Quality Assurance Program Plan (QAPP) which is a general description of the contractors' capabilities and approach to Quality Assurance. In addition, the contractors are required to prepare and submit QA Project Plans (QAPPs) outlining specific QA/QC procedures to be followed during completion of the principal contract activities. In the case of EPIC, for example, QA/QC procedures were developed and/or updated for the following processes: data acquisition; data processing; data analysis; and report production. A QA Review Form (a checklist) has been developed by ESD which is attached to and filled out for each WA by the WAM. The form is approved by the Project Officer and the designated QA Officer. All of these procedures ensure that EPIC's clients receive the highest possible quality in the products and services requested.

In FY 99, a peer review of the EPIC operation was completed. The peer review panel met at ESD-LV and received presentations on all elements of the EPIC program. A peer review report was prepared which outlined the recommendations of the peer review panel. The peer review report concluded that:

*"... EPIC is doing an outstanding job in its traditional area of historic photo analysis, mostly of Superfund and RCRA sites. However, the EPIC program is in a transition period for at least two areas, 1) R&D of new remote sensing technologies (some of which are used throughout EPA, not just hazardous waste programs), and 2) archiving historic imagery and collateral data as it transitions from analog to digital imagery. We expect that these activities will require additional new funding in addition*



*to the existing funding, which includes headquarters and regional contributions. In effect, EPIC should market its capabilities agency-wide and particularly to individuals with discretionary funds."*

A response to these and other peer reviewer recommendations which cited specific corrective actions was prepared by EPIC and submitted to National Exposure Research Laboratory management.

### **Personnel, Equipment, and Material Requirements**

The resources to support the aerial photographic interpretation and analysis program are derived from two sources. Base funding is provided through the Office of Research and Development (ORD). These resources provide for in-house personnel and materials as well as limited extramural support. Funding to support specific projects comes directly from the requesting Program or Regional office. Resources primarily support contractor operations and equipment acquisition. All capital equipment purchases are justified in accordance with established EPA procurement procedures.

## FY 2000 Program Summary

During FY 2000, EPIC continued to fund task requests from the Regional and Program offices. While some of the Regional Superfund requests were not listed in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) data base, they were fully justified as Superfund activities, and in many cases had higher priorities in the Regions than those tasks identified in CERCLIS.

Resources for FY 2000 are shown in Table 2. A total of \$2838.0K in extramural funds was available for direct support of remote sensing for hazardous waste site assessment and emergency response under the Superfund and RCRA programs. This included supplemental funding of \$300.0K provided by OERR in FY 2000 to allow the Division to maintain its capability for providing remote sensing support to the Regions. Also, EPIC received \$45.0K in ORD FY 2000 funding. Of the Superfund, RCRA and OERR funding, \$1290.0K was carried over from FY 2000 to FY 2001; \$945.0K of ORD funding was carried over to FY 2001. Smaller amounts of funding were received to support the specific project requirements of other programs and/or offices.

**Table 2. Funding Available in FY 2000 (\$K)**

<u>Source</u>	<u>Carryover FY99 to FY00</u>			<u>FY00 Funds Received</u>			<u>Carryover FY00 to FY01</u>		
	SF	RCRA	Other	SF	RCRA	Other	SF	RCRA	Other
REGION 1	-0-	-0-	-0-	355.0	-0-	-0-	300.0	-0-	-0-
REGION 2	100.0	-0-	-0-	200.0	-0-	-0-	75.0	-0-	-0-
REGION 3	71.0	40.0	-0-	185.0	-0-	50.0	50.0	-0-	-0-
REGION 4	361.0	21.0	-0-	160.0	-0-	-0-	160.0	-0-	-0-
REGION 5	103.0	-0-	-0-	105.0	-0-	-0-	80.0	-0-	-0-
REGION 6	95.0	-0-	-0-	100.0	-0-	-0-	100.0	-0-	-0-
REGION 7	201.0	-0-	-0-	270.0	-0-	3.0	270.0	-0-	-0-
REGION 8	5.0	16.0	-0-	-0-	-0-	5.0	-0-	-0-	5.0
REGION 9	106.0	-0-	-0-	55.0	-0-	-0-	55.0	-0-	-0-
REGION 10	-0-	-0-	-0-	5.0	-0-	-0-	-0-	-0-	-0-
ORD	-0-	-0-	157.0	45.0	-0-	985.0	30.0	-0-	915.0
OSWER	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
OERR	-0-	-0-	-0-	300.0	-0-	-0-	200.0	-0-	-0-
<b>TOTAL</b>	<b>1042.0</b>	<b>77.0</b>	<b>157.0</b>	<b>1780.0</b>	<b>-0-</b>	<b>1043.0</b>	<b>1320.0</b>	<b>-0-</b>	<b>920.0</b>

Refer to Appendix A for a summary of FY 2000 projects.

In all, 55 photo interpretation projects (including one fracture trace analysis) were completed in FY 2000. An additional 14 were carried over into FY 2001. Also, four GIS projects were completed. Two projects covering two sites were analyzed as emergency responses. In addition, four overflights to obtain current aerial photographs of either sites or larger regional areas were performed. Litigation support was provided for three sites. The remaining aerial survey projects were photo reproductions or historical photo acquisitions only (i.e., requiring no photo interpretation); Regional Office requests; occasional requests for documents by the regions; and cost recoveries.

## **Records Management**

Records management refers to the way in which EPIC organizes and catalogs its technical reports and associated products that result from its day-to-day activities in support of Regional and Program offices. Since 1975, more than 4,000 reports have been produced covering hazardous waste sites and approximately 11,100 industrial sites (under Spill Prevention Control and Countermeasures). Some 110,000 frames of film are currently on file at ESD, and 80,000 additional frames have been archived in a national data bank at the EROS Data Center in Sioux Falls, South Dakota.

EPIC has completed the creation of a computer-based technical report information retrieval system. A data base has been developed which encompasses both technical and descriptive information about historical and single-date site analyses and inventory reports produced by LEB/EPIC since the inception of the program. The core data base of the system was completed in FY 90, and initial copies of the published report were distributed to key program contacts in the 10 EPA regions. In FY 96, the data base was converted from a VAX mainframe to a PC-based system and in FY 97 a final PC-based searchable data base was completed. In FY 98, a Users Guide was developed to assist Regional users in accessing and searching the data base and upgrades were made to the computer-based search routine in FY 99 and FY 2000 to make it more user friendly for use by EPIC's customers. The data base and search engine was distributed to all 10 EPA Regional Offices and to OERR at EPA Headquarters in early FY 2000. The data base and search engine is also planned to be placed on the new remote sensing website. This PC-based program allows Regional users to rapidly search the data base to locate any report entered and retrieve detailed information such as:

- Report name, number, and date
- Funding source
- Project Officer and Image Analyst
- Site location (USGS quad name and latitude/longitude, city, county, state)
- Imagery dates and types used
- Type of analysis performed
- Summary findings

The data base is updated continuously after current projects are completed. Data base updates are provided on a periodic basis to all 10 EPA Regions, and Headquarters' Program offices.

## **Equipment and Specialized Software Purchases**

In FY 2000, EPIC has continued to purchase and upgrade computer software. Installation and/or upgrades to Microsoft Office Professional 2000 were provided for the EPIC staff through a IT Support agreement with USGS. An installation of ArcView 3.2 and Spatial Analyst and two installations of SAS 7.0 were completed through the Las Vegas Branch office. One new installation and four upgrades for ArcView 3.2, two new installations for Image Analyst, and three new installations for Spatial Analyst were also purchased. A new installation for ArcInfo 8, Matlab 5.3, and Imagine 8.4 were purchased along with two upgrades to Imagine 8.4. Additional software needs were identified and purchase requests submitted in FY 2000. Finally, continued enhancement of computer capabilities is anticipated for FY 2001.

## **Other - Training**

Six EPIC scientists attended a 3-day hazardous waste operations (HAZWOPER) course on March 3-5, 1999. This training is required for all field scientists working at hazardous waste facilities and allows EPIC scientists to collect field spectral data at Superfund and other hazardous waste sites in support of technical support and research. All EPIC personnel also participated in an 8-hour Medic First Aid class on April 4, 2000. The class consisted of basic Cardiopulmonary Resuscitation (CPR) and first aid basics, including, but not limited to, choking, bleeding, and burns.

## **Future Directions**

EPIC is continuing its efforts to improve capabilities for imagery exploitation, dissemination of its derivative products, and their utilization throughout the EPA environmental community. The new off-site remote sensing technical support contract awarded in FY 2000 will continue to provide comprehensive remote sensing support to EPA Regional and Program offices and laboratories through FY 2005. Also, the new EPIC archive/library contract (awarded in early FY 2001) will help EPIC to more efficiently organize, retrieve, and track EPIC's film and report products and make them more readily accessible to EPIC's EPA customers.

In FY 96, EPIC moved its EPA staff and technical oversight operations from its current Vint Hill Farms Station location near Warrenton, VA, to the USGS headquarters in Reston, VA. It ended 23 years of continuous support from the Building 166 facility which was on the post-closure list and closed at the end of FY 97. EPIC's relocation to the USGS facility provides for more rapid access to USGS maps and natural resources data bases of value to the EPA mission, as well as access to state-of-the-art remote sensing, GIS, and mapping equipment and expertise available at this premier remote sensing agency. In addition, EPIC's security cleared staff at the USGS facility has easy access to the USGS Advanced Systems Center (on the grounds of the USGS) for using classified remote sensing data assets and equipment to support the EPA mission.

In FY 2000, EPIC partnered with other agencies which are leaders in the remote sensing field. For example, EPIC conducted research and development in cooperation with NASA to evaluate applications of new hyperspectral remote sensors to environmental problems associated with mining activities. EPIC is also partnering with the USGS on an Advanced Measurement Initiative R&D project to evaluate the location and quality of mine drainage using remote sensing spectral reflectance methods.

EPIC is partnering with the USGS to do mapping of submerged aquatic vegetation (SAV) in the Potomac River and Chesapeake Bay. This project involves the use of an advanced airborne hyperspectral remote sensing system to image SAV beds and coastal wetlands. The USGS has an ongoing ground-based SAV mapping project and will provide detailed water quality and vegetation information for areas imaged by the airborne sensor. EPIC is also partnering with the USGS Geologic Division to develop spectral libraries of environmental contaminants, focusing on organic pollutants such as PCBs. These spectral libraries are used in remote sensing image analysis to identify and classify materials in the image. The USGS is providing analytical chemistry support for the chemical analysis of field samples. Several laboratory and field spectrometers are available from the USGS for EPIC personnel to analyze and create spectral library data bases of these compounds.

# Appendix A: FY 2000 Program Remote Sensing Support Projects

## FY 2000 Superfund Remote Sensing Support

Region	Number	Site	Complete	Type	FY 99 Cost*	FY 2000 Cost**
1	20001007S	WEYERHAEUSER MILL COMPLEX, SPRINGFIELD, OR REV 1,2		HA		3404
1	20001119S	CENTR. MANOR, N. PROVIDENCE, RI TOPOGRAPHIC & ORTH +(F)	9/11/00	MAP		3198
1	20001121S	CENTREDALE MANOR, HIST. OVERL. GRAPHICS, RI +(F)	8/8/00	CA		4289
1	20001122S	PECK HILL SITE, JOHNSTON/SCITUATE, RHODE ISLAND	9/11/00	HA		11226
1	20001123S	SIX NEW ENGLAND SITES	9/11/00	MAP		1900
Region 1 FY 2000 Cost Subtotal:			\$24,017.00			

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AW = FILM ARCHIVES WORK	IP = DIGITAL IMAGE PROCESSING	PG = PHOTOGRAMMETRY SUPPORT	NO COMPLETION DATE SHOWN
CA = CURRENT ANALYSIS	FT = FRACTURE TRACE ANALYSIS	PS = PHOTO SUPPORT	= PROJECT CARRIED OVER
CO = CURRENT OVERFLIGHT	LE = LANDSCAPE ECOLOGY	RR = REPORT REPRODUCTION	INTO FY 2001
DA = DRAINAGE ANALYSIS	LS = LITIGATION SUPPORT	TA = THERMAL ANALYSIS	
ER = EMERGENCY RESPONSE	LU/LC = LAND USE/LAND COVER	WT = WETLAND ANALYSIS	
GIS = GEOGRAPHIC INFORMATION SYSTEM	MAP = THEMATIC/TOPOGRAPHIC MAP	+ = NATIONAL PRIORITIES LIST	
HA = HISTORICAL SITE ANALYSIS		+(F) = FINAL	
		+(P) = PROPOSED	
		+(D) = DELETED	

\*Source: Remote Sensing Program for EPA, FY 99 Program Summary

\*\*Source: EPIC FY 00 Project Tracking Data Base

## ***FY 2000 Superfund Remote Sensing Support***

<i><b>Region</b></i>	<i><b>Number</b></i>	<i><b>Site</b></i>	<i><b>Complete</b></i>	<i><b>Type</b></i>	<i><b>FY 99 Cost*</b></i>	<i><b>FY 2000 Cost**</b></i>
2	20002281S	PUCHAK WELL FIELD, QUADRANT 2, CAMDEN, NJ	12/8/99	HA	18232	1768
2	20002285S	PETER COOPER SITE, NY +(F)	11/17/99	HA	6776	2882
2	20002286S	SMITHTOWN GROUNDWATER CONTAMINATION, NY REV 3 +(F)	2/4/00	HA	11166	9441
2	20002290S	ROSCOE WOOD PRODUCTS, ROSCOE, NY REV. 1	2/11/00	PS	3213	3013
2	20002291S	ABBY ST. HICKORY WOODS SUBDVS., BUFFALO, NY REV 1,2	3/16/00	HA		28234
2	20002292S	EMMELL'S SEPTIC LANDFILL SITE, GALLOWAY, NJ REV 1,2	1/27/00	HA		11587
2	20002293S	CONSOLIDATED IRON, NEWBURGH, NY REVISION 1,2	5/1/00	HA		15029
2	20002294S	HIGH FALLS, NY REVISION 1	4/6/00	CO		3387
2	20002295S	SCORPIO RECYCLING MARTIN GONZALEZ, CAROLINA, PR R 1	6/7/00	PS		2067

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AW = FILM ARCHIVES WORK  
 CA = CURRENT ANALYSIS  
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 DA = DRAINAGE ANALYSIS  
 ER = EMERGENCY RESPONSE  
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 SYSTEM  
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 MAP

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 +(D) = DELETED

NO COMPLETION DATE SHOWN  
 = PROJECT CARRIED OVER  
 INTO FY 2001

***\*Source: Remote Sensing Program for EPA, FY 99 Program Summary***

***\*\*Source: EPIC FY 00 Project Tracking Data Base***



## ***FY 2000 Superfund Remote Sensing Support***

<i><b>Region</b></i>	<i><b>Number</b></i>	<i><b>Site</b></i>	<i><b>Complete</b></i>	<i><b>Type</b></i>	<i><b>FY 99 Cost*</b></i>	<i><b>FY 2000 Cost**</b></i>
2	20002296S	SCORPIO RECYCLING SAN VICENTE SUGAR MILL, PR	4/26/00	PS		2393
2	20002297S	SCORPIO RECYCLING JARAGUAS NIGHT CLUB, DORADO, PR	6/7/00	PS		1944
2	20002298S	SCORPIO RECYCLING FAMILY METAL INC., SANTUCE, PR	6/8/00	PS		2405
2	20002299S	SCORPIO RECYCLING ISLA GRANDE DOCK, SAN JUAN, PR 1	5/8/00	PS		2715
2	20002300S	DISMAL SWAMP SITE, SOUTH PLAINFIELD, NJ		PS		3031
2	20002301S	BARKER CHEMICAL, BARKER, NY AMENDMENT 1-CANC. A,B	8/10/00	HA		11612
2	20002302S	LIGHTMAN DRUM COMPANY, CEDARBROOK, NJ REVISION 1	7/31/00	HA		11960
2	20002303S	SCORPIO RECYCLING OTA BAJA, PR	6/30/00	PS		2340
2	20002304S	BURTTTERNUTS LANDFILL SITE, S. NEW BERLIN, NY REV. 1	6/28/00	PS		4708

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***\*Source: Remote Sensing Program for EPA, FY 99 Program Summary***

***\*\*Source: EPIC FY 00 Project Tracking Data Base***

## ***FY 2000 Superfund Remote Sensing Support***

<b><i>Region</i></b>	<b><i>Number</i></b>	<b><i>Site</i></b>	<b><i>Complete</i></b>	<b><i>Type</i></b>	<b><i>FY 99 Cost*</i></b>	<b><i>FY 2000 Cost**</i></b>
2	20002305S	LAHOUD SITE, PATTERSON, NJ REVISION 1	6/21/00	PS		2648
2	20002306S	BARRONE BARREL & DRUM SITE, PATTERSON, NJ REV. 1	6/19/00	PS		2624
2	20002307S	STRAIGHT STREET SITE, PATTERSON, NJ REVISION 1	6/21/00	PS		2544
2	20002308S	LEADER DYW SITE, PATTERSON, NJ REVISION 1	6/21/00	PS		4063
2	20002309S	ADDY MILL SITE, PATTERSON, NJ REVISION, 1	6/21/00	PS		2648
2	20002310S	GRAND STREET MERCURY SITE - AMENDT 1, REVISION 1 +(F)	6/30/00	HA		3836
2	20002311S	GM CENTRAL FOUNDRY, MASSENA, NY REVISION 1	7/19/00	PS		1933
2	20002312S	BUSH INDUSTRIES, LITTLE VALLEY, NY		HA		6217
2	20002313S	CATTARAUGUS CUTLERY, LITTLE VALLEY, NY		HA		2454

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***\*Source: Remote Sensing Program for EPA, FY 99 Program Summary***

***\*\*Source: EPIC FY 00 Project Tracking Data Base***

## ***FY 2000 Superfund Remote Sensing Support***

<b><i>Region</i></b>	<b><i>Number</i></b>	<b><i>Site</i></b>	<b><i>Complete</i></b>	<b><i>Type</i></b>	<b><i>FY 99 Cost*</i></b>	<b><i>FY 2000 Cost**</i></b>
2	20002314S	METALTEC/AEROSYSTEMS SF LITIGATION SUPPORT, NJ +(F)	7/25/00	LS		11449
2	20002315S	PASCALE PROPERTY, WASHINGTON, NJ REVISION 1		ER		5231
2	20002316S	JEFFERY FUELS BULK STORAGE SITE, NY		PS		1154
2	20002317S	ZONOLITE-TRENTON SITE, NJ	9/8/00	PS		3016
2	20002318S	LACKAWANNA FOUNDRY, LACKAWANNA, NY		CO		3542
2	20002319S	MERCURY REFINING SITE, ALBANY, NY	9/8/00	PS		2518
2	20002320S	ICELAND COIN LAUNDRY SITE, NJ		PS		1530
<b><i>Region 2 FY 2000 Cost Subtotal:</i></b>			<b><i>\$177,923.00</i></b>			

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***\*\*Source: EPIC FY 00 Project Tracking Data Base***

## ***FY 2000 Superfund Remote Sensing Support***

<b>Region</b>	<b>Number</b>	<b>Site</b>	<b>Complete</b>	<b>Type</b>	<b>FY 99 Cost*</b>	<b>FY 2000 Cost**</b>
3	20003400S	FENTRESS LANDING FIELD, VIRGINIA BEACH, VA REV. 1	1/6/00	HA		7295
3	20003410S	INDUSTRIAL ENTERPRISES, ROSEDALE, MD REV. 1 +(P)	1/19/00	HA	4770	9352
3	20003415S	WATSON-JOHNSON LANDFILL, BUCKS COUNTY, PA REV	1/27/00	PS	19662	113
3	20003418S	SPRING VALLEY AREA, WASHINGTON, DC REVISION 1,2	9/11/00	PS		18174
3	20003419S	MALVERN TCE SITE - MALVERN, PA REVISION 1,2	2/8/00	CO		8755
3	20003420S	ETNA PLAYGROUND, ETNA, PA - REVISION 1	10/25/99	PS		697
3	20003421S	PERRY PHILLIPS LANDFILL AREA, SADSBUURYVILLE, PA R 1	12/22/99	PS		3766
3	20003422S	PLYMOUTH TOWNSHIP CO2 RELEASE, PA REV 1,2	6/23/00	HA		42236
3	20003423S	HEIZER CREEK LANDFILL, POCA, WV REVISION 1	3/2/00	HA		12247

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***\*Source: Remote Sensing Program for EPA, FY 99 Program Summary***

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## ***FY 2000 Superfund Remote Sensing Support***

<i><b>Region</b></i>	<i><b>Number</b></i>	<i><b>Site</b></i>	<i><b>Complete</b></i>	<i><b>Type</b></i>	<i><b>FY 99 Cost*</b></i>	<i><b>FY 2000 Cost**</b></i>
3	20003425S	PERRY PHILLIPS LANDFILL AREA, SADSBUURYVILLE, PA 1	5/31/00	HA		13431
3	20003426S	AMERICAN ASPHALT, KINGSTON, PA	7/24/00	HA		18132
3	20003427S	BUCKINHAM DRUM SITE, BUCKINGHAM STE. FORST. VA 1	5/17/00	HA		6726
3	20003428S	SPRING VALLEY, WASHINGTON, DC AMENDMENT A REV 1	8/7/00	PG		19567
3	20003429S	COLGATE PAY DUMP SITE, BALTIMORE, MD REVISION 1		HA		7897
3	20003430S	PERRY PHILLIPS LANDFILL AREA, SADSBUURYVILLE, PA	8/2/00	FT		6761
3	20003431S	PATUXENT RIVER OIL SPILL, MD REVISION 1	5/9/00	ER		48249
3	20003432S	PLYMOUTH TOWNSHIP CO2 RELEASE, PA REVISION 1		HA		4474
3	20003433S	METAL BANK (ADDENDUM), PHILADELPHIA, PA REV. 1 +(F)	8/28/00	HA		11608
<i><b>Region 3 FY 2000 Cost Subtotal:</b></i>			<i><b>\$239,480.00</b></i>			

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## ***FY 2000 Superfund Remote Sensing Support***

<b><i>Region</i></b>	<b><i>Number</i></b>	<b><i>Site</i></b>	<b><i>Complete</i></b>	<b><i>Type</i></b>	<b><i>FY 99 Cost*</i></b>	<b><i>FY 2000 Cost**</i></b>
4	20004449S	COPPER BASIN MINING DISTRICT SITE, TN/GA -A,B	8/2/00	HA	69420	25639
4	20004452S	SANFORD GASIFICATION PLANT, S FL. AM A, CANCELED	12/7/99	MAP	1099	6
4	20004457S	CAPITOL CITY PLUME, MONTGOMERY CO, AL AM A,1	10/8/99	HA	6821	310
4	20004459S	CALHOUN PARK AREA, CHARLESTON COUNTY, SC REV	11/8/99	PS	2310	1476
4	20004460S	ITT THOMPSON INDUSTRIES SITE, MADISON, FL R 1	11/4/99	HA	8284	6863
4	20004461S	FORMER MACON NAVAL ORDNCE PLANT LANDFILL REV	11/22/99	HA	12728	6120
4	20004462S	TRIANGLE PACIFIC, ELIZABETH CITY, NC REV 1	11/8/99	HA	7977	9874
4	20004463S	GRESHAMS LAKE INDUSTRIAL PARK, RALEIGH, NC REV	11/15/99	HA	11694	7402
4	20004466S	MACALLOY CORP. SITE, NO. CHARLSTON, SC REV. 1,2 +(P)	12/9/99	HA	7750	10509

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## ***FY 2000 Superfund Remote Sensing Support***

<b>Region</b>	<b>Number</b>	<b>Site</b>	<b>Complete</b>	<b>Type</b>	<b>FY 99 Cost*</b>	<b>FY 2000 Cost**</b>
4	20004468S	ADMIRAL HOME APPLIANCES, WILLISTON, SC	11/3/99	HA	7021	4365
4	20004470S	BORDEN CHEMICAL/TENOROC MINE, AUBURNDALE, FL	11/8/99	PS	2403	2109
4	20004471S	ESTECH GENERAL CHEMS CORP., RICHLAND CO., SC 1	1/5/00	HA	2520	18217
4	20004472S	POTTER'S SEPTIC TANK SVC. PITS, WILMINGTON, NC 1 +(F)	10/28/99	PS	1097	912
4	20004473S	BROWN'S DUMP, JACKSONVILLE, FL REV. 1	1/6/00	HA	2205	9411
4	20004474S	JACKSONVILLE ASH SITE, JACKSONVILLE, FL AMEND A R 1	3/2/00	HA		17986
4	20004475S	LANDIA CHEMICAL, LAKELAND, FL	12/3/99	PS		2145
4	20004476S	TUTTLE ELEMENTARY SCHOOL, SARASOTA, FL	1/21/00	PS		3763
4	20004477S	SOLITRON MICROWAVE SITE, PORT SALERNO, FL +(F)	3/2/00	HA		11055

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## ***FY 2000 Superfund Remote Sensing Support***

<b><i>Region</i></b>	<b><i>Number</i></b>	<b><i>Site</i></b>	<b><i>Complete</i></b>	<b><i>Type</i></b>	<b><i>FY 99 Cost*</i></b>	<b><i>FY 2000 Cost**</i></b>
4	20004478S	ALCOA PROPERTIES, ALCOA, TN REVISION 1		HA		29475
4	20004479S	POTTER'S SEPTIC TANK SERVICE PITS, WILMINGTON, NC R1 +(F)	4/26/00	HA		9145
4	20004480S	43RD STREET BAY DRUM SITE, TAMPA, FL REVISION 2 A	5/4/00	HA		21992
4	20004481S	JEFFERSON & BULLIT COUNTY, LOUISVILLE, KY	2/17/00	RR		2508
4	20004482S	TWO SITES IN WILMINGTON, NORTH CAROLINA	5/8/00	PS		4737
4	20004483S	MACALLOY CORPORATION, NORTH CHARLESTON, SC REV 1 +(P)	3/28/00	RR		1205
4	20004484S	DAVIS TIMBER COMPANY, HATTIESBURG, MS REVISION 1	4/26/00	PS		1104
4	20004485S	CHEMTRON CORP.AKA.AIR LIQUIDE FACILITY, FL	7/13/00	HA		13070
4	20004486S	GEORGIA PACIFIC HARDWOOD, PLYMOUTH, NC REVISION 1		HA		20387

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## ***FY 2000 Superfund Remote Sensing Support***

<i><b>Region</b></i>	<i><b>Number</b></i>	<i><b>Site</b></i>	<i><b>Complete</b></i>	<i><b>Type</b></i>	<i><b>FY 99 Cost*</b></i>	<i><b>FY 2000 Cost**</b></i>
4	20004487S	CALLAWAY & SON DRUM SERVICE, LAKE ALFRED, FL		HA		7452
4	20004488S	ANODYNE, INC., MIAMI BEACH, FL REVISION 1,2 +(F)		LS		3641
4	20004489S	CALLAWAY & SON DRUM SERVICE, AUBURNDALE, FL REV 1		HA		4674
4	20004490S	CROWN ZELLERBACH ABANDONED SITE, PEARL RIVER, MS	8/28/00	PS		3311
<i><b>Region 4 FY 2000 Cost Subtotal:</b></i>					<i><b>\$260,863.00</b></i>	

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## ***FY 2000 Superfund Remote Sensing Support***

<i><b>Region</b></i>	<i><b>Number</b></i>	<i><b>Site</b></i>	<i><b>Complete</b></i>	<i><b>Type</b></i>	<i><b>FY 99 Cost*</b></i>	<i><b>FY 2000 Cost**</b></i>
5	20005562S	TORCH LAKE SITE, HOUGHTON COUNTY, MI A CANC 1 +(F)	3/6/00	PG	257	9286
5	20005563S	VESICOL CHEMICAL CORP/PINE RIVER, ST. LOUIS, MO 1	1/27/00	PG	228	15098
5	20005564S	CHEMICAL RECOVERY SITE, ELYRIA, OH REVISION 1	12/9/99	HA	5170	7080
5	20005567S	TREMONT CITY LANDFILL/BARRELFILL, CLARK CO., OH 2	11/4/99	HA	1393	1132
5	20005568S	U.S. AVIEX, NILES, MI REVISION 1,2 +(F)	6/20/00	IP		11522
5	20005569S	FORMER MARION ENGINEERING DEPOT/RIVER VAL. SCHLS A	3/14/00	HA		10557
5	20005570S	FORMER SCIOTO ORDNANCE PLANT (SOP), OH AMEND A,B 1	7/11/00	HA		26031
5	20005571S	MARINA CLIFFS/NORTHWESTERN BARREL, MILWAUKEE, WI 1		HA		1547
5	20005572S	TREMONT CITY LANDFILL SITE, CLARK COUNTY, OH AM A		HA		5422
<i><b>Region 5 FY 2000 Cost Subtotal:</b></i>			<i><b>\$87,675.00</b></i>			

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## ***FY 2000 Superfund Remote Sensing Support***

<i><b>Region</b></i>	<i><b>Number</b></i>	<i><b>Site</b></i>	<i><b>Complete</b></i>	<i><b>Type</b></i>	<i><b>FY 99 Cost*</b></i>	<i><b>FY 2000 Cost**</b></i>
6	20006001S	QUESTA, NM - REVISION 1	2/16/00	PS		3059
6	20006002S	STEPHENSON BENNETT MINE SITE, ORGAN, NM	4/26/00	PG		1128
6	20006003S	ATCHISON, TOPIKA, AND SANTA FE (AT&SF), NM - AMND A	5/2/00	HA		2934
6	20006004S	SIKES PIT, TX LITIGATION SUPPORT - 1,A,2		LS		30584
6	20006005S	MARION PRESSURE TREATING, LA AMEND. A		HA		11164
6	20006006S	ARCADIA REFINERY, LISBON, LA	9/11/00	PS		1788
6	20006007S	SANTO DOMINGO, PUEBLO, NM		PS		497
<i><b>Region 6 FY 2000 Cost Subtotal:</b></i>			<b>\$51,154.00</b>			

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<b><i>Region</i></b>	<b><i>Number</i></b>	<b><i>Site</i></b>	<b><i>Complete</i></b>	<b><i>Type</i></b>	<b><i>FY 99 Cost*</i></b>	<b><i>FY 2000 Cost**</i></b>
7	20007732S	LINCOLN (EX) AIR FORCE BASE, NE REVISION 1,2	3/31/00	HA	24694	44014
7	20007735S	POOLS PRAIRIE (OU #6), MISSOURI REVISION 1 +(F)	12/22/00	HA	986	9812
7	20007736S	TYSON VALLEY (EX) ARMY POWDER STORAGE REV 1	6/28/00	HA		20171
7	20007737S	ST. LOUIS (EX) ORDNANCE PLAN & ARMY AMMUNITION PLA 1	5/23/00	HA		30326
7	20007738S	LEAVENWORTH AUTO PARTS, KANSAS AMENDMENT A	3/2/00	HA		1432
7	20007739S	ASARCO OMAHA PLANT, NEBRASKA	1/18/00	PS		2080
7	20007741S	MCCOOK (EX) ARMY AIRFIELD, NE		HA		923
7	20007742S	JOHNSON COUNTY INDUSTRIAL AIRPORT, KS		HA		864
<b><i>Region 7 FY 2000 Cost Subtotal:</i></b>			<b><i>\$109,622.00</i></b>			

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8	20008816S	GREEN RIVER LAUNCH COMPLEX, UTAH	12/22/00	PS	16127	2901
<b><i>Region 8 FY 2000 Cost Subtotal:</i></b>			<b><i>\$2,901.00</i></b>			

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9	20009931S	PEMACO SITE - MAYWOOD, CA +(F)	12/9/99	PS	3170	905
9	20009932S	KAPAA LANDFILL, OAHU, HAWAII, REVISION 1,2,3	7/18/00	HA	3341	11245
9	20009933S	DISCIPLINARY BARRACKS, LOMPOC, CA REVISION 2	3/9/00	HA	1369	15030
9	20009934S	OMEGA CHEMICAL, WHITTIER, CA REVISION 1,2	5/4/00	HA		20989
9	20009935S	STANDARD VENEER SITE, CRESCENT CITY, CA -AMEND A	4/3/00	HA		3227
9	20009936S	DUTTON SITE, CRESCENT CITY, CA - PHOTO CANCELED A	4/10/00	HA		5255
9	20009937S	ALTURAS SITE, MODOC, CA - A - (PHOTO AN CANCELED) A	4/26/00	HA		3813
9	20009938S	MCNAMARA & PEEPE SAWMILL, CRESCENT CITY, CA REV 1	6/30/00	PS		2371
9	20009939S	CITY OF ARCATA PROPERTY, CA	6/30/00	PS		3531

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9	20009940S	MCCLOUD PROPERTIES, MCCLOUD, CA	7/10/00	PS		3476
9	20009941S	EWA BEACH, HI REVISION 1	7/13/00	PS		2959
9	20009942S	38TH STREET BURN DUMP, SAN DIEGO, CA, REVISION 1	8/3/00	PS		1475
9	20009943S	ANACONDA COPPER MINE, YERINGTON, NV REVISION 1	9/11/00	PS		1445
<b><i>Region 9 FY 2000 Cost Subtotal:</i></b>			<b><i>\$75,721.00</i></b>			

***FY 2000 Superfund Total Cost: \$1,029,356.00***

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AW = FILM ARCHIVES WORK  
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 GIS = GEOGRAPHIC INFORMATION  
 SYSTEM  
 HA = HISTORICAL SITE ANALYSIS

IP = DIGITAL IMAGE PROCESSING  
 FT = FRACTURE TRACE ANALYSIS  
 LE = LANDSCAPE ECOLOGY  
 LS = LITIGATION SUPPORT  
 LU/LC = LAND USE/LAND COVER  
 MAP = THEMATIC/TOPOGRAPHIC  
 MAP

PG = PHOTOGRAMMETRY SUPPORT  
 PS = PHOTO SUPPORT  
 RR = REPORT REPRODUCTION  
 TA = THERMAL ANALYSIS  
 WT = WETLAND ANALYSIS  
 + = NATIONAL PRIORITIES LIST  
 +(F) = FINAL  
 +(P) = PROPOSED  
 +(D) = DELETED

NO COMPLETION DATE SHOWN  
 = PROJECT CARRIED OVER  
 INTO FY 2001

***\*Source: Remote Sensing Program for EPA, FY 99 Program Summary***

***\*\*Source: EPIC FY 00 Project Tracking Data Base***

## ***Appendix A: FY 2000 Program Remote Sensing Support Projects***

### ***FY 2000 RCRA Remote Sensing***

<b><i>Region</i></b>	<b><i>Number</i></b>	<b><i>Site</i></b>	<b><i>Complete</i></b>	<b><i>Type</i></b>	<b><i>FY 99 Cost*</i></b>	<b><i>FY 2000 Cost**</i></b>
3	20003413R	TWENTYMILE CREEK WATERSHED, NICHOLAS CO., WV 1	9/11/00	IP	2536	18242
3	20003414R	TWENTYMILE CREEK WATERSHED, NICHOLAS CO., WV 1	2/22/00	LU	7314	22998
3	20003424R	SIX SITES IN SOUTHEASTERN VIRGINIA REVISION 1,2	3/16/00	CO		10750
4	20004455R	MORTON INTERNATIONAL, INC., MOSS POINT, MS RE 1	1/13/00	HA	4790	16265
7	20007740R	UNION PACIFIC RAILYARD, OELWEIN, IA	9/11/00	PS		4016

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 INTO FY 2001

***\*Source: Remote Sensing Program for EPA, FY 99 Program Summary***

***\*\*Source: EPIC FY 00 Project Tracking Data***



## ***FY 2000 RCRA Remote Sensing***

<b><i>Region</i></b>	<b><i>Number</i></b>	<b><i>Site</i></b>	<b><i>Complete</i></b>	<b><i>Type</i></b>	<b><i>FY 99 Cost*</i></b>	<b><i>FY 2000 Cost**</i></b>
8	20008826R	ENSIGN BICKFORD COMPANY, CO REVISION 1	1/3/00	HA	8960	8068
8	20008827R	REMEL METALS, ENGLEWOOD, CO REV 1 AMEND A CNCLD	5/1/00	HA		6139
8	20008828R	ALLIANT TECHSYSTEMS SITE, ARAPAHOE COUNTY, CO, REV 1	8/8/00	HA		3069
<b><i>FY 2000 RCRA Total Costs:</i></b>			<b><i>\$89,547.00</i></b>			

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***\*Source: Remote Sensing Program for EPA, FY 99 Program Summary***

***\*\*Source: EPIC FY 00 Project Tracking Data***

# Appendix A: FY 2000 Program Remote Sensing Support Projects

## FY 2000 Wetlands Remote Sensing Support

Region	Number	Site	Complete	Type	*FY 2000 Cost
5	20005573W	ROWLAND FABIAN SITE, LAKE COUNTY, IN	8/17/00	CEO	449
FY 2000 Wetland Total Cost:			\$449.00		

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 CEO = COST ESTIMATE ONLY  
 DA = DRAINAGE ANALYSIS  
 ER = EMERGENCY RESPONSE  
 GIS = GEOGRAPHIC INFORMATION  
 SYSTEM

HA = HISTORICAL SITE ANALYSIS  
 IP = DIGITAL IMAGE PROCESSING  
 FT = FRACTURE TRACE ANALYSIS  
 LE = LANDSCAPE ECOLOGY  
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 INTO FY 2001

\*Source: EPIC FY 00 Project Tracking Data Base

## ***Appendix A: FY 2000 Program Remote Sensing Support Projects***

### ***FY 2000 Research and Development Support***

<b><i>Region</i></b>	<b><i>Number</i></b>	<b><i>Site</i></b>	<b><i>Complete</i></b>	<b><i>Type</i></b>	<b><i>FY 2000 Cost**</i></b>
ALL	200RD001S	EPIC FILM LIBRARY DB - AMENDMENT A	12/22/99	AW	12148
ALL	200RD002R	GALVESTON BAY SEA GRASS MONITORING, TX REV. 1 AM. A	12/13/99	IP	1595
ALL	200RD003S	REMOTE SENSING DATA AND REPORT LIBRARY AMEND A 1,2	9/11/00	AW	224779
ALL	200RD011R	EMAP WESTERN LANDSCAPE ECOL. ASSMT. REV 1,2	9/11/00	GIS	175221
ALL	200RD022R	GIS SUPPORT FOR ECO PEST TOX PROGRAM REV 1,2	9/11/00	GIS	90561
ALL	200RD029R	NO. AMERICAN LANDSCAPE PROJECT SUPPORT RE3AD	9/11/00	GIS	177283

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 INTO FY 2001

***\*\*Source: EPIC FY 00 Project Tracking Data***

## ***FY 2000 Research and Development Support***

<b><i>Region</i></b>	<b><i>Number</i></b>	<b><i>Site</i></b>	<b><i>Complete</i></b>	<b><i>Type</i></b>	<b><i>FY 2000 Cost**</i></b>
ALL	200RD032R	ACCURACY ASSESST. DATA-LANDSAT THEMATIC MAP REV. 1,2	2/21/00	GIS	8579
ALL	200RD033R	ACCURACY ASSESSMENT - REGIONS 5,7,10 - REV. 1	9/11/00	HA	114366
ALL	200RD036R	LITTLE MIAMI, OH RIVER BASIN LANDSCAPE, REVISION 1	9/11/00	LE	35169
ALL	200RD037R	GREAT MIAMI RIVER REMOTE SENSING PROJECT	9/11/00	LU	8054
ALL	200RD038R	THE LITTLE MIAMI RIVER - RIPARIAN LND. COVER, OH R 2	9/11/00	LU	56407
ALL	200RD039R	WHITE RIVER BASIN, AR REVISION 1	9/11/00	LE	26185
ALL	200RD040R	WESTERN EMAP PILOT - AMEND A	9/11/00	IP	8683

***Research Total:                      \$939,030.00***

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***\*\*Source: EPIC FY 00 Project Tracking Data Base***

## Appendix B

### LEB/EPIC Project Support Contacts

The following LEB/EPIC staffs are available to provide information to Regional and other EPA offices and staff regarding LEB products and services, technical specifications to meet the requester's requirements, and ordering instructions.

REGION	EPIC WAM	PHONE	REGION	EPIC WAM	PHONE
1	Terry Slonecker <a href="mailto:slonecker.t@epa.gov">slonecker.t@epa.gov</a>	703-648-4289	6	Dave Williams <a href="mailto:williams.davidj@epa.gov">williams.davidj@epa.gov</a>	703-648-4798
2	Dave Jennings <a href="mailto:jennings.david@epa.gov">jennings.david@epa.gov</a>	703-648-4293	7	Phil Arberg <a href="mailto:arberg.phil@epa.gov">arberg.phil@epa.gov</a>	702-798-2545
3	Mary Lacerte <a href="mailto:lacerte.mary@epa.gov">lacerte.mary@epa.gov</a> Pete Stokely <a href="mailto:stokely.peter@epa.gov">stokely.peter@epa.gov</a>	703-648-4137 703-648-4292	8	Taylor Jarnagin <a href="mailto:jarnagin.taylor@epa.gov">jarnagin.taylor@epa.gov</a>	703-648-4797
4	Joan Bozik <a href="mailto:bozik.joan@epa.gov">bozik.joan@epa.gov</a> Don Garofalo <a href="mailto:garofalo.donald@epa.gov">garofalo.donald@epa.gov</a>	703-648-4288 703-648-4285	9	Phil Arberg <a href="mailto:arberg.phil@epa.gov">arberg.phil@epa.gov</a>	702-798-2545
5	Joan Bozik <a href="mailto:bozik.joan@epa.gov">bozik.joan@epa.gov</a> Don Garofalo <a href="mailto:garofalo.donald@epa.gov">garofalo.donald@epa.gov</a>	703-648-4288 703-648-4285	10	Phil Arberg <a href="mailto:arberg.phil@epa.gov">arberg.phil@epa.gov</a>	702-798-2545

#### Photogrammetric/Topographic Mapping Support

All Regions - David B. Jennings: (703) 648-4293

## Appendix C

### Regional Remote Sensing Coordinators (RSCs)

The following are EPA Regional staffs which act as liaisons between the Regions and EPIC. These individuals assist EPA Regional personnel and offices in ordering EPIC products and services. They have also completed various remote sensing training programs offered by EPIC and are qualified to answer questions, mostly of a nontechnical nature, regarding EPIC's capabilities.

REGION	RSC	PROGRAM	PHONE
1	Dick Willey	SUPERFUND	(617) 918-1266
1	Richard Piligian	RCRA	(617) 918-1757
2	Keith Glenn	ESD	(732) 321-4454
2	Diana Cutt	SUPERFUND	(212) 637-4311
3	Vic Guide	ESD	(215) 814-2733
4	Carmen Santiago-Ocasio	SUPERFUND	(404) 562-8948
4	Neil Burns	SUPERFUND	(404) 562-8289
5	Walt Francis	RCRA	(312) 353-4921
5	Steve Ostrodka	SUPERFUND	(312) 886-3011
5	Steve Peterson	SRT	(312) 353-1422
6	Rena McClurg	RCRA	(214) 665-8314
6	La Donna Walker	SUPERFUND	(214) 665-6666
7	Aaron Zimmerman	RCRA	(913) 551-7333
7	Larry Stafford	SUPERFUND	(913) 551-7394
8	Larry Diede	RCRA	(303) 312-6428
8	Tony Selle	SUPERFUND	(303) 312-6774
9	Ron Leach	RCRA	(415) 744-2031
9	Michael Gill	SUPERFUND	(415) 744-2385
10	Bill Bogue	ESD	(206) 553-1676
10	Vickey Renshaw	RCRA	(206) 553-2586