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Agency

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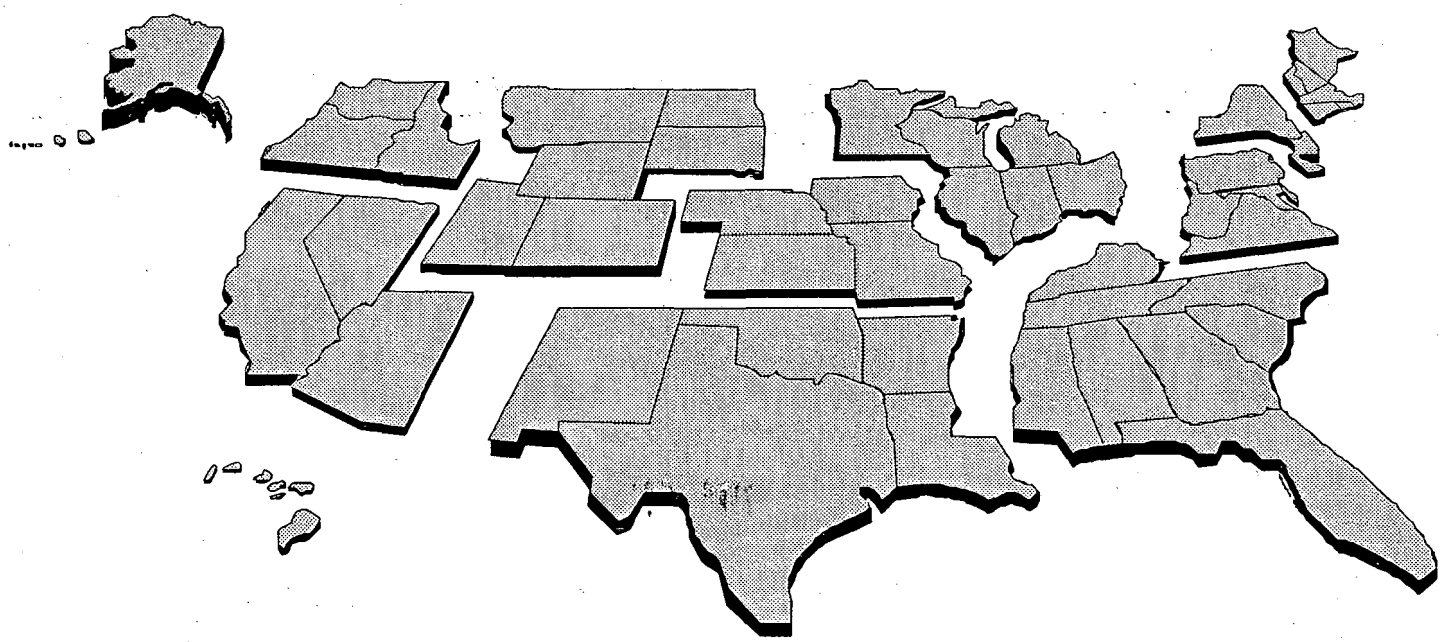
EPA

# Remote Sensing Program for EPA

## FY 2001 Program Summary



# REMOTE SENSING PROGRAM FOR EPA

## FY 2001 PROGRAM SUMMARY

## ENVIRONMENTAL PHOTOGRAPHIC INTERPRETATION CENTER

## (EPIC)

**FEBRUARY 2002**

**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**

## NOTICE

The US Environmental Protection Agency, through its Office of Research and Development, performed and partially funded the research described in this report. This document is intended for internal Agency use only. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

## FOREWORD

Since the mid-1970's, the Environmental Protection Agency 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 of the Office of Research and Development through the Landscape Ecology Branch (LEB), Environmental Photographic Interpretation Center (EPIC) and its remote sensing capabilities in Las Vegas and in Reston, Virginia.

In FY 99, LEB/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 continued and research commenced in FY 2001.

In FY 2000 LEB/EPIC awarded a new five-year (1 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, and 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 in Las Vegas, Nevada (ESD), 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 SARA and under the National Contingency Plan (NCP). 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 Environmental Protection Agency 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 Environmental Sciences Division of the Environmental Protection Agency in Las Vegas, Nevada, to provide technical support to Regional Offices, and to the Office of Solid Waste and Emergency Response.

## ORD PROGRAM SUPPORT

In FY 2001, LEB/EPIC provided remote sensing and GIS support in the form database development, research, data acquisition, processing, analysis and accuracy assessment activities for EMAP, AMI and other R&D programs and activities. LEB/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. LEB/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.

LEB/EPIC also continued a R&D project in multi-media technology to develop new and better means of providing remote sensing products and services to Agency users. This included continued research for the digital conversion of LEB/EPIC reports and archives. A Remote Sensing Training CD-ROM entitled *Remote Sensing: Fundamentals and Applications* was completed in FY99 and has been broadly distributed throughout the Agency in FY 2000 and FY 2001. Also in FY 1999, LEB/EPIC began developing a remote sensing website which became operational in FY 2000. In FY 2001 updates to the website were made as new activities were initiated or completed or new products or services were made available. The website contains a wealth of information on the fundamentals of remote sensing and the technical support products, services, and R&D activities of the Environmental Photographic Interpretation Center. The URL for the site is: http://lvord1.las.epa.gov:9876/epic/default.htm.

## OTHER PARTNERING ACTIVITIES

LEB/EPIC is partnering with EPA program offices and laboratories on several projects. The Office of Air and LEB/EPIC are developing a method to estimate tropospheric aerosols using satellite imagery. LEB/EPIC is assisting the NHEERL lab and the EMAP program in mapping large river resources using National Technical Means. LEB/EPIC provided technical expertise to

the National Imagery and Mapping Agency (NIMA) to evaluate multispectral and hyperspectral image processing software packages as part of the NIMA Pathfinder Program. This program evaluates government and commercial software packages to assist users in matching appropriate software tools with their needs. LEB/EPIC is partnering with the Department of Energy (DOE) and NIMA to develop image processing procedures for use with advanced remote sensing systems. LEB/EPIC is continuing to partner with the USGS Geologic Division to develop spectral libraries of environmental contaminates, focusing on organic pollutants such as PCB's. 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 LEB/EPIC personnel to analyze and create spectral library databases of these compounds.

In March, 2001, LEB/EPIC co-sponsored with EPA Region 4's GIS & Information Management Branch, a two-day conference, entitled *Above & Beyond: An EPA Remote Sensing Conference.* The conference, held in Las Vegas, was attended by approximately 100 people representing: all ten EPA regional offices; EPA GIS coordinators; EPA enforcement staff; Agency remote sensing R&D and applications scientists; spatial data quality assurance specialists; spatial data information planners; and representatives from other federal agencies, academia, and the private sector. More than thirty speakers gave presentations relating to operational remote sensing usage; latest developments in remote sensing tools and technology; remote sensing and GIS accuracy assessment; and remote sensing research and development. The goal of this successful conference was:

***To inform and update EPA regional remote sensing coordinators, management and other technical or interested staff of the latest developments in the field of remote sensing as they***

***apply to environmental issues at the EPA. And to generate interest in and demonstrate the technology, and to show how remote sensing is being utilized in other Regions, Offices, and Programs in the Agency.***

## REMOTE SENSING/GIS ACCURACY ASSESSMENT SUPPORT

LEB/EPIC continued its support of remote sensing accuracy assessment by developing an in-house truth GIS dataset for the North American Landscape Characterization (NALC) project in the area of the Mid-Atlantic Integrated Assessment (MAIA). High resolution aerial photographs were used to develop land cover codes for the assessment of the NALC land cover data derived from Landsat MSS imagery.

LEB/EPIC also further developed its remote sensing and GIS accuracy assessment work by completing the truth dataset for the Delaware Catskill watershed in New York and the Upper Accotink watershed in Virginia.

LEB/EPIC also initiated two interagency agreements with the U.S. Geological Survey (USGS) to provide accuracy assessment data for the Multi Resolution Landcover Consortium (MRLC) datasets for EPA Region 8 and EPA Region 9. Truth data will be developed by USGS using National Technical Means data sources for over 2,000 data points in the two regions.

## SPRING VALLEY SUPPORT

LEB/EPIC continued its in-house and contract support for on-going investigation of World War I chemical and munitions contamination at the Spring Valley Superfund site in Washington D.C. Through its contractor, EPIC produced a second, more comprehensive analysis of historical aerial photos of American University and the Spring Valley area. LEB/EPIC also produced in-house, six GIS databases of ground scars, pits, trenches and other relevant aerial photographic signatures of potential waste disposal that are currently being used by the U.S. Army Corps of

Engineers to develop formal risk assessment scenarios for arsenic sampling and additional geophysical investigations.

## FIELD SPECTRAL SUPPORT

LEB/EPIC provided field data collection of high resolution spectral data of invasive vegetation species for the Great Lakes Remap project, Submerged Aquatic Vegetation for the Chesapeake Bay Program, rangeland vegetation for the EMAP Western Pilot, and desert vegetation for the investigation of perchlorate in the Las Vegas Wash.

## LEB/EPIC LIBRARY/ARCHIVE

The LEB/EPIC library/archive contains over 25 years of aerial and satellite film acquisitions, related products and documentation. In FY 2001, the archive contractor continued to support LEB/EPIC and its remote sensing operations, and to make progress in the analog to digital conversion and inventory control of the facility holdings. Inventory control, database update and information integration has been greatly increased with the use of library management software. These activities, combined with continued bar coding efforts, have facilitated more efficient item searches and data retrieval. The analog-to-digital conversion activities, which were halted for much of the year due to logistical problems, resumed and is proceeding well. Metadata is being collected and the footprints of the film digitized. This data is then transferred to the U.S. Geological Survey's EROS Data Center (EDC) for ingestion into their *EarthExplorer* database. An interagency agreement between EPA/EPIC and USGS/EDC was initiated in FY 1999 to facilitate this effort. EDC will provide EPA with metadata search and retrieval services based on a graphical interface developed by EDC. The search and retrieval system will enable EPA users to quickly search for and determine the extent and attributes of EPIC's aerial photographic and

satellite image coverage for any location in the United States. The goal of this effort is to create a searchable, easy to use, softcopy metadata database.

## LEB/EPIC REPORT - HTML PROTOTYPE

In an effort to develop multi-media technical transfer technologies, LEB/EPIC continued research for producing standard LEB/EPIC reports in interactive, digital format, delivered on CDROM media. A prototype was developed in FY 99 using the LEB/EPIC Report TS-PIC-9802237S, Aerial Photographic Analysis, Pavilion Avenue Field Study Area, Riverside, New Jersey. The report was reproduced in an 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 LEB/EPIC Report TS-PIC-20004486S, Aerial Photographic Analysis Report for the Georgia-Pacific Corporation Hardwood Sawmill Site, Plymouth, North Carolina. In FY 2001 LEB/EPIC explored the potential use of new compression software for reducing the size of data files associated with digital conversion of LEB/EPIC image analysis reports, while at the same time maintaining image content and quality. The ultimate goal is to develop a user-friendly, digital version of the LEB/EPIC reports which can be produced cost-effectively.

## MULTI-MEDIA TRAINING CDROM

LEB/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, 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 LEB/EPIC customers. This project was initiated through

an interagency agreement with the General Services Administration under the FAST program. In FY 2001 the CD-ROM was distributed within and outside the Agency to interested users.

## REMOTE SENSING TRAINING

In FY 01 LEB/EPIC conducted a remote sensing training course for EPA Region 9 staff. The course consisted of 4 1-day courses and was provided by two LEB/EPIC remote sensing scientists to more than 40 EPA Region 9 and state staff covering the basics of aerial cameras, films, photographs, maps, scale, displacement, object recognition and photographic signatures. Regional staff from the Superfund, Waste Management, Water (wetlands, wastewater), and Policy and Management Divisions, as well as confined animal feeding operation (CAFO) inspectors, attended the course. Also covered, through hands-on image analysis training, were aerial photo interpretation applications to drainage identification and mapping, land use/cover mapping, and feature condition recognition and assessment. Part 2 of the course focused on specific areas of interest to EPA Region 9 such as application of aerial photo interpretation to CAFO's, urban feature recognition and assessment, and hazardous waste site analysis.

## 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 1999, LEB/EPIC initiated a new remote sensing research and development program. Research plans were prepared and underwent peer review. At the close of FY 1999, reconciliation of the peer reviewer's comments was underway, and research commenced for some projects in FY 2000 and continued through FY 2001. A description of these projects can be viewed on LEB/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 2001, work was conducted on 120 Superfund aerial survey projects covering more than 100 specific waste sites. Of these, 6 projects covering 6 sites were initiated as emergency responses. Additionally, litigation support was provided to the Regions for 2 sites, and 26 overflights were completed to acquire new aerial photographs. Work on 36 of these projects was carried over into FY 2002.

Finally, 9 miscellaneous projects providing general support to Superfund activities, including data management and report/film archive maintenance and support, and QA SOP development were budgeted from CERCLA funds. It is anticipated that in FY 2002, operations will be conducted in much the same way as previous years.

## RCRA PROGRAM SUPPORT

In FY 2001, work was initiated on 5 Resource Conservation and Recovery Act (RCRA) projects covering 5 RCRA sites. Almost all projects were in support of enforcement and compliance activities. Work on 4 of these projects was completed in FY 2001.

## ORD PROGRAM SUPPORT

In FY 2001, LEB/EPIC provided remote sensing and GIS support in the form database development, research, data acquisition, processing, analysis and accuracy assessment activities for EMAP, NALC, AMI and other R&D programs and activities. LEB/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. LEB/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.

LEB/EPIC also initiated R&D projects in several new areas of multi-media 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 LEB/EPIC reports and archives, and the development and update of a new LEB/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 the Environmental Photographic Interpretation Center. The site was maintained and updated during FY 2001.

## OTHER PARTNERING ACTIVITIES

LEB/EPIC is partnering with EPA program offices and laboratories on several projects. The Office of Air and LEB/EPIC are developing a method to estimate tropospheric aerosols using satellite imagery. LEB/EPIC is assisting the NHEERL lab and the EMAP program in mapping large river resources using National Technical Means. LEB/EPIC provided technical expertise to the National Imagery and Mapping Agency (NIMA) to evaluate multispectral and hyperspectral image processing software packages as part of the NIMA Pathfinder Program. This program evaluates government and commercial software packages to assist users match appropriate software tools with their needs. LEB/EPIC is partnering with the Department of Energy (DOE) and NIMA to develop image processing procedures for use with advanced remote sensing systems. LEB/EPIC is continuing to partner with the USGS Geologic Division to develop spectral libraries of environmental contaminates, focusing on organic pollutants such as PCB's. 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 LEB/EPIC personnel to analyze and create spectral library databases of these compounds.

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## REMOTE SENSING PROGRAM FOR EPA

## FY 2001 PROGRAM SUMMARY

### *INTRODUCTION*

The Environmental Sciences Division in Las Vegas, Nevada (ESD) of the Office of Research and Development, 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 Environmental Photographic Interpretation Center (EPIC), a field station of the Landscape Ecology Branch (LEB), and its remote sensing capabilities in Las Vegas, Nevada and in Reston, Virginia.

In FY 1999, LEB/EPIC initiated a new **remote sensing research and development** program. Research plans were prepared and underwent peer review. At the close of FY 1999 and into FY 2000, reconciliation of the peer reviewers' comments was underway. Research on these projects commenced in FY 2000 and continued through FY 2001.

### *REMOTE SENSING TECHNICAL SUPPORT*

Analysis of air- and space-borne acquired 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 inch by 9 inch 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 of these photographs from sources nationwide is a significant step in our analysis of sites. Finally, our 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 Landsat Thematic Mapper for conducting broad area characterizations of environmental and natural resources, and land use and land cover assessments and mapping.

LEB/EPIC 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 may be found in Table 1.

**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

## TABLE 1. REMOTE SENSING TECHNICAL SUPPORT PROJECTS, PRODUCTS, AND AVERAGE FY 01 COSTS++

| Project Type | Application | Product | Turn-around | Approximate Cost/Site |
|---|---|---|---|---|
| Emergency Response | Hazardous Materials Release | Photos and Overlays, Annotated Maps, Interpretative Description | 24 hours | $19,000++ |
| Single-Date Analysis | Current Information | Report with photos, Maps, Overlays, and Interpretive Description | 6 to 36 weeks | $10,000** |
| Intensive Analysis | Chance Analysis | Report with Photos, Maps, Overlays, and Interpretive Description Using Historical and Current Data | 4 to 12 months | $13,000++ |
| Area Inventory or Place-Based Analysis | Regional or Area Survey | Report with Photos, Maps, Overlays, and Interpretive Description | 2 to 12 months | $70.00 per square mile |
| Photogrammetry | Mapping and Quantitative Analysis | Topographic Maps, Area and Volume Calculations | 3 to 6 months | * |
| Floodplain Analysis | Flood Extent Prediction | Floodplain Contours | 2 to 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 to $15,000 including travel |

+ +NOTE: Average costs were calculated for projects completed in FY 01.

*NOTE: Cost depends on contour intervals, size of site, population density, and on whether or not 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 $10.00 to $1300.00 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.

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 of 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) | 7:00am-4:30pm (ET) |
| | (301) 869-8409 (Home Telephone) | 24-hours |
| | 1-800-918-5272 | 24-hours |
| Phillips A. Arberg | (702) 798-2545 (Work Telephone) | 7:30am-5:30pm (PT) |
| | (702) 261-9911 (Home Telephone) | 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 in 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 1930's 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. The Center maintains an index of the imagery holdings of the Earth Resources Observations System (EROS) Data Center (EDC) 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.

Occasionally, 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 over 700,000 single sheets in 50,000 volumes. The Library of Congress maintains this collection, and a published volume may be purchased from the L.C. cataloguing the 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 to 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**

LEB/EPIC 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, LEB/EPIC 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 (NPL) as of September 1984. The LEB/EPIC 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**

LEB/EPIC produces topographic and feature maps, generally at a small contour interval (usually specified at 2 feet to 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 setting foot on 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 1999, LEB/EPIC initiated a new remote sensing research and development program. Research and development involves the scientific evaluation of existing and developing air- and space-borne 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. LEB/EPIC remote sensing scientists developed research plans in FY 1999. The plans were sent out for scientific peer review. Most of the reviewers' comments were returned and reconciled in FY 2000. Research commenced on reconciled projects in FY 2000 and FY 2001. The five 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 are reported at scientific symposia, in appropriate reports, in scientific journals and other publications, and on LEB/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), a field station 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 remote sensing program. The LEB/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 should be sent to the attention of the director of the Environmental

Photographic Interpretation Center. A concurrent telephone call and correspondence copy of the request may also be directed to the appropriate Regional Remote Sensing Coordinator. The LEB/EPIC director reviews the request and assigns it to an LEB/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 LEB/EPIC 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 LEB/EPIC and the Region to accept Regional requests for LEB/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 LEB/EPIC. Appendix C lists the Regional Remote Sensing Coordinators who act as liaisons between Regional or Program Offices requesting LEB/EPIC support and the LEB/EPIC WAMs. Remote Sensing Coordinators assist requesters by providing them with information on the type of support available through LEB/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 Landscape Ecology Branch remote sensing report library and archive.

As a part of an annual planning process to identify Regional remote sensing support needs for the coming year, LEB/EPIC WAM's 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 support requirements and funding needs are met.

**Contractor Support**

In support of LEB/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, non-dedicated contract which was awarded for a one-year base period, and four one-year option periods.

**Reorganization**

In FY 1997 the Characterization Research Division (CRD-LV) reorganized and became the Environmental Sciences Division (ESD) and the former Monitoring Sciences Branch (MSB) under which LEB/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 EPA.

**Quality Assurance**

New and more comprehensive Quality Assurance/Quality Control procedures and SOP's were in place in FY 1996 and revised and updated in FY 2001. The ESD has developed a Quality Management Plan (QMP). The LEB/EPIC support contractors are also required to prepare and submit to EPA a Quality Assurance Program Plan which describes the contractors' capabilities and approach to Quality Assurance. In addition, the contractors are required to prepare and submit QA Project Plans (QAPP's) outlining specific QA/QC procedures to be followed during completion of the principal contract activities. In the case of LEB/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 Work Assignment by the Work Assignment Manager. The form is approved by the Project Officer and the designated QA Officer. All of these procedures ensure that LEB/EPIC's clients receive the highest possible quality in the products and services requested.

In FY 1999, a peer review of the LEB/EPIC operation was completed. The peer review panel met at ESD-LV and received presentations on all elements of the LEB/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 LEB/EPIC and submitted to NERL 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 2001 PROGRAM SUMMARY*

During FY 2001 LEB/EPIC continued to fund task requests from the Regions and Program Offices. While some of the Regional Superfund requests were not listed in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database, 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 2001 are shown in Table 2. A total of $3528.1K 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 $250.0K provided by OERR in FY 2001 to allow the Division to maintain its capability for providing remote sensing support to the Regions. Also in FY 2001, LEB/EPIC received $63.0K in ORD Superfund funding. Of the SF, RCRA and OERR funding, $1719.5K was carried over from FY 2001 to FY 2002. Non-Superfund ORD funding in the amount of 931.5K to support the R&D activities of the Landscape Ecology Branch was received in FY 2001. $899.7K of this ORD funding was carried over to FY 2002. Smaller amounts of funding were received to support the specific project requirements of other programs and/or offices.

In all, 51 photo interpretation projects were completed in FY 2001. An additional 22 were carried over into FY 2001. In addition, 1 fracture trace and 2 wetland analyses were completed in FY 2001. Also, eleven topographic mapping projects were completed in FY 2001 and 2 of these were carried over into FY 2002. Also, 2 GIS projects were completed, and an additional GIS project was carried over into FY 2002. Four emergency response support projects were completed in FY 01 and an additional emergency response project was carried over into FY 02. In addition, 26 overflights to obtain current aerial photographs of either sites or larger regional areas were performed. An additional 8 overflights to acquire current aerial photography or digital imagery were performed in support of the Western EMAP and Great Lake Species R&D projects. Litigation support was provided for 2 sites. The remaining aerial survey projects were photo

## TABLE 2. FUNDING AVAILABLE IN FY 00 ($K)

| SOURCE | CARRYOVER FY00 TO FY01 | | | FY01 FUNDS RECEIVED | | | CARRYOVER FY01 TO FY02 | | |
|---|---|---|---|---|---|---|---|---|---|
| | SF | RCRA | OTHER | SF | RCRA | OTHER | SF | RCRA | OTHER |
| REGION 1 | 350.0 | -0- | -0- | 225.0 | -0- | -0- | 249.0 | -0- | -0- |
| REGION 2 | 75.0 | -0- | -0- | 200.0 | -0- | -0- | 165.0 | -0- | -0- |
| REGION 3 | 50.0 | -0- | -0- | 650.0 | 30.0 | -0- | 462.5 | -0- | -0- |
| REGION 4 | 160.0 | -0- | -0- | 350.0 | -0- | -0- | 280.0 | -0- | -0- |
| REGION 5 | 93.0 | -0- | -0- | 160.0 | -0- | -0- | 122.0 | -0- | -0- |
| REGION 6 | 100.0 | -0- | -0- | 100.0 | -0- | -0- | 37.0 | -0- | -0- |
| REGION 7 | 270.0 | -0- | -0- | 150.0 | -0- | -0- | 285.0 | -0- | -0- |
| REGION 8 | 5.0 | -0- | -0- | -0- | 0.1 | -0- | -0- | -0- | 5.0 |
| REGION 9 | 55.0 | -0- | -0- | 50.0 | -0- | -0- | 69.0 | -0- | -0- |
| REGION 10 | 5.0 | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| ORD | -0- | -0- | -0- | 63.0 | -0- | 931.5 | -0- | -0- | 899.7 |
| OSWER | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| OERR | 200.0 | -0- | -0- | 250.0* | -0- | -0- | 50.0 | -0- | -0- |
| TOTAL | 1363.0 | -0- | -0- | 2198.0 | 30.1 | 931.5 | 1719.5 | -0- | 899.7 |

Refer to Appendix A for a summary of FY 2001 projects.

*$200K of FY 01 funding went to the LEB/EPIC Archive Support contract.

reproductions or historical photo acquisitions only (i.e., requiring no photo interpretation); image analysis support to the Landscape Ecology Branch; regional office requests; occasional requests for documents by the regions; and cost recoveries.

**Records Management**

Records management refers to the way in which LEB/EPIC organizes and catalogs its technical reports and associated products that result from its day-today 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 LEB/EPIC, and 80,000 additional frames have been archived in a national data bank at the EROS Data Center in Sioux Falls, South Dakota.

LEB/EPIC has completed the creation of a computer-based technical report information retrieval system. A database 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 database of the system was completed in FY 1990, and initial copies of the published report were distributed to key program contacts in the ten EPA regions. In FY 1996 the database was converted from a VAX mainframe to a PC-based system and in FY 1997 a final PC-based searchable data base was completed. In FY 1998 a Users Guide was developed to assist Regional users in accessing and searching the database and upgrades were made to the computer-based search routine in FY 1999 and FY 2000 to make it more user friendly for use by LEB/EPIC's customers. The database and search engine

was distributed to all ten EPA Regional Offices and to OERR at EPA headquarters in early FY 2000. The database 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 database 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 analyses performed
- Summary findings

The database is updated continuously as current projects are completed. Data base updates are provided on a periodic basis to all ten EPA Regions, and Headquarters Program Offices.

**Equipment and Specialized Software Purchases**

In FY 2001, LEB/EPIC has continued to purchase and upgrade our software and hardware. Specifically, we purchased geospatial software (Surfer) to support our R&D work on the Great Lakes thermal study. We also added two new NT computers for supporting our image processing and analysis work, and for running other GIS and geospatial software such as ArcView. As part of our efforts to evaluate and develop methods suitable for converting our traditional hard copy image analysis reports to digital form, we purchased Adobe Design Collection software. The utility of this software for report conversion purposes will be evaluated during FY 2002.

**Other -Training**

In FY 2001 LEB/EPIC research scientists involved with conducting field work to support their R&D projects commenced and/or completed the training course for Safety, Health and Environmental Management Training for Field Activities. The LEB/EPIC director also

completed the OSHA 600 Collateral Duty Safety & Health Course to enable him to function as the EPA collateral duty officer for the EPIC-Reston field station.

***FUTURE DIRECTIONS***

LEB/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 continued throughout FY 2001 to provide comprehensive remote sensing support to EPA Regional and Program Offices and laboratories. Also, a new LEB/EPIC archive/library contract (awarded in early FY 2001) is helping LEB/EPIC to more efficiently organize, retrieve and track LEB/EPIC's film and report products and make them more readily accessible to LEB/EPIC's EPA customers.

In FY 1996 LEB/EPIC moved its EPA staff and technical oversight operations from its Vint Hill Farms Station location near Warrenton, VA to the U.S. Geological Survey (USGS) headquarters in Reston, VA. Vint Hill Farms Station was on the post-closure list and closed at the end of FY 1997. During FY 1996 LEB/EPIC ended twenty-three years of continuous operations and support to the EPA from Building 166 on Vint Hill. LEB/EPIC, however, is continuing its operations from the USGS. Our relocation to the USGS facility gives us more rapid access to USGS maps and natural resources databases 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, LEB/EPIC's cleared staff at the USGS facility has 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 2001, LEB/EPIC partnered with other agencies that are leaders in the remote sensing field. For example, we conducted research and development in cooperation with the National Aeronautics and Space Administration (NASA) to evaluate applications of new hyperspectral remote sensors to environmental problems associated with mining activities.

LEB/EPIC is partnering with the U.S. Geological Survey (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. LEB/EPIC is also partnering with the USGS Geologic Division to develop spectral libraries of environmental contaminates, focusing on organic pollutants such as PCB's. 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 LEB/EPIC personnel to analyze and create spectral library databases of these compounds.

# APPENDIX A

# FY 2001 REMOTE SENSING SUPPORT PROJECTS

# *APPENDIX A: FY 2001 REMOTE SENSING SUPPORT*

## *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 1 | 20101007S | WEYERHAEUSER MILL COMPLEX, SPRINGFIELD, OR 3 | 1/22/01 | HA | 3404 | 11293 |
| 1 | 20101124S | THREE NEW ENGLAND SITES, TOPO-MAPPING AMEND 2 | 9/28/00 | MAP | | 2477 |
| 1 | 20101125S | SHORT TERM TECHNICAL SUPPORT AMEND 1,2,3 | | IP | | 14872 |
| 1 | 20101126S | PIKE HILL COPPER MINE, CORINTH, VT AMENDMENT1,2,3 | 9/11/01 | MAP | | 16053 |
| 1 | 20101127S | MOHAWK TANNERY, NASHUA, NH AMENDMENT 1,2 +(P) | 7/9/01 | MAP | | 15227 |
| 1 | 20101128S | SUTTON BROOK DISPOSAL AREA, TEWKSBURY, MA AMED1,3 +(F) | 9/11/01 | MAP | | 21104 |
| 1 | 20101129S | NUCLEAR METALS, CONCORD, MA AMEND 1,2 +(F) | 7/9/01 | MAP | | 11705 |
| 1 | 20101130S | SCOVILL INDUSTRIAL LANDFILL, WATERBURY, CT,AMEND2 +(F) | 9/11/01 | MAP | | 12602 |



AW=FILM ARCHIVES WORK
CA=CURRENT ANALYSIS
CO=CURRENT OVERFLIGHT
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
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 2002**

**Source: Remote Sensing Program for EPA, FY 00 Program Summary* ***Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 1 | 20101131S | ELY MINE, VERSHIRE, VT AMEND. 1,2 +(F) | 9/11/01 | MAP | | 8756 |
| 1 | 20101132S | KERR-AMERICAN MINE, BLUE HILL, ME AMENDMENT 1,2,3 | | MAP | | 20362 |
| 1 | 20101133S | CALLAHAN MINING CORPORATION, BROOKSVILLE, ME A.1,3 +(P) | | MAP | | 17882 |
| 1 | 20101134S | PETERSON/PURITAN, CUMBERLAND, RI AMEND 1, 2,3 +(F) | 9/11/01 | MAP | | 26917 |
| 1 | 20101135S | KERR-AMERICAN MINE, BLUE HILL, ME AMEND 1, 2,3,4 | 3/22/01 | HA | | 16583 |
| 1 | 20101136S | CALLAHAN MINING CORP., BROOKSVILLE, ME AMEND 1,2,3 +(P) | 4/3/01 | HA | | 13668 |
| 1 | 20101137S | PIKE HILL COPPER MINE, CORINTH, VT AMEND 1,2,3 | 7/13/01 | HA | | 12435 |
| 1 | 20101138S | SUTTON BROOK DISPOSAL AREA, TEWKSURY, MA AM.1,2 | 6/11/01 | HA | | 31214 |
| 1 | 20101139S | NUCLEAR METALS, CONCORD, MA AMEND.1,2 | 7/2/01 | HA | | 19363 |



AW=FILM ARCHIVES WORK
CA=CURRENT ANALYSIS
CO=CURRENT OVERFLIGHT
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
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 2002**

**Source: Remote Sensing Program for EPA, FY 00 Program Summary*

***Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 1 | 20101140S | SCOVILL INDUSTRIAL LANDFILL, WATERBURY, CT AM.1,2 | 2/1/01 | HA | | 14649 |
| 1 | 20101141S | ELY MINE, VERSHIRE, VT AMEND.1,2 +(F) | 7/2/01 | HA | | 18284 |
| 1 | 20101142S | BROAD BROOK MILL, E. WINDSOR, CT AMEND.1,2,3 +(P) | 2/12/01 | HA | | 14405 |
| 1 | 20101143S | BROAD BROOK MILL, E. WINDSOR, CT AMEND. 1 +(P) | 9/11/01 | MAP | | 11281 |
| 1 | 20101144S | PETERSON/PURITAN LANDFILL, CUMBERLAND, RI,AMEND1,2 +(F) | 9/11/01 | PS | | 9193 |
| 1 | 20101145S | PIKE HILL, MOHAWK TANNERY, SUTTON BROOK, BR AMEND2 | 9/11/01 | MAP | | 4932 |
| 1 | 20101146S | NUCLEAR METALS, SCOVILL LF, ELY MINE, AMEND 1,2 | 9/11/01 | MAP | | 1840 |
| 1 | 20101147S | HATHEWAY AND PATTERSON SITE, MANSFIELD, MA AMND1 +(P) | 9/11/01 | HA | | 13301 |
| 1 | 20101148S | HATHEWAY & PATTERSON SITE, MANSFIELD, MA AMND 1,2 +(P) | | CO | | 21624 |



AW=FILM ARCHIVES WORK
CA=CURRENT ANALYSIS
CO=CURRENT OVERFLIGHT
DA=DRAINAGE ANALYSIS
ER=EMERGENCY RESPONSE
GIS=GEOGRAPHIC INFORMATION SYSTEM
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**NO COMPLETION DATE SHOWN = PROJECT CARRIED OVER INTO FY 2002**

**Source: Remote Sensing Program for EPA, FY 00 Program Summary* ***Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 1 | 20101149S | TROY MILLS LANDFILL, TROY, NH AMENDMENT 1 | | HA | | 4251 |
| 1 | 20101150S | CLINTON RIGBY BROOK, CLINTON, MA AMENDMENT 1 | 9/6/01 | HA | | 284 |

*FY 2001 Cost Subtotal:* $386,557.00



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**Source: Remote Sensing Program for EPA, FY 00 Program Summary*

***Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 2 | 20102300S | DISMAL SWAMP SITE, NJ AMEND 1, 2 | 10/5/00 | PS | 3031 | 512 |
| 2 | 20102312S | BUSH INDUSTRIES, LITTLE VALLEY, NY AMEND 1,2 | 11/16/00 | HA | 6217 | 6602 |
| 2 | 20102313S | CATTARAUGUS CUTLERY LITTLE VALLEY NY AMEND2 | 11/15/00 | HA | 2454 | 10425 |
| 2 | 20102315S | PASCALE PROPERTY, WASHINGTON, NJ AMEND 1,2 | 11/8/00 | PS | 5231 | 1868 |
| 2 | 20102316S | JEFFERY FUELS BULK STORAGE SITE, NY AMED 1,2 | 11/17/00 | HA | 1154 | 1124 |
| 2 | 20102318S | LACKAWANNA FOUNDRY, LACKAWANNA, NY AMEND12 | 10/20/00 | PS | 3542 | 1116 |
| 2 | 20102320S | ICELAND COIN LAUNDRY, VINELAND, NJ AMEND 1, 2, 3 +(F) | 11/17/00 | HA | 1530 | 814 |
| 2 | 20102321S | SHORT TERM TECHNICAL SUPPORT (REGION 2) AMEND.1,2 | | PS | | 3307 |
| 2 | 20102322S | CROWN CLEANERS OF WATERTOWN, INC NY AMEND 1,2 +(P) | 1/16/01 | HA | | 3770 |



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**NO COMPLETION DATE SHOWN = PROJECT CARRIED OVER INTO FY 2002**

**Source: Remote Sensing Program for EPA, FY 00 Program Summary* ***Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 2 | 20102323S | ITHACA GUN COMPANY, NY AMEND. 1, 2 | 12/15/00 | HA | | 3831 |
| 2 | 20102324S | MERCURY REFINING SITE, ROESSLEVILLE, NY AMENDMENT 1,2,3 +(F) | 3/28/01 | HA | | 15051 |
| 2 | 20102325S | PATTERSON ROAD SITE , NJ AMENDMENT 1, 2,3 | 1/22/01 | PS | | 7509 |
| 2 | 20102327S | SHENANDOAH GROUNDWATER CONTAMINATION SITE NY AM 2 +(F) | 2/7/01 | PS | | 5077 |
| 2 | 20102328S | UNION SPRINGS WELL SITE AMENDMENT 1,2 | 6/8/01 | PS | | 5808 |
| 2 | 20102329S | ZONOLITE - TRENTON SITE, HAMILTON, NJ AMEND. 1,2 | 7/9/01 | HA | | 12950 |
| 2 | 20102330S | WEEDSPORT FACILITY-VERMICULITE INVEST. NY AMND 1,2 | 7/12/01 | PS | | 3670 |
| 2 | 20102331S | DIAMOND HEAD OIL REFINERY DIV. SITE, KEARNY, NJ AMEND 1 +(P) | | HA | | 4318 |
| 2 | 20102332S | LAWRENCE AVIATION INDUSTRIES SITE, BOOKHAVEN, NY,2 +(F) | | HA | | 13040 |



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**Source: Remote Sensing Program for EPA, FY 00 Program Summary*

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# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 2 | 20102333S | WESTINGHOUSE FOUNDRY SITE, ATTICA, NY,AMENDMENT 1 | | HA | | 1375 |

*FY 2001 Cost Subtotal:* $102,167.00



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**Source: Remote Sensing Program for EPA, FY 00 Program Summary*

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# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 3 | 20103429S | COLGATE PAY DUMP, BALTIMORE, MD AMEND 1,2 | 12/1/00 | HA | 7897 | 7188 |
| 3 | 20103432S | PLYMOUTH TOWNSHIP CO2 RELEASE, PA AMEND1,2 | 11/28/00 | HA | | 6861 |
| 3 | 20103434S | FORT DETRICK (AREA B) FREDERICK, MD AMEND 1, 2,3 | 1/31/01 | HA | | 19582 |
| 3 | 20103435S | SHORT TERM TECHNICAL SUPPORT (REGION 3) AMEND 1,2 | | HA | | 14697 |
| 3 | 20103436S | LOUISA MINE MINE STUDY AREA, LOUISA, VA AMEND. 1 | 11/20/00 | ER | | 9632 |
| 3 | 20103437S | BOARHEAD FARMS, UPPER BLACK EDDY, PA AMEND.1,2 +(F) | 1/8/01 | PS | | 3819 |
| 3 | 20103438S | NORWOOD WILSON, SR. FARM, HOPEWELL, VA AMED1,2.3,5 | 3/2/01 | HA | | 21498 |
| 3 | 20103439S | SPRING VALLEY, WASHINGTON, DC AMEND. 1,2,3,4 | 6/6/01 | HA | | 25969 |
| 3 | 20103440S | TRIUMPH EXPLOSIVES FIREHOLE, ELKTON, MD AMEND 1,2 | 3/5/01 | PS | | 2116 |



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# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 3 | 20103442S | CAMBRIDGE TOWN GAS, CAMBRIDGE, MD AMEND 1,2 | 6/20/01 | PS | | 3716 |
| 3 | 20103443S | ARCHIVE METADATA AML CONVERSIONS, AMEND 1,2 | | AW | | 15431 |
| 3 | 20103445S | LACKAWANNA REFUSE, OLD FORGE BOROUGH, PA AMD 1,2,4 +(D) | 8/29/01 | HA | | 14201 |
| 3 | 20103446S | LEHIGH ELECTRIC & ENGINEERING CO.,PA AMEND 1,2,3 +(D) | 9/11/01 | CO | | 13042 |
| 3 | 20103447S | TAYLOR BOROUGH DUMP, TAYLOR BOROUGH, PA, AMND3,4 +(D) | 8/29/01 | CO | | 12451 |
| 3 | 20103448S | WESTERN NORRISTOWN DUMP AREA, PA AMND.1 | 7/30/01 | HA | | 18176 |
| 3 | 20103449S | AVTEX FIBERS, FRONT ROYAL, VA AMEND1,2,4,5CANC +(F) | 7/17/01 | FT | | 10676 |
| 3 | 20103450S | FORMER FORT FOOTE, PRINCE GEORGE'S CO, MD AMD1 | | HA | | 6571 |
| 3 | 20103451S | FORMER FT.LINCOLN SITE, OFF. OF RES.& DEVMT.DC, 1 | | HA | | 6858 |



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# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 3 | 20103452S | FORMER MALONEY CHEMICAL LAB.ORGANIC UNIT 3,DC 1 | | HA | | 6237 |
| 3 | 20103454S | BIG JOHN SALVAGE,HOULT RD,FAIRMONT,WV,AM1 +(F) | | HA | | 1913 |
| 3 | 20103455S | FORMER NAVAL RADIO STATION, ARLINGTON,VA AMEND 1 | | PS | | 762 |
| 3 | 20103456S | FORMER DIAMOND ORDNANCE FUZE LAB. WASH.DC AMD1 | | PS | | 742 |

*FY 2001 Cost Subtotal:* $222,138.00



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# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 4 | 20104478S | ALCOA PROPERTIES, ALCOA, TN AMEND 1, 2 | 12/4/00 | HA | 29475 | 3785 |
| 4 | 20104486S | GEORGIA-PACIFIC HARDWOOD SITE AMEND 1, 2 | 1/12/01 | HA | 20387 | 3505 |
| 4 | 20104487S | CALLAWAY & SON DRUM SERVICE, FL AMEND 1,2 +(F) | 2/19/01 | HA | | 6799 |
| 4 | 20104488S | ANODYNE, INC. MIAMI BEACH, FL AMEND 1,2,3,6 +(F) | 6/12/01 | LS | 3641 | 12663 |
| 4 | 20104489S | CALLAWAY & SON DRUM SERVICE AUBURNDALE, FL 6 +(F) | 11/16/00 | HA | 4674 | 6387 |
| 4 | 20104491S | SIXTY-ONE INDUSTRIAL PARK, MEMPHIS, TN AMEND 1 | 1/5/01 | HA | | 17369 |
| 4 | 20104492S | SHORT TERM TECHNICAL SUPPORT - REGION 4 AMEND1 | | IP | | 7333 |
| 4 | 20104493S | AMERICAN CREOSOTE WORKS, PENSACOLA, FL AMEND1,2,3 +(F) | 4/18/01 | HA | | 18082 |
| 4 | 20104494S | RED PANTHER CHEMICAL, CLARKSDALE, MS AMEND 1 | 5/14/01 | HA | | 12548 |



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# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 4 | 20104495S | INEZ COAL SLURRY SPILL, KY AMENDMENT 1 | 9/11/01 | ER | | 20066 |
| 4 | 20104496S | ANNISTON PCB SITE, ANNISTON, AL AMENDMENT 1,2 | 6/8/01 | HA | | 16224 |
| 4 | 20104497S | MORTON CLARK HEAD START SCHOOL, BRADENTON, FL AM1 | 9/6/01 | HA | | 12482 |
| 4 | 20104498S | SOUTHERN WOOD PIEDMONT, BUNNELL, FL AMEND.1 | 8/1/01 | HA | | 14373 |
| 4 | 20104499S | AMERICAN CREOSOTE WORKS, INC.LOUISVILLE,MS,AMEND2 +(F) | 9/21/01 | HA | | 12314 |
| 4 | 20104500S | FLURA CHEMICAL SITE, NEWPORT, TN, AMEND.1 | 7/24/01 | PS | | 6049 |
| 4 | 20104501S | T.H. AGRICULTURE & NUTRITION SITE, ALBANY, GA AMD.1 +(F) | 9/10/01 | HA | | 12970 |
| 4 | 20104502S | GULF STATES STEEL (GSS), GADSDEN, AL AMEND. 1,3 | | HA | | 4645 |
| 4 | 20104503S | RALEIGH STREET DUMP, TAMPA, FL AMENDMENT 1,2,3 | 7/23/01 | CA | | 808 |

*FY 2001 Cost Subtotal:* $188,402.00



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# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 5 | 20105571S | MARINA-CLIFFS/NORTHWESTERN BARREL, WI A 1,2 | 4/4/01 | HA | 1547 | 3820 |
| 5 | 20105572S | TREMONT CITY LANDFILL, CLARK COUNTY, OH AMD3 | 11/28/00 | HA | 5422 | 5736 |
| 5 | 20105574S | SHORT TERM TECHNICAL SUPPORT - REGION 5,AMEND1,2 | | IP | | 4107 |
| 5 | 20105575S | DUCK & OTTER CREEKS, OREGON, OH AMENDMENT 1,2,3,5 | | HA | | 32351 |
| 5 | 20105576S | MATERIAL RECOVERY SERVICES LANDFILL, WI AM12,3,4,5 | 1/5/01 | ER | | 18472 |
| 5 | 20105577S | VALLEYCREST LANDFILL (A.K.A. NO.SANITARY) OH A.1,3 | 8/16/01 | HA | | 20636 |
| 5 | 20105578S | FORMER NEWARK AIR FORCE BASE, HEATH, OH AMEND1 | 7/17/01 | HA | | 14526 |
| 5 | 20105579S | LOCKFORMER SITE, LISLE, IL AMENDMENT 1,3 | 7/26/01 | HA | | 13199 |
| 5 | 20105580S | SUMMIT AUTO FLUFF, SUMMIT, IL AMENDMENT 1 | 6/19/01 | ER | | 11641 |



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| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 5 | 20105581S | FORD ROAD LANDFILL, ELYRIA, OH, AMENDMENT 1,2,3 | | HA | | 1388 |
| | | *FY 2001 Cost Subtotal:* $125,876.00 | | | | |
| 6 | 20106003S | SUPERFUND SHORT TERM TECHNICAL SUPPORT,AMND.1,2 | | IP | | 12366 |
| 6 | 20106004S | SIKES PIT, TX AMENDMENT 1, 2,3,4,5,6 +(F) | 9/11/01 | LS | 30584 | 86876 |
| 6 | 20106005S | MARION PRESSURE TREATING SITE, LA AMEND. 1,2 +(F) | 12/8/00 | HA | 11164 | 5198 |
| 6 | 20106007S | SANTO DOMINGO PUEBLO, PENA BLANCA NM AME1B27 | 5/23/01 | PS | 497 | 12003 |
| 6 | 20106008S | EMERGENCY RESPONSE IMAGERY SUPP. HAYNESVILLE, LA 2 | 12/11/00 | ER | | 1427 |
| 6 | 20106009S | IMPERIAL REFINING, ARDMORE, OK AMENDMENT 1 +(F) | 9/11/01 | PS | | 3844 |
| 6 | 20106638S | ASARCO SMELTER (EMERGENCY) EL PASO, TX, AMEND.1 | | ER | | 33464 |
| | | *FY 2001 Cost Subtotal:* $155,178.00 | | | | |



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| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 7 | 20107741S | MCCOOK (EX) ARMY AIRFIELD AMEND. 1,2,3,4,5 | 5/30/01 | HA | 923 | 58673 |
| 7 | 20107742S | JOHNSON COUNTY INDUSTRIAL AIRPORT, KS AMEND3 | 7/19/01 | HA | 864 | 46472 |
| 7 | 20107743S | SHORT TERM TECHNICAL SUPPORT - REGION 7 | | HA | | 7406 |
| 7 | 20107745S | WINONA POST, SHANNON COUNTY, MO, AMEND 1 | | HA | | 6253 |
| 7 | 20107746S | ARMOUR ROAD SITE, NORTH KANSAS CITY, MO AMEND1 +(F) | | HA | | 3588 |
| 7 | 20107747S | THOMASVILLE WOOD PRODUCTS, THOMASVILLE, MO,AM1 | 9/11/01 | HA | | 2412 |

*FY 2001 Cost Subtotal:* $124,804.00



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**NO COMPLETION DATE SHOWN = PROJECT CARRIED OVER INTO FY 2002**

**Source: Remote Sensing Program for EPA, FY 00 Program Summary* ***Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 SUPERFUND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 9 | 20109943S | CASMALIA SITE, CA AMENDMENT 1,2 +(F) | 2/16/01 | HA | | 4673 |
| 9 | 20109944S | OFFICE OF RESEARCH AND DEVELOPMENT AMEND 1,2,3 | | IP | | 7779 |
| 9 | 20109945S | ALLIED SIGNAL, PHOENIX, AZ AMENDMENT 1, 2 | | HA | | 6200 |
| 9 | 20109946S | UNIDYNAMICS/WHITE TANK MNT., PHOENIX, AZ AMND. 1,3 | | HA | | 16984 |
| 9 | 20109947S | US/MEXICO TIRE PILES - AMENDMENT 1 | | CA | | 39434 |

*FY 2001 Cost Subtotal:* $75,070.00

*FY 2001 SUPERFUND TOTAL COST:* $1,380,192.00



AW=FILM ARCHIVES WORK
CA=CURRENT ANALYSIS
CO=CURRENT OVERFLIGHT
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
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 2002**

**Source: Remote Sensing Program for EPA, FY 00 Program Summary* ***Source: EPIC FY 01 Project Tracking Data*

# *APPENDIX A: FY 2001 REMOTE SENSING SUPPORT*

## *FY 2001 RCRA REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|
| 3 | 20103444R | ALLIED SIGNAL, HOPEWELL, VA AMENDMENT 1 | 6/13/01 | PS | | 4247 |
| 3 | 20103453R | TRANGUCH GASOLINE SPILL SITE, HAZELTON, PA AMEND1 | 9/12/01 | CA | | 7488 |
| 6 | 20106010R | PCS NITROGEN, GEISMAR, LA AMENDMENT 1 | 2/9/01 | WT | | 785 |
| 7 | 20107744R | WILLIAMS PIPELINE, AUGUSTA, KANSAS, AMENDMENT 1,2 | 3/21/01 | PS | | 3876 |



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CA=CURRENT ANALYSIS
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HA=HISTORICAL SITE ANALYSIS
IP=DIGITAL IMAGE PROCESSING
FT=FRACTURE TRACE ANALYSIS
LE=LANDSCAPE ECOLOGY
LS=LITIGATION SUPPORT
LU/LC=LAND USE/LAND COVER
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 2002**

**Source: Remote Sensing Program for EPA, FY 00 Program Summary*

***Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 RCRA REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 00** | *FY 2001*** |
|---|---|---|---|---|---|---|

*FY 2001 RCRA TOTAL COSTS:* $16,396.00



AW=FILM ARCHIVES WORK
CA=CURRENT ANALYSIS
CO=CURRENT OVERFLIGHT
DA=DRAINAGE ANALYSIS
ER=EMERGENCY RESPONSE
GIS=GEOGRAPHIC INFORMATION SYSTEM
HA=HISTORICAL SITE ANALYSIS
IP=DIGITAL IMAGE PROCESSING
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PS=PHOTO SUPPORT
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**NO COMPLETION DATE SHOWN = PROJECT CARRIED OVER INTO FY 2002**

**Source: Remote Sensing Program for EPA, FY 00 Program Summary*

***Source: EPIC FY 01 Project Tracking Data*

# *APPENDIX A: FY 2001 REMOTE SENSING SUPPORT*

## *FY 2001 WETLAND REMOTE SENSING SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLETE* | *TYPE* | *FY 2001** |
|---|---|---|---|---|---|
| 8 | 20108001W | WETLAND ANALYSIS, WEST VALLEY CITY, UT AMEND 3 CNC | 5/30/01 | WT | 1071 |

*FY 2001 WETLAND TOTAL COST:* $1,071.00



AW=FILM ARCHIVES WORK
CA=CURRENT ANALYSIS
CO=CURRENT OVERFLIGHT
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
LS=LITIGATION SUPPORT
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PS=PHOTO SUPPORT
RR=REPORT REPRODUCTION
TA=THERMAL ANALYSIS
WT=WETLAND ANALYSIS
+=NATIONAL PRIORITIES LIST
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**NO COMPLETION DATE SHOWN = PROJECT CARRIED OVER INTO FY 2002**

**Source: EPIC FY 01 Project Tracking Data Base*

# *APPENDIX A: FY 2001 REMOTE SENSING SUPPORT*

## *FY 2001 RESEARCH AND DEVELOPMENT SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 2001** |
|---|---|---|---|---|---|
| ALL | 201RD001R | RIPARIAN METRIC RESEARCH, AMENDMENT 1,2,3 | 9/11/01 | IP | 36370 |
| ALL | 201RD002R | INDICATORS FOR PESTICIDES STUDIES AMEND. 1, 2 | 9/11/01 | GIS | 105962 |
| ALL | 201RD003R | MAIA/NEW YORK WATERSHEDS - GIS SUPPORT AMEND2 | | GIS | 53503 |



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**NO COMPLETION DATE SHOWN = PROJECT CARRIED OVER INTO FY 2002**

**Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 RESEARCH AND DEVELOPMENT SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 2001** |
|---|---|---|---|---|---|
| ALL | 201RD004R | EMAP WESTERN PILOT FIELD ACTIVITIES AMEND. 1,2,3,4 | 9/11/01 | HA | 192898 |
| ALL | 201RD005R | WESTERN EMAP LANDSCAPE ECOL.ASSESSMENT AMD 1,2 | 9/11/01 | LE | 111912 |
| ALL | 201RD006R | NORTH AMERICAN LANDSCAPE PROJECT SUPPORT,AMND3,6 | 6/25/01 | LE | 60458 |



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**Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 RESEARCH AND DEVELOPMENT SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 2001** |
|---|---|---|---|---|---|
| ALL | 201RD007R | LANDSCAPE ASSMT. IN THE WHITE RIVER BASIN, AK AMD2 | 9/11/01 | LE | 69477 |
| ALL | 201RD008S | EMERGENCY TECHNICAL SUPPORT AMEND. 1, 2 | 9/11/01 | ER | 2243 |
| ALL | 201RD009S | SPRING VALLEY (PG), WASHINGTON, D. C.AM 1,2,3,4,5 | 5/21/01 | PG | 13966 |



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**Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 RESEARCH AND DEVELOPMENT SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 2001** |
|---|---|---|---|---|---|
| ALL | 201RD010R | WESTERN EMAP PILOT - AMENDMENT 1,2,3,4 | | TA | 80909 |
| ALL | 201RD011R | LITTLE MIAMI, OH RIVER BASIN AMENDMENT 1,2 | 9/11/01 | LE | 3036 |
| ALL | 201RD012R | GREAT LAKES INVASIVE & AGGRESSIVE SPECIES AMND.1,4 | 9/11/01 | LU | 267993 |



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**Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 RESEARCH AND DEVELOPMENT SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 2001** |
|---|---|---|---|---|---|
| ALL | 201RD013S | THERMAL IR RESEARCH, 2 RHODE ISLAND SITES, AMEND 1 | 6/8/01 | TA | 28976 |
| ALL | 201RD014R | ACCURACY ASSMT.OF MRLC LAND COV.REG.5,7&10AMEN3,5 | 9/11/01 | LU | 109491 |
| ALL | 201RD015S | PRODUCTION OF RECTIFICATION SOP AMENDMENT 1,2 | 9/11/01 | HA | 6268 |



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**Source: EPIC FY 01 Project Tracking Data*

# *FY 2001 RESEARCH AND DEVELOPMENT SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 2001** |
|---|---|---|---|---|---|
| ALL | 201RD016R | SAN PEDRO WATERSHED, AZ AMENDMENT 1,2,3,4 | 6/19/01 | HA | 8132 |
| ALL | 201RD017R | 1946 NAVAL AIR CRASH,NOV.PEN.ANTARCTICA, AMND.1,2 | 5/21/01 | PG | 6058 |
| ALL | 201RD018R | ATTILA SUPPORT (REAP) | 9/11/01 | GIS | 10086 |



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# *FY 2001 RESEARCH AND DEVELOPMENT SUPPORT*

| *REGION* | *NUMBER* | *SITE* | *COMPLET* | *TYPE* | *FY 2001** |
|---|---|---|---|---|---|
| ALL | 201RD019R | 3822 EAST QUEEN SITE, SPOKANE, WA - AMENDMENT 1 | | PS | 5635 |
| ALL | 201RD021R | ASSESSING URBAN GROWTH & LAND COVER TRENDS,AMN1 | 9/11/01 | LU | 10791 |

*RESEARCH TOTAL* $1,184,164.00



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**NO COMPLETION DATE SHOWN = PROJECT CARRIED OVER INTO FY 2002**

**Source: EPIC FY 01 Project Tracking Data*

# APPENDIX B

# LEB/EPIC PROJECT SUPPORT CONTACTS

## APPENDIX B

## LEB/EPIC PROJECT SUPPORT CONTACTS

## AND WORK ASSIGNMENT MANAGERS

The following LEB/EPIC staff 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 | LEB/EPIC WAM | PHONE | REGION | LEB/EPIC WAM | PHONE |
|---|---|---|---|---|---|
| **1** | Terry Slonecker<br>slonecker.t@epa.gov | 703-648-4289 | **6** | Phil Arberg<br>arberg.phil@epa.gov | 702-798-2545 |
| **2** | Dave Jennings<br>jennings.david@epa.gov | 703-648-4293 | **7** | Phil Arberg<br>arberg.phil@epa.gov | 702-798-2545 |
| **3** | Mary Lacerte<br>lacerte.mary@epa.gov<br>Pete Stokely<br>stokely.peter@epa.gov | 703-648-4137<br>703-648-4292 | **8** | Taylor Jarnagin<br>jarnagin.taylor@epa.gov | 703-648-4797 |
| **4** | Joan Bozik<br>bozik.joan@epa.gov<br>Don Garofalo<br>garofalo.donald@epa.gov | 703-648-4288<br>703-648-4285 | **9** | Phil Arberg<br>arberg.phil@epa.gov | 702-798-2545 |
| **5** | Joan Bozik<br>bozik.joan@epa.gov<br>Don Garofalo<br>garofalo.donald@epa.gov | 703-648-4288<br>703-648-4285 | **10** | Phil Arberg<br>arberg.phil@epa.gov | 702-798-2545 |

Photogrammetric/Topographic Mapping Support

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

# APPENDIX C

# REGIONAL REMOTE SENSING COORDINATORS

# APPENDIX C

## REGIONAL REMOTE SENSING COORDINATORS (RSCs)

The following are EPA Regional staff who act as liaisons between the Regions and LEB/EPIC. These people assist EPA Regional personnel and offices in ordering LEB/EPIC products and services. They have also completed various remote sensing training programs offered by LEB/EPIC and are qualified to answer questions, mostly of a non-technical nature, regarding LEB/EPIC's capabilities.

| REGION | RSC | PROGRAM | PHONE | REGION | RSC | PROGRAM | PHONE |
|---|---|---|---|---|---|---|---|
| 1 | Dick Willey | SUPERFUND | (617) 918-1266 | 6 | Rena McClurg | RCRA | (214) 665-8314 |
| 1 | Richard Piligian | RCRA | (617) 918-1757 | 6 | La Donna Walker | SUPERFUND | (214) 665-6666 |
| 2 | Keith Glenn | ESD | (732) 321-4454 | 7 | Aaron Zimmerman | RCRA | (913) 551-7333 |
| 2 | Diana Cutt | SUPERFUND | (212) 637-4311 | 7 | Larry Stafford | SUPERFUND | (913) 551-7394 |
| 3 | Vic Guide | ESD | (215) 814-2733 | 8 | Larry Diede | RCRA | (303) 312-6428 |
| 4 | Carmen Santiago-Ocasio | SUPERFUND | (404) 562-8948 | 8 | Tony Selle | SUPERFUND | (303) 312-6774 |
| 4 | Neil Burns | SUPERFUND | (404) 562-8289 | 9 | Ron Leach | RCRA | (415) 972-3362 |
| 5 | Walt Francis | RCRA | (312) 353-4921 | 9 | Michael Gill | SUPERFUND | (415) 972-3054 |
| 5 | Steve Ostrodka | SUPERFUND | (312) 886-3011 | 10 | Bill Bogue | ESD | (206) 553-1676 |
| 5 | Steve Peterson | SRT | (312) 353-1422 | 10 | Vickey Renshaw | RCRA | (206) 553-2586 |