USDA ■ Forest Service
**forest pest management methods application group**
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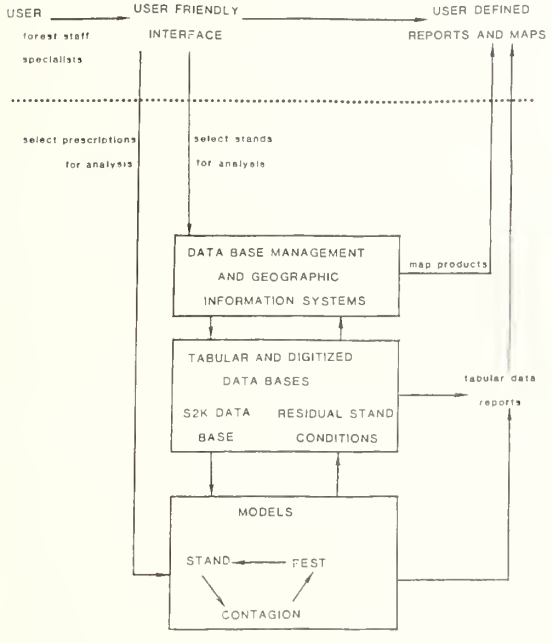
May 1983 (16)

NEWSLETTER

## AN INTEGRATED PEST IMPACT ASSESSMENT SYSTEM (IPIAS)

IPIAS is a series of socioeconomic models, a stand growth simulator, a pest model, a geographic information system (GIS), pest loss data and, a forest resource data base, such as the Forest Service System 2000 (S2K), integrated together and housed in a "user friendly" interactive computer system. The system can be queried to provide quantitative estimates of pest impact under a variety of pest management alternatives. The inserted skematic gives an idea of how the IPIAS components are interrelated to produce a pest impact assessment system.



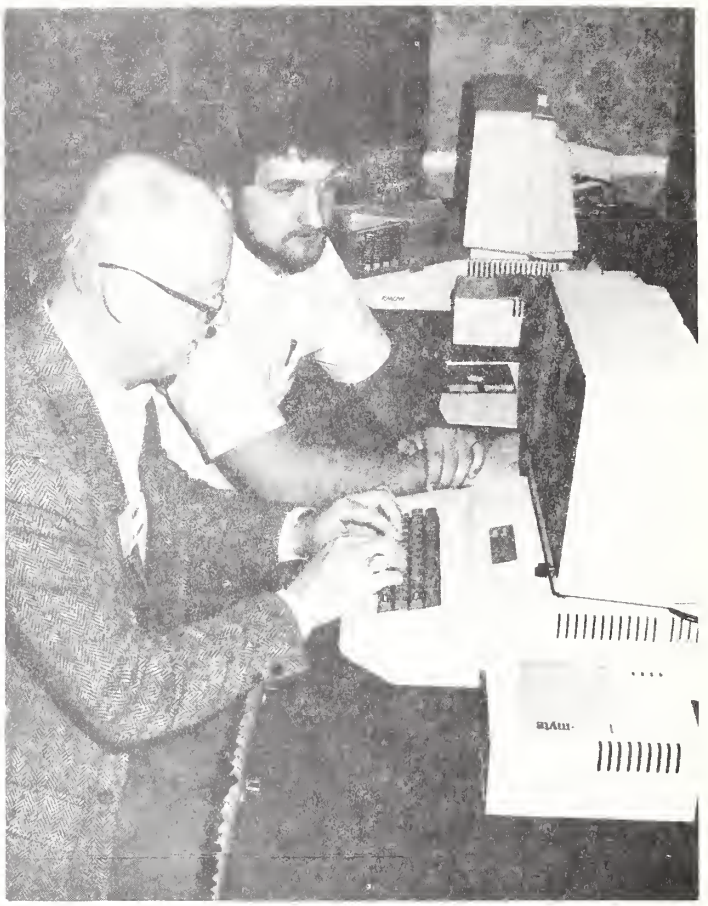

Components below the dotted line remain transparent to the user.

During November 1982 MAG and the Rocky Mountain Region hosted an executive summary and technology transfer workshop to introduce recently developed methods for assessing mountain pine beetle impact in ponderosa pine on the Pike National Forest in Colorado, using the IPIAS approach. This week was the result of a cooperative project involving the Forest Service, Fish and Wildlife Service, University of Arizona and Virginia Polytechnic Institute and State University. Over 60 people attended the two day session which was held in Denver, Colorado. Response to the workshop was favorable and has led to an increased interest in the IPIAS concept.

A second workshop was convened in February 1983 to review accomplishments to date and define the direction future development of pest impact assessment methods should take. The five day workshop, attended by over 40 individuals representing varied expertise and backgrounds, was held in Milliken, Colorado. This workshop was facilitated by the Adaptive Environmental Assessment (AEA) group of the Western Energy and Land Use Team (WELUT), U.S. Fish and Wildlife Service. The AEA process, consisting of a collection of systems analyses, group dynamics, and conflict resolution techniques, aided MAG in developing a 5-year task action plan for assessing impacts of mountain pine beetle in lodgepole pine. After review by workshop participants, this plan will be submitted for approval and funding.

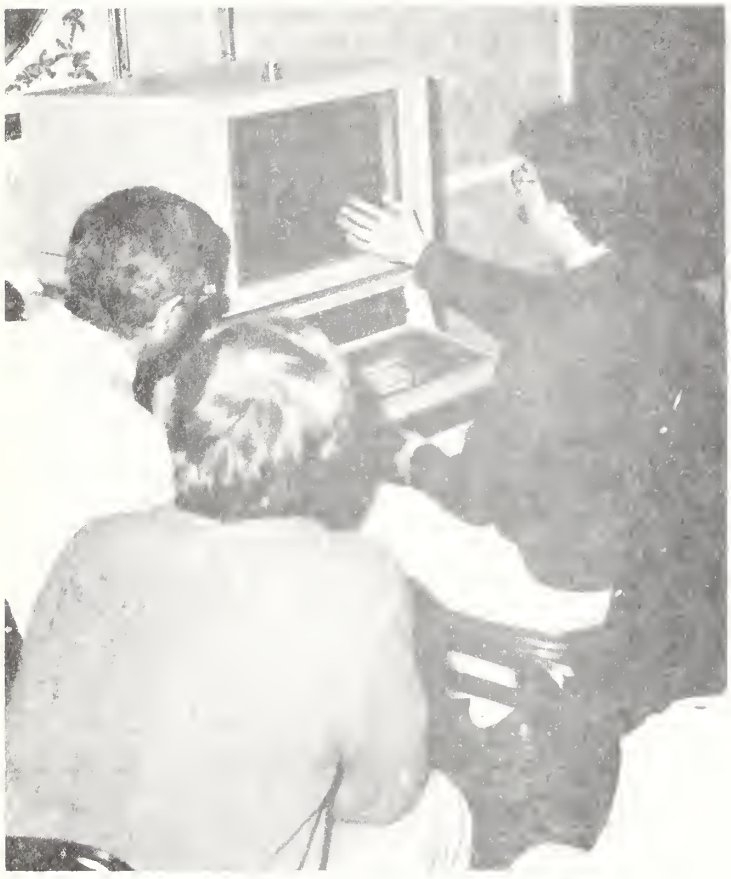
An operational evaluation of IPIAS will use and expand upon the data base that now exists for the Pike National Forest. It will be used by forest managers to develop a realistic decision matrix and related benefit/cost analysis for an Environmental Assessment in preparation for timber sales in two compartments selected through the forest planning process. The compartments selected contain active mountain pine beetle infestations and treatment prescriptions will include mountain pine beetle related options.

The treatment prescriptions selected will be monitored over time and used to update the data base and related models.



*Bruce Hull, Virginia Polytechnic Institute and State University, and Dave King, University of Arizona (foreground), running IPIAS models on an Apple II computer at the Denver Technology Workshop. (Above)*

*Don Hunter, U.S. Fish & Wildlife Service, describes a map product generated from his agency's geographic information system (MOSS).*



*Russ Pence, U.S. Fish & Wildlife Service, instructing workshop participants on how to use MOSS on a Tektronix 4014.*

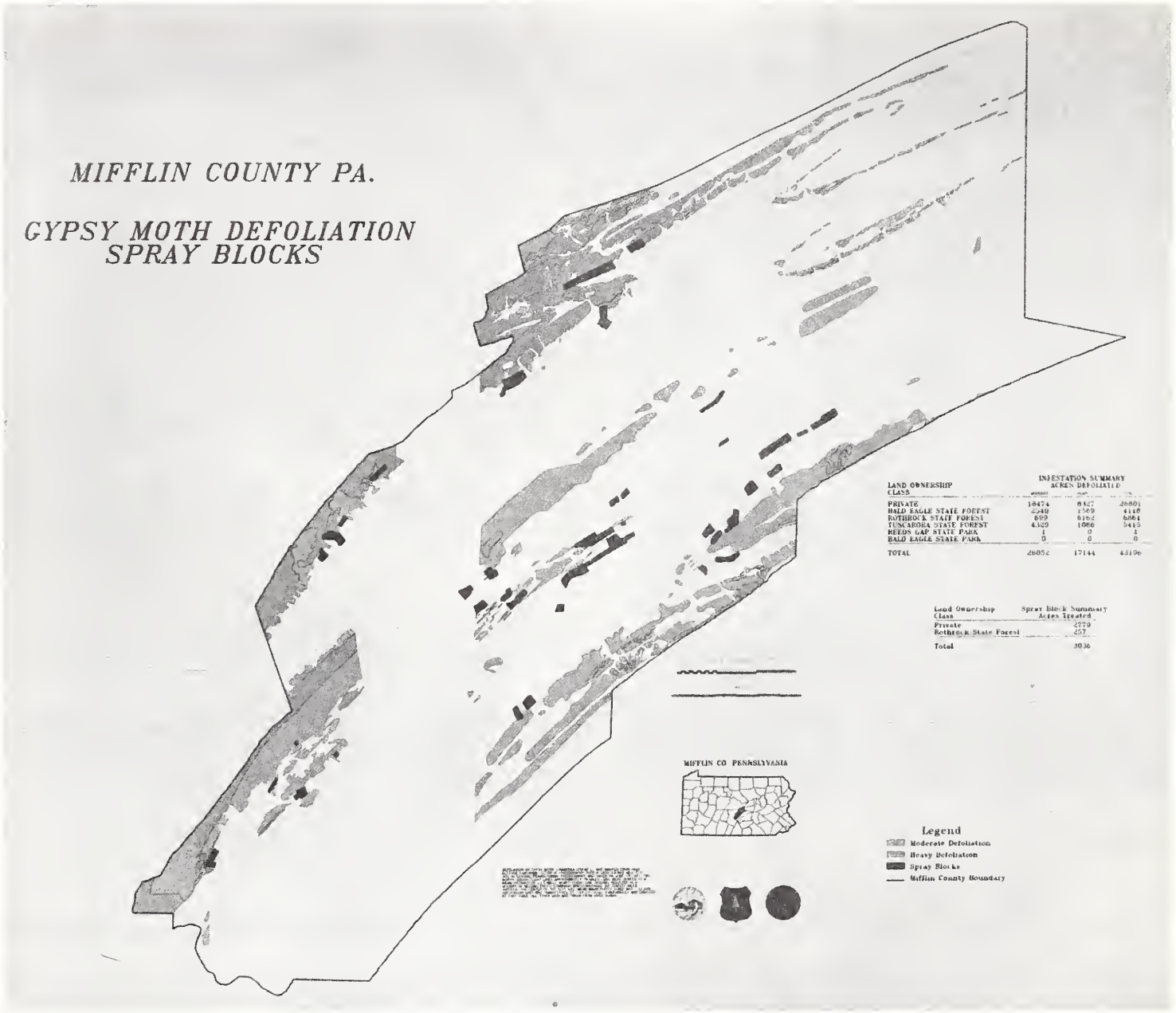
## GYPSY MOTH PHOTO MISSION

A high altitude panoramic photo mission to map hardwood defoliation by gypsy moth has been scheduled by MAG. The mission is a cooperative undertaking involving three Federal agencies; the Forest Service, NASA and EPA, and the states of Delaware, Maryland, New Jersey and Pennsylvania. It is the result of a successful demonstration of high altitude panoramic aerial photography for defoliation mapping conducted in Pennsylvania in 1981.

The mission will be flown in late June or early July, by a NASA U-2 based at Moffett Field, California to coincide with peak gypsy moth defoliation. Film will be processed by the EPA Vint Hill Laboratory in Warrenton, Virginia, and delivered to the states for photo interpretation and map transfer.

Approximately 33 million acres of land will be covered in the four state area which will require about 1,900 frames of photography. The photos will provide a permanent record of 1983 gypsy moth defoliation in the four state area from which infestation maps can be prepared and the effectiveness of 1983 aerial spray programs can be evaluated. In addition, a number of other agencies within the four states involved have expressed an interest in using the aerial photography for other applications.

During March, the Forest Service sponsored a two day training workshop in Harrisburg, Pennnsylvania at the headquarters of the Pennsylvania Bureau of Forestry, Forest Pest Management Staff. Training was provided in geometry of panoramic aerial photography, characteristics of color-IR film, classification of defoliation, and transfer of defoliation to a map base. Eighteen photo interpreters, representing the four states, participated. Training was given by James "Denny" Ward of the Southern Region Forest Insect and Disease Survey Unit in Doraville, Georgia and Bob Acciavatti of the Northeastern Area Field Office in Morgantown, West Virginia.




*Sample map product from U.S. Fish and Wildlife Service's Geographic Information System of gypsy moth defoliation in Mifflin County, Pennsylvania. Light grey shaded areas were defoliated in 1981. Darker areas are spray blocks. Defoliation was mapped from high altitude panoramic photography. Data gap in western third of map is an area of missing photo coverage.*

## A GEOGRAPHIC INFORMATION SYSTEM FOR GYPSY MOTH

Keeping track of infestation maps, spray blocks and related summaries for a pest which is capable of causing widespread damage such as the gypsy moth can be an overwhelming task. A computer based geographic information system may provide some help.

Through a cooperative agreement with the Fort Collins based Western Energy and Land Use Team of the U.S. Fish and Wildlife Service, MAG has arranged to demonstrate the use of their geographic information system, MOSS, for storage, retrieval and display of data on gypsy moth status. Eight data themes were digitized for Mifflin County in central Pennsylvania and a data base was constructed which included location of forested areas, defoliated areas, spray blocks, cultural features - roads and communities, landownership status, county boundaries, and major streams. Defoliation data was taken from maps prepared by interpretation of 1981 high altitude panoramic aerial photography.

The data base is now operational and is presently being used to demonstrate its utility for a number of applications in forest pest management. A primary use is to summarize statistical data on annual defoliation by major landownership class (state, private, etc.), a requirement of the Nationwide Forest Insect and Disease Reporting System (FIDIS). Other uses include maintaining a historical atlas of areas damaged and areas treated, buffering sensitive areas in spray blocks and evaluating degree of foliage protection in treated areas. High quality maps can be produced through an auxiliary cartographic output system (COS) which can be used to display infestation status, areas treated or proposed for treatment or any combination of themes which exist in the data base.

## SPRUCE BUDWORM LOSS ASSESSMENT SURVEYS

MAG, in cooperation with Northeastern Area's St. Paul Field Office and the CANUSA-East, Spruce Budworm Research and Development Program will evaluate four survey methods designed to estimate volume of due mortality caused by spruce budworm. The evaluation will be conducted on the Nicolet National Forest in northeastern Wisconsin. The survey techniques consist of: (1) Fixed plot field sampling; (2) aerial sketchmap classification of mortality; (3) large-scale aerial photo sampling; and (4) high altitude panoramic aerial photography. All four techniques will be compared for precision and cost effectiveness. Work is scheduled to begin in July.

## MODELING EFFECTS OF DWARF MISTLETOES

The ability to simulate growth reduction caused by dwarf mistletoe infestation through growth and yield models is essential in order to estimate impacts of these parasitic plants. This capability has existed for some time with the stand growth and yield simulator RMYIELD developed by Rocky Mountain Forest and Range Experiment Station. This model is effective for simulations in pure lodgepole and ponderosa pine stands in the central and southern Rocky Mountains. It is not suited for conditions further north where trees have different growth rates and stands tend to contain a mixture of tree species.

A workshop was held in Fort Collins in early March to begin development of a dwarf mistletoe effects model that can be interfaced with PROGNOSIS, a tree growth and yield simulation model developed by Dr. Albert Stage of the Intermountain Forest and Range Experiment Station in Moscow, Idaho.

The workshop focused on development of dwarf mistletoe effects models for lodgepole pine, western larch and Douglas-fir primarily for use in the Intermountain and Northern Regions. A schedule for a two year program of work was agreed to. The work will be done as a cooperative effort by Ralph Johnson and Oscar Dooling of the Northern Region, Dave Hamilton and Niel Martin of the Intermountain Forest and Range Experiment Station, and Mike Marsden of MAG.

*Lodgepole pines with heavy dwarf mistletoe infestation. Effects of dwarf mistletoe on tree growth will be included in growth and yield models.*

## MODELING SPRUCE BUDWORM IMPACTS

The effects of a western spruce budworm epidemic is defoliation of host trees species, followed by growth loss and tree mortality. To quantify these effects on tree growth and mortality, Forest Pest Management personnel are using the stand simulation model, PROGNOSIS.

Donn Cahill and Ron Beveridge of the Boise Forest Pest Management Field Office of the Intermountain Region are measuring growth of infested stands against simulated growth of these same stands without an infestation. Mike Marsden, MAG Biometrician is working with them on the analysis of the data. The advantages to this approach are: (1) The impact can be evaluated over a longer time period; (2) The growth differences are estimated from the stands that are actually infested.

Evaluation of the impact over a longer time period allows one to take recovery by individual trees into account. Some epidemics may be followed by periods of increased growth by the surviving hosts. If necessary, the time period for an impact evaluation can be extended to the rotation age for the stand.

## AERIAL PHOTO PROGRAM

The newly established FPM/MAG photo program is designed to handle small, specialized aerial photo mission needs by Forest Pest Management throughout the United States. The program will provide photo support which is not practical to contract for the following reasons: (1) Critical timing of photo acquisition to capture insect and disease damage symptoms at their peak; (2) control on applications and feasibility testing is required; and (3) responsing to unpredicted events, such as insect and disease outbreaks, severe storm damage, etc.

The staff is preparing for a busy summer schedule of photo mission flying. A variety of photo missions have been planned; some firmly set, while others are tentative at this time. Flights will take the Queen Air photo plane and crew to Idaho, Oregon, South Dakota, Colorado, New Mexico, Texas and Wisconsin this year.

Scheduling of photo missions is on a "first come - first served" basis. The procedures for acquiring photo support consist of contacting Dick Myhre at MAG with mission specifications. Once the details of the mission have been determined, a written cost estimate is prepared. If the user concurs with the estimate, funds are then made available to MAG through established Forest Service transfer of funds procedures. The photo aircraft and crew are then scheduled.

## MAG HOSTS CANADIAN TASK FORCE

A special task force of forest pest management and remote sensing specialists of the Canadian Forestry Service visited with the MAG Team to discuss ways of obtaining improved data on pest losses to Canada's forest resource. The team consisted of Don Ostaff of the Maritimes Forest Research Center in Fredericton, New Brunswick, and Don Leckie and Jim Peaker of the Petawawa National Forestry Institute near Chalk River, Ontario. Topics of discussion included use of aerial photography to map pest damage, interfacing loss data with resource inventories and use of geographic information systems for data storage and retrieval.

## USE OF RIA DATA FOR ESTIMATING PEST LOSS

Collection of data on forest pest incidence and damage by the Resource Inventory and Analysis Unit (RIA) of the Southeastern Forest Experiment Station in Asheville, North Carolina has been underway for a number of years. The reliability of data collected through this process is dependent upon the quality of training provided to field crews in recognition of pest damage. The Asheville Field Office of the Southern Region's Forest Pest Management Staff has placed high priority on providing the necessary training to RIA crews. The training consists of formal sessions, field manuals and on site follow-up visits with the crews during data collection.

A special project designed to evaluate the feasibility of collecting data on forest pest incidence and damage in the west is nearing completion. This project was initiated as a cooperative project between MAG and the RIA work unit of the Intermountain Forest and Range Experiment Station in Ogden, Utah when Idaho was scheduled for a resource inventory. RIA field crews were given instruction in recognition of pest damage by Forest Pest Management Staffs of the Northern and Intermountain Regions. Data analysis is now nearly completed and final reports are scheduled for publication this summer.

This demonstration, which includes areas of the greatest tree species diversity in the Rocky Mountains, tends to confirm results of work done in the southeast. Data on incidence of pests whose symptoms are durable and present throughout the growing season can be obtained by RIA field crews. Examples include many of the diseases such as dwarf mistletoes, stem cankers and heart rots.

Based on the encouraging preliminary results of this work, the Intermountain RIA Unit collected pest incidence data in conjunction with their scheduled inventory of Colorado in 1982.

## MAG STAFF ACTIVITIES

Sharon Hoekstra, MAG secretary, has accepted an appointment as secretary to the Deputy Director, Rocky Mountain Forest and Range Experiment Station.

Jo Johnson has joined the MAG staff as Editorial Clerk. Among her many responsibilities will be the editing and attractive layout of this Newsletter. Jo's last assignment was with the Lands Staff on the Custer National Forest in Billings, Montana.

Dona Davis is our new part-time Clerk Typist. She was previously a Clerk Typist for the Forest Service, National Timber Sale Accounting Group in Fort Collins.

Bill Ciesla recently presented two papers on uses of high altitude panoramic aerial photography in forest pest management, one at the gypsy moth management meeting in Harrisburg, Pennsylvania, another at a joint ASP-BLM workshop in Denver, Colorado.

Bill White and Dick Myhre represented MAG at the Western Forest Insect Work Conference in Santa Rosa, California. Bill discussed recent work by MAG on mountain pine beetle impact assessment and Dick discussed the aerial photo acquisition program.

Dick Myhre participated in a one day poster session at the joint ASP-BLM workshop in Denver and discussed planning aerial photo missions for resource surveys.

The line drawings in this issue of the MAG Newsletter were prepared by Curtis O'Neil of the Rocky Mountain Region Timber Management Staff in Denver. Curtis is an entomologist who recently joined the staff and has a special talent for scientific illustration. Many thanks for the fine drawings, Curtis.

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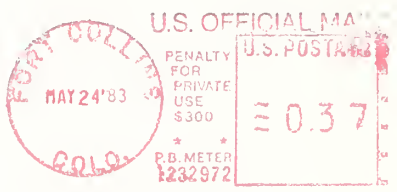


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