CENTER FOR REMOTE SENSING AND CARTOGRAPHY

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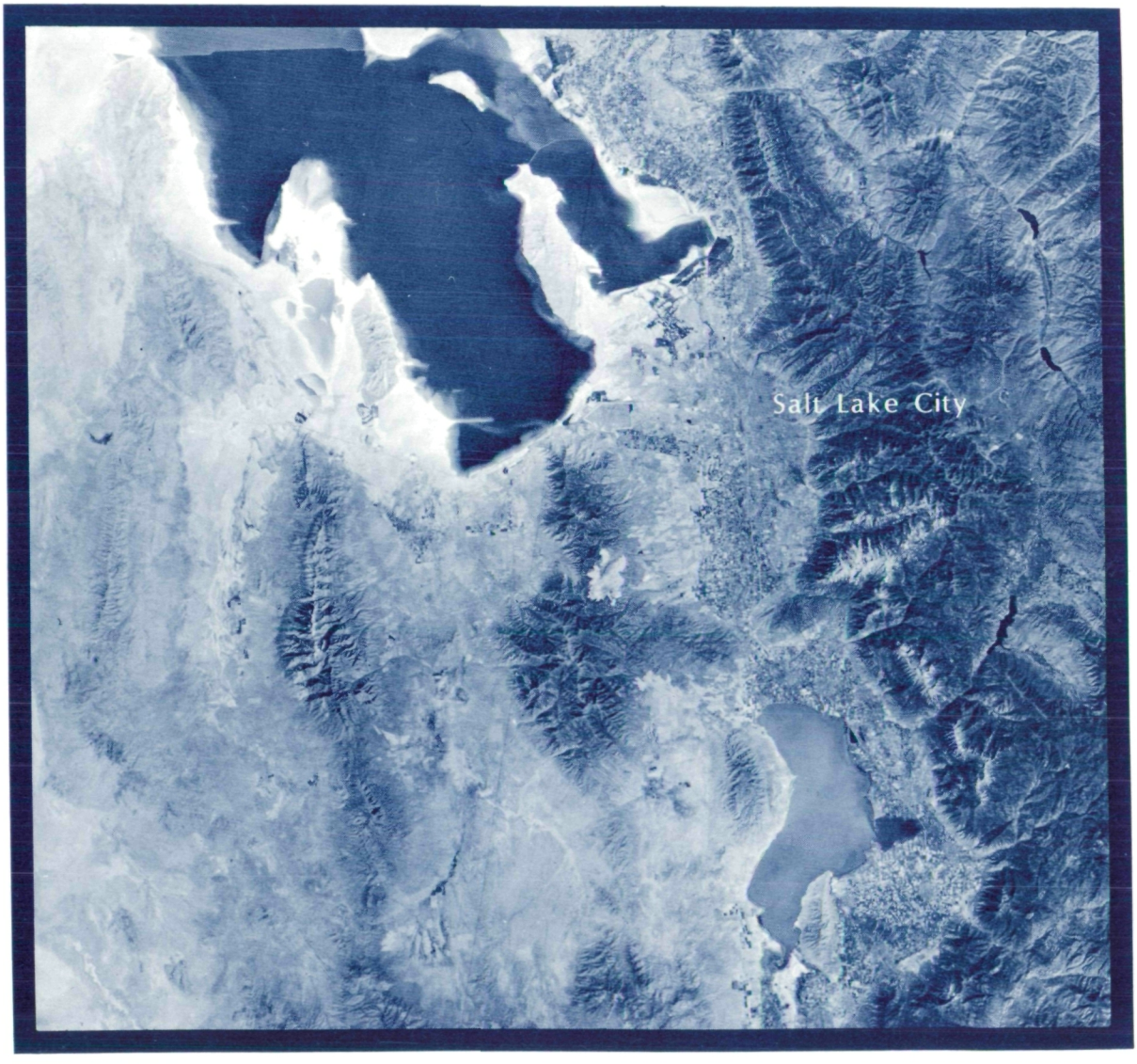



UNIVERSITY OF UTAH RESEARCH INSTITUTE

Salt Lake City

# EPA ENVIROPOD ANNUAL REPORT

A Summary of the Use of the Enviropod Under a Memorandum of Understanding among EPA Region VIII, the State of Utah, and the University of Utah Research Institute, March 1, 1983 - February 28, 1984

CRSC Report 84-2

Merrill K. Ridd

Center for Remote Sensing and Cartography
University of Utah Research Institute
391 Chipeta Way, Suite D
Salt Lake City, Utah 84108

801-524-3456

March 1984

# FOREWORD

This is a brief summary of the Environmental Protection Agency (EPA) Enviropod activity in the State of Utah under a Memorandum of Understanding (MOU) among EPA Region VIII, the State of Utah, and the Center for Remote Sensing and Cartography (CRSC) of the University of Utah Research Institute. (UURI). The MOU was effective from March 1, 1983 to February 28, 1984.

The Center (CRSC) and the State of Utah gratefully acknowledge the generous service of EPA in making this experimental vehicle available during a critical year of environmental stress in Utah. It was a season of unprecedented and unpredicted flooding and land failure in most counties of the state. To have Enviropod available to monitor events and results was extremely beneficial.

We wish to thank Denis Nelson, Regional Remote Sensing Coordinator, Research and Development, EPA Region VIII, Denver; and Gary A. Shelton, Remote Sensing Specialist, and the Environmental Monitoring Systems Laboratory, EPA, Las Vegas, for making the Enviropod available, meeting with state officials, instructing the team on the use and application of the system, making film and processing available, and for all other on-going support toward the successful use of Enviropod in Utah.

## ENVIROPOD

The EPA Enviropod is a light-weight aerial camera system fitted to mount under the fuselage of a Cessna 172 or 182. (See Exhibit A.) The Pod is a 30 lb. framework with a vertical camera port and a forward-looking 45 degree oblique port. The cameras provided by EPA are panoramic. The film format is 70mm along flight path and 200mm left to right. Scale, therefore, is essentially constant along track and variable across track.

Film provided by EPA is of the finest quality natural color and color infrared (CIR) Kodak Estar base. The film exhibits remarkable clarity, allowing enlargements up to 20x or 30x with increasing detail.

The system is especially designed for environmental monitoring. It is exceptionally flexible. Because of the light weight, its attachment to a light aircraft, the positioning of camera mounts, and the panoramic configuration of the cameras, the camera system may be positioned over the target almost at will. Time of day, lighting conditions, altitude above the target, and angle of view can be readily managed, even in mountainous terrain. Because of these things, and because the system can be loaded and mounted on short notice, it is especially suitable for emergency service.

## ESTABLISHING THE AGREEMENT

Following a visit by the director of CRSC to EPA's Las Vegas environmental laboratories in July 1982, a meeting was set up in Salt Lake City to explore the possibility of a cooperative agreement. In preparation for the meeting, a list of agencies/persons was prepared and invitations were extended by telephone and mail (Exhibit B). On December 3, 1982 a meeting was held at

CRSC/UURI with 24 state specialists representing nine agencies and five local government personnel to discuss Enviropod and its use. Exhibit C is a roster of participants, along with CRSC staff and EPA specialists. Denis Nelson, EPA Denver, and Gary Shelton, EPA Las Vegas, explained the system and its possible applications in Utah.

It was widely agreed the system should be accepted and applied. The State Planning Coordinator's Office (SPCO) was identified as the lead state agency for purposes of signing the MOU and to work through CRSC to coordinate the use of the system. CRSC was identified as the technical agency to be responsible for camera and Pod operations, flight planning, photo indexing, and communications. (See Exhibit D.)

## PROMOTION

On January 28, 1983 David Conine, State Planning Coordinator's Office, made a presentation to the multi-agency Resource Development Coordinating Committee (RDDC), involving key state, federal, and local specialists engaged in environmental/resource issues. The Enviropod was explained and examples of photography exhibited.

In preparation for another RDDC presentation, CRSC compiled an extensive list of state and federal agencies, and prepared a five-page introduction to EPA's Enviropod and its applications (Exhibit E). The material was mailed to dozens of offices, in advance of the April 26 RDCC meeting, inviting them to fill out an enclosed form on any anticipated applications of the system. The respondents were encouraged to come to the RDDC meeting with the forms completed.

At the April 26 meeting, Merrill Ridd, Richard Jaynes, and David Conine discussed the possibilities with the group, and ascertained the number of applications and target locations for the various agencies. It was decided to invite all interested to come to a working meeting at CRSC on May 5 or May 6, to map out and coordinate the needed flights.

On May 5, representatives from three state agencies came well prepared with maps and specifications in hand:

Maureen Wilson, Wildlife Resources
Wes Dewsnup, Emergency Management
Ken Travous, State Parks

On May 6 the following met and charted needs:

Kyle Stevens, Utah Department of Agriculture
Paul McCauley, USU Extension Range Specialist
Karl Kappe, State Lands and Forestry
Don Gillespie, National Park Service
Dave Cole, Water Resources
Keith Rosevere, Utah Department of Transportation

On May 18 CRSC mailed out "Procedures for Scheduling Enviropod Flights...," including a "Mission Planning Form" and an "Enviropod Flight Request" (Exhibit F) to a growing list of interested agencies.

## ENVIRONMENTAL HAZARDS

Beginning on April 12 an extensive landslide occurred in Spanish Fork Canyon, just downstream from the town of Thistle, blocking US Highway 6/50 and the main lines of Denver and Rio Grande Western Railroad and Utah Railway, and impounding water that inundated the town and switching yard. Fifteen homes and ten businesses were submerged. And this was just the beginning.

Over the next three months, 22 of Utah's 29 counties were declared disaster areas by the President under Public Law 93-288. Meanwhile, major and minor landslides and floods occurred in dozens of places along the

densely populated Wasatch Front and elsewhere. Ultimately, the problem would reach a peak on Utah Lake and Great Salt Lake. Utah Lake rose to a historic maximum 4.93 feet above compromise on July 1, and Great Salt Lake reached the highest level in 59 years, rising to 4205 feet m.s.l., damaging industrial, transport, and waterfowl facilities around the lake.

## ENVIROPOD APPLICATIONS

Fortunately for Utah, EPA had completed the Enviropod agreement with the state just prior to the series of "disaster" events. The camera system had been test flown and proven just weeks before.

Exhibit G is a summary of Enviropod missions flown from March 21 through November 4. Most of the flights were in response to emergency/hazard conditions. As a result, some of the anticipated flights for various agencies, those of a non-emergency nature, were not carried out.

A large amount of both natural color and CIR footage was acquired through the ready response of CRSC, the cooperation of SPCO, and the courtesy of EPA. Valuable photographic records of disaster events, which would otherwise have gone unrecorded, were captured on film. Further, as mechanical complications arose, Denis Nelson and Gary Shelton and their staffs promptly provided replacement parts, instruction, and even additional cameras and pods sufficient to keep the system going through the high-demand period.

It should be known and acclaimed generally throughout the state all that was done behind the scenes through EPA officers and laboratories to make possible the monitoring of much of the damage sustained by the 1983 events.

## PROCEDURE

The summary in Exhibit G shows the date, area, subject, agency, film type, and other pertinent information for the 23 missions. In many cases, both types of film (natural color and CIR) were used, depending upon the nature of the target/problem. The vertical and/or forward oblique cameras were used accordingly.

In preparation for each flight, many steps were involved. The requesting agency, sometimes through a visit to CRSC, otherwise through telephone calls, would describe the problem and the target area. Decisions were made as to:

1. Type of film (natural color and/or CIR) and filter
2. Vertical and/or oblique camera
3. Preferred date and time of day, sun angle, etc.
4. Stereoscopic or monoscopic coverage
5. Scale and flying altitude
6. Flight line placement on quadrangles
7. Direction of flight line/s
8. Airplane and pilot access (Cessna 172 or 182 required)
9. Auxiliary airstrip and camera loading, in the case of distant targets and/or multi-roll flights
10. Personnel/photographer needs

With approaching target date, further action was taken:

1. Battery charging and other laboratory preparations
2. Preparation of flight maps, charts, and tables for carry-on
3. Advance weather check in target area

4. Arrangements for transporting the system to the airport, and for installing the cameras and Pod
5. Final weather/sky cover check for target area at anticipated arrival time
6. Final setting of camera aperature, filter attachment, and mounting of the Pod to the aircraft

As the airplane returned to the airport, arrangements were made to:

1. Dismount the Pod
2. Down load the camera
3. Prepare and package the film for shipping to EPA
4. Take the film package to the airport for shipping (if quick "turn-around" is essential), or to the Post Office

Film was mailed to EPA, Las Vegas, for processing. Frequently, EPA responded to an emergency request with a 24-hour, or less, processing and return time, using airport-to-airport mailing or even airline parcel shipping facilities, covering processing and shipping costs, as well as film cost, as a special service to the state because of the emergency nature of events.

EPA would generally call CRSC when the film was shipped back, allowing CRSC to pick up at the airport. Returning to the lab, CRSC performed the following tasks:

1. Identify and mark the roll with a code indicating the mission, roll, film type, and camera position (vertical or oblique)
2. Label each frame of the roll with a unique number (300 frames per roll) to facilitate use and subsequent reference to the photo frame

3. If the agency so desired, cut each frame, and mount into clear plastic sleeves, and mount in a vinyl binder
4. Place the flight map and all planning forms in a file folder
5. Maintain a master file of all flights, by mission and objective, open to the public
6. Call the agency to receive the photography and billing

CRSC considers all Enviropod photography to be a vital record and archive. Not only now, but as time goes by, the photographic record of environmental happenings throughout Utah will be invaluable. Indexing and proper filing are essential. So is public (but controlled) access to all frames of photography.

For storage, keeping the film on rolls is much simplier and cheaper (and safer), but for interpretation and access, frame-by-frame storage is much more effective. Outside of CRSC, few agencies have a motorized or even mechanical, real-to-real light table viewing facility.

If desired, CRSC would be pleased to make such facilities available and/or to perform interpretive services. Some agencies have received such service.

Attached as Exhibit H is a typical billing outline that has evolved through the 1983 experience.

## RESULTS

Success in the 1983 experimental MOU will have to be assessed from all three points of view. To CRSC it has added a significant workload, essentially subsidized from other projects. Because of the emergency nature of so many missions and requests, the entire staff had to be alert to, and involved in,

the telephone calls, flight plans, scheduling, cost estimations, and drop-in traffic to demonstrate the film and its uses. However, the program has been useful to some of the CRSC projects, especially those on contract to state agencies, and has allowed CRSC personnel to be a part of the hazard detection and analysis effort.

To EPA there are two issues, administrative and operational. From an administrative point of view, communications from CRSC and the state have not been as open or complete as they need to be. The continuously rushed conditions caused less than ideal communication between the CRSC/state activity and Denver, leaving uncertainity there as to what was transpiring week-by-week in Utah.

Further, the operational laboratory facilities at EPA, Las Vegas were frequently stressed by emergency requests, as CRSC tried to respond to agency demands. This entire load was placed on top of EPA's standard processing stream, and they were further pressed by their own emergency requirements. Nevertheless, the EPA lab was incredibly efficient and cooperative.

From the state's point of view, there were many successes, and a few disappointments. Most flight requests were prompted by emergency conditions, and most results were successful in terms of timing and product quality. There were a few surprises in exposure, as darkening clouds or lateness of day closed in before an airplane could be obtained, get off the ground, and over the target area.

This was the biggest single obstacle to smooth and continued performance of the program: available aircraft. In early stages, a certain state employee made his airplane and his time available, on demand and with no assurance of reimbursement, to complete a number of missions. As emergencies mounted it

became essential to turn to other sources, as backup, and some responded, notably the Highway Patrol and the Division of Wildlife Resources. When emergencies were no longer priming the pump, it became very difficult to schedule an airplane with any assurance. This obstacle must be overcome if any follow-on MOU is to be effective.

To assess the response by state agencies, CRSC has contacted most by telephone, with a brief survey form. Exhibit I highlights those responses. The responses generally are favorable, with exceptions as noted above.

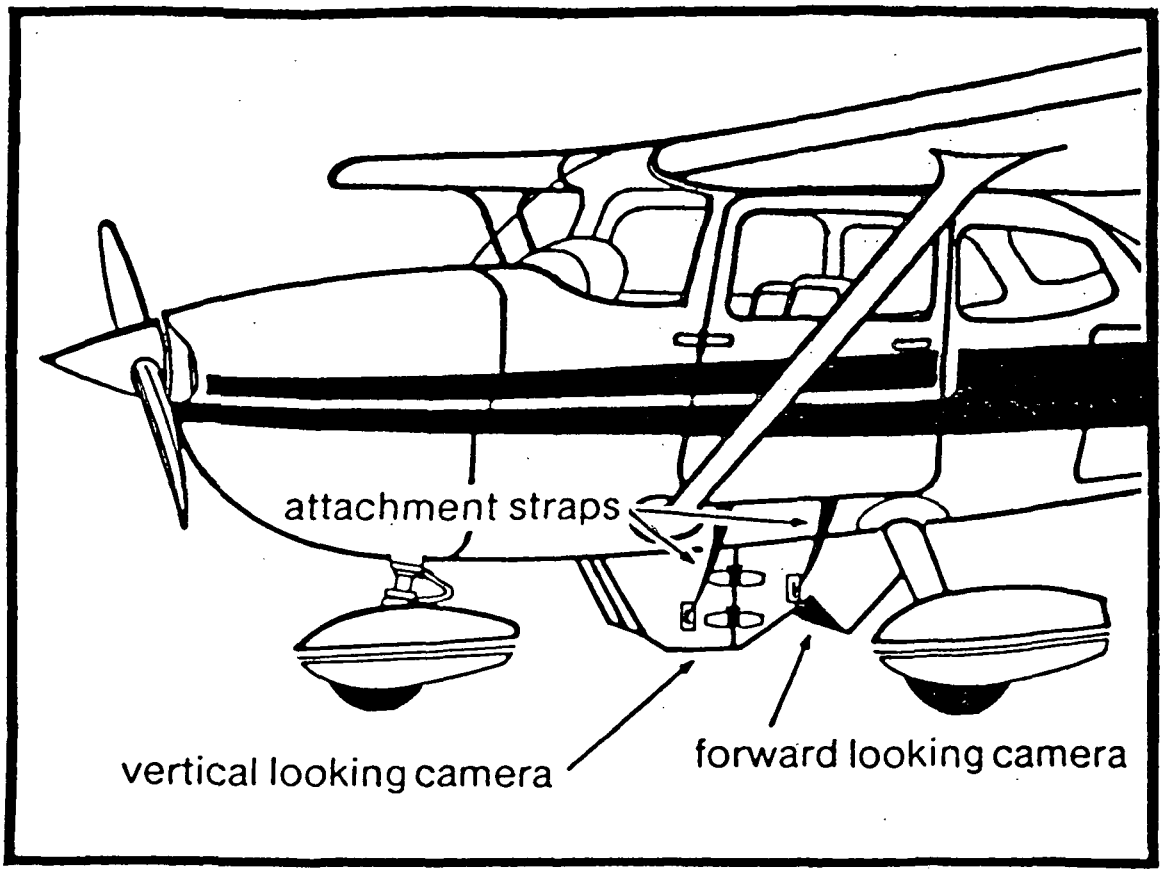
## ENVIROPOD HANDBOOK

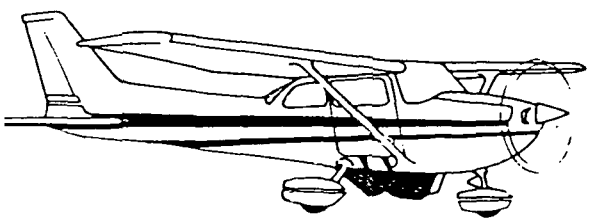
In response to a request from the Federal Emergency Management Administration (FEMA), CRSC has prepared a new Enviropod Handbook: A Guide to Preparation and Use of the Environmental Protection Agency's Light-Weight Aerial Camera System, CRSC Report 84-1. Experience gained by CRSC during the 23 missions has provided sufficient foundation to summarize all the essential steps to successful use of the system. The document provides all the information, charts, and tables necessary from flight planning and pre-flight preparations, through the flight, to post-flight activities.

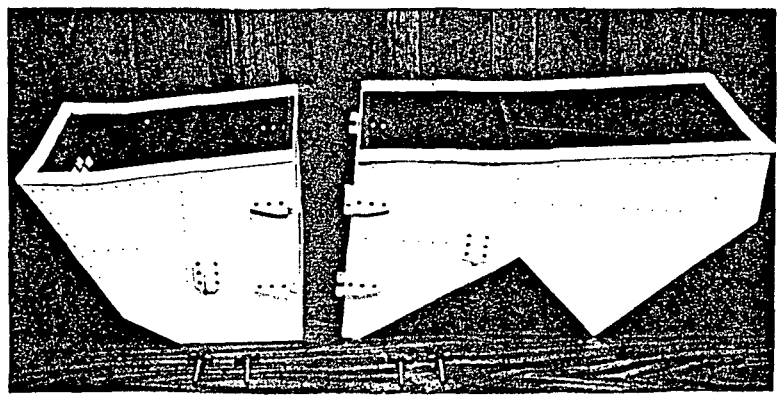
## SUMMARY

1. Access to the EPA Enviropod was most timely for the 1983 period of environmental stresses. The camera system performed well, and provided invaluable photographic record of a number of emergency events and other conditions.

2. EPA performed generously and efficiently in providing the system and supplying film, processing, and return shipping.
3. EPA was quick to provide spare parts, replacement cameras, and pods as needed.
4. CRSC gained experience and the use of some film products helpful to state contract projects, and was able to assist the state in a time of need.
5. An Enviropod Handbook has been prepared to expedite further use of the system.
6. The only significant difficulty was the lack of continuous access to aircraft. This is a problem that must be resolved prior to any continuation of the agreement.
7. The use of aerial photo/remote sensing techniques in environmental detection and resource mapping has proven itself again. Agencies should give thought to operational applications in environmental monitoring, mapping, and analysis, accessing EPA's airborne Daedalus scanner and other camera systems, and/or CRSC's photo interpretation and digital image processing/GIS capabilities to serve on-going needs through professional analysts.





Enviro-Pod Sections Before Mating.

Exhibit A

Exhibit B

# EPA Presentation on the ENVIROPOD

(A Remote Sensing Instrument for Environmental Monitoring)

at

The Center for Remote Sensing and Cartography (CRSC)
University of Utah Research Institute
420 Chipeta Way, Research Park
(east of Continental Bank, near Ft. Douglas Cemetery)

2:00 p.m., Friday, December 3, 1982

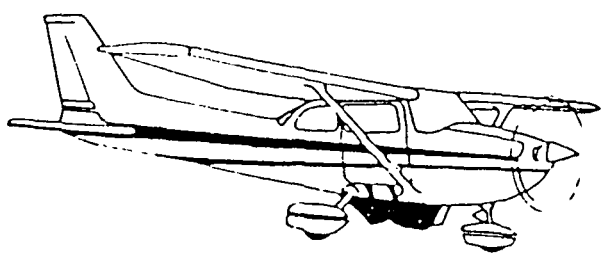
Purpose: To discuss possible applications to state, federal, and local agency needs.

Presentation by Gary A. Shelton, remote sensing specialist at EPA, Las Vegas, and Denis Nelson, regional remote sensing coordinator, EPA Regional Office, Denver.

After a 50-minute briefing, there will be an open discussion on potential applications to particular agency needs. The technical/management relationship between the State of Utah (and other agencies), CRSC, and EPA will also be discussed.

Potential uses include:

| | |
|---|---|
| Agriculture | - crop production, water resources, forest management |
| Environmental | - impact assessment, pollution monitoring |
| Government | - city planning, highway inspection |
| Commercial | - powerline inspection, construction site monitoring |
| Training | - photogrammetry, interpretation |



# Roster of Participants at EPA Enviropod Meeting

December 3, 1982

| Name | Agency | Telephone |
|---|---|---|
| Glenn Baldwin | Utah Department of Transportation | 965-4223 |
| D. V. Bollschweilor | " " " " | 965-4224 |
| Sally Kefer | Division of Oil, Gas & Mining | 533-5771 |
| Chauncey Powis | Department of Natural Resources | 533-5356 |
| Kent Gray | Utah Department of Health | 533-4145 |
| Scott Anderson | " " " " | 533-4145 |
| Dave Conine | State Planning | 533-5245 |
| Hunter Weiler | " " | 533-4970 |
| Bryan Whitaker | State Air Quality | 533-6110 |
| Steven Thiriot | Utah State Department of Health Bureau of General Sanitation | 533-6163 |
| Jerold Barnes | Salt Lake County Planning | 535-7461 |
| Mike Reichert | State Division of Environmental Health | 533-6146 |
| Farnum White | Utah Department of Agriculture | 533-4112 |
| Al Regenthal | Utah Division of Wildlife Resources | 533-9333 |
| Tim Provan | " " " " " | " |
| Maureen Wilson | | " |
| Cathy Jenn | Department of Natural Resources | 533-7495 |
| David K. Mann | Utah Division of Wildlife Resources | 533-9333 |
| Norm Stauffer | Utah Division of Water Resources | 533-7617 |
| Dave Cole | " " " " " | 533-7700 |
| Lorayne Tempest | Utah Division of Emergency Management | 533-5271 |
| Wes Dewsnup | " " " " " | " |
| Ralph Findlay | " " " " " | 533-5278 |
| Gerald Kaffer | " " " " " | 533-5271 |
| Keith Roseyear | Utah Department of Transportation | 965-4339 |
| Wilf Sommerkorn | Davis County Planning | 451-3278 |
| Chris Schaefer | " " " | " |
| Dean Barney | Salt Lake City Planning | 535-7757 |
| John Poulson | Utah Department of Agriculture | 533-4339 |

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# MEMORANDUM OF UNDERSTANDING
# AMONG
# THE STATE OF UTAH,
# THE U.S. ENVIRONMENTAL PROTECTION AGENCY,
# AND
# THE CENTER FOR REMOTE SENSING AND CARTOGRAPHY

## BACKGROUND

The Environmental Protection Agency (EPA) is responsible for monitoring systems research relative to the detection and monitoring of environmental contaminants. In recognition of the vast geographic area or areas that must be addressed by national, regional and state monitoring programs, the EPA has encouraged the use of aircraft and satellite data acquisition systems to obtain both synoptic and site-specific environmental data.

To complement more advanced airborne data acquisition systems, the EPA's Office of Research and Development has developed a low cost, readily deployable, overhead monitoring system, known as the ENVIROPOD, which is capable of acquiring high resolution aerial photoimagery in oblique and vertical modes. The technologies associated with this system enhance the capabilities of the regions and participating state agencies in the area of emergency response, compliance, resource evaluation, monitoring and planning. The ENVIROPOD has been evaluated at both the research and operational levels in EPA.

It is the objective of this agreement to make available to the State of Utah, and interested cooperating agencies, overhead monitoring technology on a demonstration basis for a period not to exceed one year. It is understood that the State will provide aircraft coordination through the State Planning Coordinator's Office (SPCO), and that individuals acquiring or requesting aerial photography will be responsible for the cost of services provided by the aircraft and related mission activities. Management and operations of the system will be provided by the Center for Remote Sensing and Cartography (CRSC), University of Utah Research Institute (UURI).

## PURPOSE

To establish a program for demonstrating the benefits the State and other agencies can derive from in-house overhead monitoring capabilities and to:

(1) Determine whether or not such a program can materially improve programs for control and assessment of the environment.

(2) Attain a measurement of the cost-versus-benefits of such a program and identify how the costs can be defrayed.

## SCOPE OF WORK

1. EPA's Environmental Monitoring Systems Laboratory and Region VIII will provide training to CRSC and State personnel on operations and applications of the ENVIROPOD.

2. The State of Utah and/or other requesting agencies, will cover costs of the aircraft, crew, and associated expenses.

3. CRSC and the State of Utah will coordinate all missions with EPA Region VIII.

4. EMSL-LV will provide all film processing for a one-year period.

5. The State of Utah and CRSC will prepare an evaluation report at completion of experiment.

PROVISIONS

1. Direct support will be provided by the EMSL-LV and Region VIII. This will include necessary training, film processing, and camera maintenance.

2. The activities conducted through this agreement can be terminated by one of the participants by providing written notice ninety (90) days prior to proposed termination date.

3. The State will be responsible for equipment, crews, public and private property in the event of accidents.

4. EPA is not responsible for any liability in the operation of the aircraft or the ENVIROPOD. This includes any legal action(s) that may arise in connection with the purpose for which the equipment is operated and/or deployed by the State of Utah.

5. The period of Memorandum of Understanding is March 1, 1983 through February 28, 1984.

AUTHORIZATION

1. Dr. Merrill Ridd, Director, Center for Remote Sensing and Cartography, University of Utah Research Institute, in cooperation with SPCO, will coordinate activities, including monitoring requirements, flight planning, funds, and program administration.

2. Mr. Gary A. Shelton of EPA will coordinate activities between the EPA Headquarters and Region VIII. Mr. Denis Nelson will coordinate those activities between CRSC/State, and the EPA Region VIII.

RESPONSIBILITIES

1. The Environmental Protection Agency will provide:

   (a) a minimum of one ENVIROPOD with two cameras to the participating State on a loan basis;

   (b) processing of film;

   (c) observer training in installation, operation, and camera maintenance.

2. The State of Utah, or the requesting agency, will provide for:

   (a) insurance;

   (b) fuel;

(c) aircraft;

(d) crews.

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3. CRSC will actively promote the use of ENVIROPOD among State, federal, and local agencies, and demonstrate its utility as a part of its on-going NASA-sponsored outreach effort. In addition, with appropriate funding from the cooperating agencies, CRSC will provide:

(a) overall program coordination and communication;

(b) project planning consultation;

(c) integrated project planning with all interested State, federal, and local agencies.

CRSC will also provide, at cost, photointerpretation and resource analysis/planning services as requested on a project basis.

AUTHORITY

This agreement is entered under the authority of the Intergovernmental Cooperation Act.

Wm. S. Partridge, President — 2-7-83 Date
University of Utah Research Institute

Steven J. Durham, — 3/2/83 Date
Regional Administrator-Region VII
U.S. Environmental Protection Agency

Glenn E. Schweitzer, Director — 6/2/83 Date
Environmental Monitoring Systems Laboratory
U.S. Environmental Protection Agency

Marthe Dyner, State Planning Coordinator — 2-7-83 Date
State of Utah

Eugene Findlay, Director — 23 Feb 83 Date
Utah Division of Finance

David L. Wilkinson, Attorney General — 2/24/83 Date
State of Utah

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

CENTER FOR REMOTE SENSING AND CARTOGRAPHY
420 CHIPETA WAY, SUITE 190
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE: 801-581-8016

April 1983

To: Distribution (state, federal, and local agencies)

1. A Memorandum of Understanding was recently prepared among EPA, the State of Utah, and the UURI Center for Remote Sensing and Cartography. EPA has made available for state, federal, and local government use a versatile aerial camera system (Enviro-Pod) with free film and processing for one year.

2. Natural color photography and color-infrared photography are both available (concurrently on the same flight, if desired) from a vertical camera port or a forward-looking $45^{0}$ oblique port. Film type, scale, date, time of day, pattern of flight, and other factors may be selected by the agency.

3. Test flights show that the photography is the highest quality, allowing up to 30x enlargement and more, to identify the most remarkable detail on the ground or water. Its uses are limitless in natural resource analysis, environmental monitoring, urban applications, etc.

4. The State Planning Coordinator's Office (SPCO) serves as the lead state agency in the agreement. The Center for Remote Sensing and Cartography (CRSC) at UURI serves as technical advisor in the agreement. They will jointly share in communication, coordination, and flight planning.

5. A professionally supervised internship is being established at CRSC to provide on-going technical expertise and consultation to cooperating agencies. For a modest fee, the agency may obtain ready access to this technical service.

6. On a project basis, the cost of aircraft operation will need to be covered by the agency prescribing the mission. The cost may be shared through careful coordination. SPCO has arranged for access to aircraft at minimal rates.

7. With the approach of spring weather, we need to assemble very soon to identify specific agency needs in terms of subject, location, scale, photo format, and timing, and to coordinate flight specifications to maximize efficiency and utility of the products.

8. At the RDCC meeting April 26, a block of time will be devoted to this purpose. Attached is a map and general spec sheet for your use.

9. Please take some time with the people in your agency to so identify localities, subjects, and priorities, and bring the map and sheet to the meeting April 26. From that point, we will quickly prepare flight schedules and specifications.

Thanks for your cooperation. Please call either of us if you have any questions.

Sincerely,

Dave Conine slb

Merrill Ridd slb

Dave Conine, SPCO
533-4978

Merrill Ridd, CRSC
581-8016

MKR:slb

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

CENTER FOR REMOTE SENSING AND CARTOGRAPHY
420 CHIPETA WAY, SUITE 190
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE: 801-581-8016

# Aerial Photo Needs

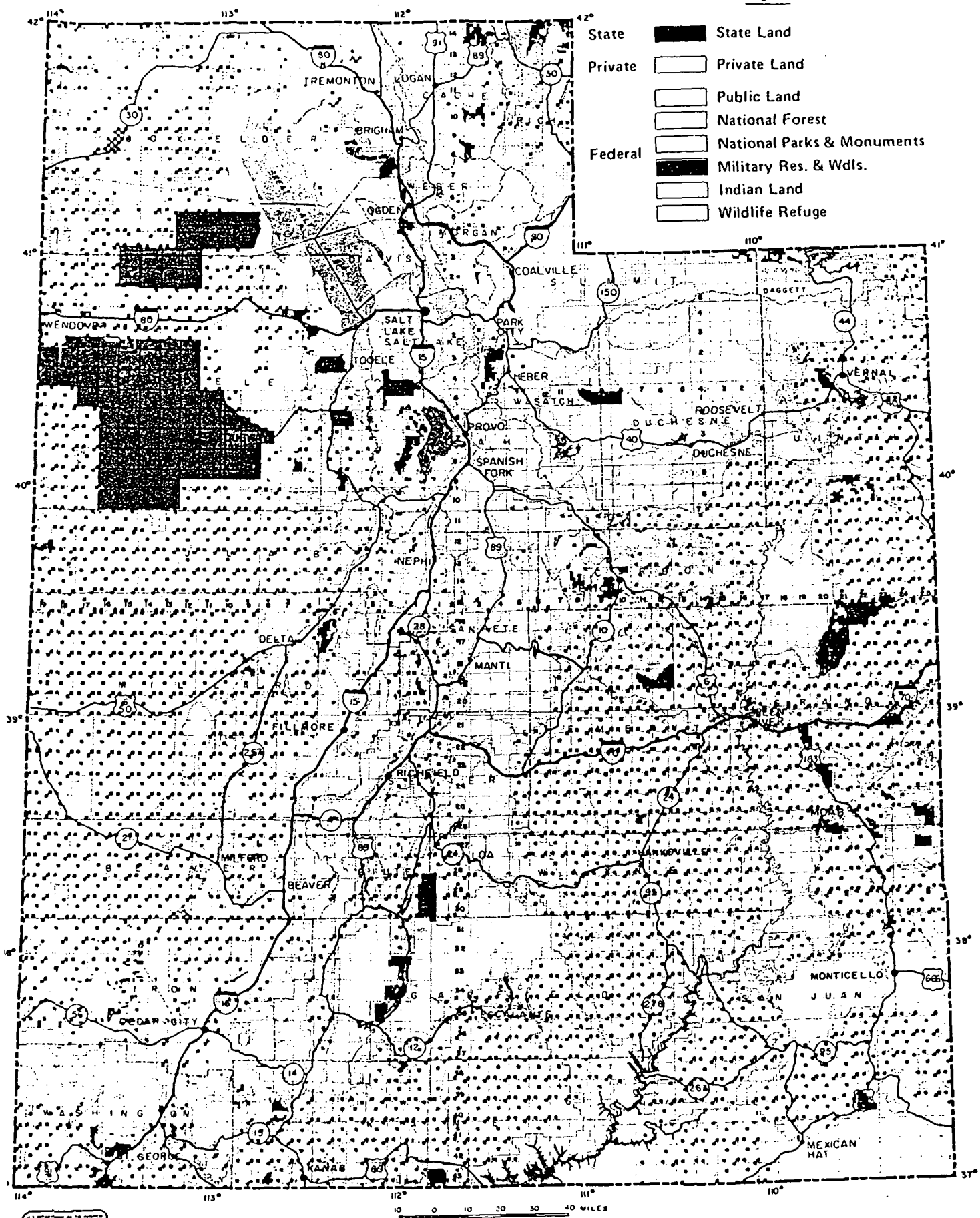
Agency _____ Date _____

I. On the attached map, mark the areas where your agency has an interest in obtaining up-to-date, detailed aerial photo data. We are not speaking of broad, blanket coverage of a county, but of particular sites with particular problems requiring high quality, current photography.

II. Number each area mapped and fill in the attached sheet accordingly.

III. Bring the map and sheet to the RDCC meeting April 26.

# UTAH LAND STATUS




U.S. Department of Interior
Bureau of Land Management

Aerial Photo Needs

Agency _____ Date _____

| Map Area | Target/s | Optimum Month | Vertical or Forward Oblique | Natural Color or CIR |
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UNIVERSITY OF UTAH RESEARCH INSTITUTE

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CENTER FOR REMOTE SENSING AND CARTOGRAPHY
420 CHIPETA WAY, SUITE 190
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE: 801-581-8016

MEMORANDUM

To: All organizations interested in obtaining Enviro-Pod photography

From: Center for Remote Sensing and Cartography (CRSC) and
State Planning Coordinator's Office (SPCO)

Re: Procedures for Scheduling Enviro-Pod Flights and Cost Payments

The following is an outline of procedures for obtaining Enviro-Pod aerial photography:

1. Requesting organization should complete a "Mission Planning Form" for each area of interest (form attached). If the requesting organization is unclear about any item on the form, please call:

| CRSC | | | SPCO | |
|---|---|---|---|---|
| Merrill Ridd | 581-8018 | or | Dave Conine | 533-5245 |
| Richard Jaynes | 581-8019 | | Building 116 | |
| | | | State Capitol | |
| | | | Salt Lake City, UT 84114 | |

Options, applications, and costs may be discussed, and a tentative flight date scheduled. Possibilities for mission cost sharing may be pursued.

2. The requesting organization should also complete the top portion of the "Enviro-Pod Flight Request" form (copy attached). Upon receipt of the CRSC/SPCO cost estimate for obtaining photography, the requesting organization should enter the figure under item #2 of the request form.

3. CRSC/SPCO will proceed with final flight scheduling and photography acquisition upon receipt of the completed and signed flight request form, with accompanying purchase order or requisition.

ENVIRO-POD AERIAL PHOTOGRAPHIC SYSTEM
MISSION PLANNING FORM

GENERAL INFORMATION Date: _____

Requesting Organization: _____

Address: _____

Technical Contact Person: _____

General Project Description: _____

PROPOSED ENVIRO-POD MISSION

1. Project Location. Attach USGS map (1:24,000 or 1:100,000), or xerox copy of map, marking proposed flight area. Brief description of target area: _____

_____

2. Project Timing. The photo mission is to be flown between _____ (month-day-year) and _____ (month-day-year). Preferred date: _____ (month-day-year)

Preferred solar angle (low angle for shadow, sun overhead for minimal shadow): _____

Special timing considerations (i.e., high water stage, after leaf drop, etc.):

_____

3. Photography Specifications (check applicable blanks).

Vertical _____ Natural Color _____ Color Infrared _____

Oblique _____ Natural Color _____ Color Infrared _____

For vertical photos only, specify type of coverage required:

Monoscopic ____ Stereoscopic ____

Desired nominal vertical photo scale: 1:_____ or 1" = _____ feet.

4. Special Instructions. Please provide any additional information about the anticipated applications of the requested photography which may aid in flight planning. Also, note any deadlines for photography delivery.

_____

_____

_____

_____

5. It is often encouraged that an individual from your organization accompany the pilot on photo missions to aid in obtaining target photography and to reduce costs. Please indicate who may be available, if desired, to participate in this mission.

_____

6. Organizations interested in mission cost sharing: _____

Organizations contacted but not interested: _____

ENVIRO-POD FLIGHT REQUEST

Requesting Organization: _____

Address: _____

Billing Contact Person: _____

Organization P.O. No. or Requisition No.: _____

Special Billing Information: _____

Re: General Project Description (from Mission Planning Form): _____

_____

This is a request for the acquisition of Enviro-Pod panoramic photography in accordance with the attached Mission Planning Form and mission area description and map(s). This request is made with an understanding of the following major terms:

1. The Center for Remote Sensing and Cartography (CRSC) and the State Planning Coordinator's Office (SPCO), pursuant to a joint Memorandum of Understanding between the Environmental Protection Agency (EPA), CRSC, and SPCO effective March 1, 1983, will provide the following services: mission planning and scheduling; pilot and aircraft arrangements; acquisition of photography, including film processing through EPA; and aerial photo labeling and indexing. CRSC/SPCO will obtain requestor authorization to change any of the mission specifications should scheduling conflicts, duplicate requests, or weather problems make compliance with requested specifications impracticable.

2. The requesting organization agrees to the following:

   a. To reimburse SPCO/CRSC for costs incurred in providing the services noted above. The following is a reasonably accurate estimate of the total cost for these services for the mission specified: $_____.

   b. To maintain photography in an indexed and accessible manner and to make it available to meet the reasonable requests of other organizations to study or duplicate the photography. All Enviro-Pod photography will be indexed in records to be maintained at CRSC. Although the photography becomes the property of the requesting organization upon payment for its acquisition, each Enviro-Pod photograph is a unique public document. Each frame of developed film is the only source for obtaining duplicate copies.

Authorized Signature of Requesting Organization

_____ _____

Date

| Mission Number | Mission Ldr & Pilot | Flight Date | Area | Subject & Frame Numbers | Agency | Vertical IR/NC Status | Oblique IR/NC Status | Shipped Date/How | Received Date/How | Indexed Date | Delivered Date/Who |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Dave Conine<br>Merrill Ridd | 21 March 1983 | Salt Lake Co.<br>Davis/GS Lake | Shore/River<br>Farmland | | NC<br>Mostly in sleeves | IR 2 frame/ slides roll | | yes | | |
| 2 | Dave Conine<br>Watanake | 10 April 83 | Henry Mtns<br>Escalade River<br>Capitol Reef | Buffalo | | NC<br>1 frame/ slide roll | NC (with filter) roll | | yes | | |
| 3 | Conine<br>Ridd<br>Case (UGMS) | 23 April 83 | Spanish Fork<br>Provo | Thistle slide | | IR under-exposed mostly roll frames cut | | | yes | | |
| 4 | Conine<br>Price | 5 May 83 | Spanish Fork<br>Provo<br>Sugarhouse Park | Thistle slide 14-149<br>Landslide y mt 150-157<br>1-8 9-13 | | NC<br>Binders | | | yes | | Dave Conine |
| 5 | Conine<br>Nat'l. Geog. | 15 May<br>22 May<br>28 May | Canyonlands<br>Zion/Springdale<br>Canyonlands/ Nuclear | | | NC | | | yes | | |
| 6 | Conine<br>Merola | 2 June | Davis County<br>Tooele County | Floods/Slides | TCDS<br>Tooele | NC<br>F88-288 | | | yes | 6 July 83<br>Willie | Lisa Siman for Joe Urbanic 7 July 83 |
| 7 | Conine<br>Price<br>Rawlins | 8 June | Elko | Humboldt River | Nevada Fish & Game | NC Misfire<br>no exposures | IR | | yes | | |
| 8 | Conine<br>Watanake<br>Rawlins | 10 June | Elko | Humboldt River | Nevada Fish & Game | IR | | | yes | | |
| 9 | Conine<br>H. Brown<br>C. Cook | 15 June | SL County | Jordan high water | County Flood Control | NC<br>½ roll | | | yes | 23 June<br>Willie | Dave Lovel 23 June |
| 10a<br>10b | Mike Royce<br>Merola | 17 June | Davis Co. 10a<br>Lower Weber 10b | slides | USU<br>Bob Pack<br>Bill Lund<br>Craig Barker<br>John Reeve | IR | | | yes | | yes<br>Roland Jeppson |

| Mission Number | Mission Ldr & Pilot | Flight Date | Area | Subject & Frame Numbers | Agency | Vertical IR/NC Status | Oblique IR/NC Status | Shipped Date/How | Received Date/How | Indexed Date | Delivered Date/Who |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | Conine<br>Wayne LeBaron | 2 & 3 July 83 | Sevier<br>Sanpete<br>Millard | Sevier Riv. high water<br>DMAD<br>Desert | State Environ-mental Health | NC | | | 21 July<br>US Mail<br>priority | | |
| 12 | Mike Royce<br>Bill Case | 6 July 83 | Sevier Co. | Landslides | UGMS | NC F8<br>265 frames | NC F8<br>½ roll<br>166 frames | 7-7-83<br>A/P PO to A/P PO | 7-28-83<br>regular mai | 8-5-83<br>Ren Willie | 8-5-83<br>Bill Case |
| 13 | Dave Conine<br>R. Willie | 12 July | Provo Bay<br>Goshen Bay<br>East shoreline GSL | high water | Div. of Water Resources | IR 042<br>F8 haze clear | NC 056<br>F8 haze clear | 18 July<br>A/P PO to A/P PO | 7-27-83<br>regular mai | | |
| 14 | Rex Nielson<br>R. Willie | 13 July | Bear Lake<br>GSL | high water | SL&F<br>CRSC | IR 042<br>F8 lt haze clear | NC 050<br>F8 lt haze clear | 18 July<br>A/P PO to A/P PO | 7-27-83<br>reg. mail | | |
| 15 | Dave Conine<br>R. Willie | 19 Jul | Philips Refinery | dead trees | Env. Health<br>Mike Behling | NC 042<br>F8 | F8 056 | 7-26-83<br>Express PO | 7-28-3<br>regular | | |
| 16 | Dave Conine<br>R. Willie | 20 Jul | Causeway<br>Luein & Antelope Island | high water damage | Water Res.<br>Dave Cole | NC 042<br>F8 | NC 056<br>F8 | 7-26-83<br>Express PO | 7-28-83<br>regular | | |
| 17 | Mike Royce<br>Bill Case | 23 Jul | Joe's Valley | | UGMS | F5.6 056<br>302 | F5.6 042 | 7-26-83<br>Express PO | 7-28-3 | | |
| 18 | Kevin Price<br>Joe Green | 7-28-83 | Humboldt River | Humboldt | Nevada Dept of Wildlife | F8 056 | | 8-1-83<br>Express PO | 8-3-83<br>Express PO | 8-5-83<br>K. Price | Pete Rawlings<br>NV Dept of Wildlife |
| 19a | Mike Royce<br>Bill Case | 8-4-83 | Philips Refinery | dead trees | Env Health | F5.6 042 | EPA shipped wrong film<br>F5.6 056 | 8-5-83<br>Express PO | 8-8-83<br>Obl wrong film | 8-11-83<br>Ren Willie | 8-11-83<br>40 slides<br>Mike Behlin |
| 19b | Mike Royce<br>Bill Case | 8-4-83 | Mt. Pleasant area<br>No. Dragon Creek | extent of landslides | UGMS | " | " | " | " | " | |

| Mission Number | Mission Ldr & Pilot | Flight Date | Area | Subject & Frame Numbers | Agency | Vertical IR/NC Status | Oblique IR/NC Status | Shipped Date/How | Received Date/How | Indexed Date | Delivered Date/Who |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | Doug Wheeler<br>Kevin Price<br>Tom Hathaway | 8-30-83 | Middle Sevier<br>Sanpete Co.,Delta<br>Tintic Pasture | Agr & Wetlands<br>Pinyon-Juniper, Desertification<br>Range Sites | CRSC | IR F 5.4 | NC F | | | | |
| 21 | Dave Conine | 10-26-3 | Rush Valley | rangeland study | CRSC | | | | | | |
| 22 | Dave Conine | 11-2-3 | Northern Utah | dam siting<br>70 frames | Div of Water Res. | N/A | Oblique NC | | | | |
| 23 | John Merola<br>Steve Bulwrath | 11-4-3 | Weber Co., UT | Weber River<br>full roll | Div of Wildlife Resources | Vert IR | N/A | Express 11-5-83 | | not indexed under exposed | |
| | | | | | | | | | | | |
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# ENVIROPOD MISSION COST ESTIMATING

## FIXED COSTS

Cost of film (1 rl = 300 frames)

Mission planning & preparation

Load, set, unload camera/s; package for mailing; install & remove pod; trips to and from airport

Postage for processing
- Regular postal service (UPS)
- Airport-to-Airport PO service (including time to airport)

Handling

## VARIABLE COSTS

Indexing (label, plot on map)
- Cut, put in plastic covers & binder
- Leave on roll

Airplane & pilot's time

Pilot ground time

Camera operator

Interpretation & mapping - negotiable

Response/Feedback from Participating Agencies

Agency: Environmental Health

Object/Target: Philips Refinery

1. Were you pleased with the product?

   Yes - a little dark

2. Has it been of value (how)?

   Marginal - vegatation damage was not as visible as hoped.

3. Do you anticipate need this year?

   As emergencies happen

4. Suggestions for a smoother operation.

   Film on hand and ready to go.

   Prints of the film might be valuable to some agencies.

5. Cost considerations:

   a. Film will cost $225/roll
   b. Plane and pilot (if not provided) will cost $50-$80/hr.
   c. Flight planning/installation/index/etc.
      1 roll mission cost $500-$700 (typical case)
      Does this present a problem?

   N/A (Depends on the given situation.)

Response/Feedback from Participating Agencies

Agency: Utah Geological and Mineral

Object/Target: Landslides - Sevier, Sanpete, Joe's Valley

1. Were you pleased with the product?

   No - underexposed

   Destroyed during processing.

2. Has it been of value (how)?

   Yes - documentary

3. Do you anticipate need this year?

   Yes - landslides, etc.

4. Suggestions for a smoother operation.

   Pilot problems (plane not available)

   Make sure power for a certain pod is available.

5. Cost considerations:

   a. Film will cost $225/roll
   b. Plane and pilot (if not provided) will cost $50-$80/hr.
   c. Flight planning/installation/index/etc.
      1 roll mission cost $500-$700 (typical case)
      Does this present a problem?

      Would need to see itemized breakdown for cost.

Response/Feedback from Participating Agencies

Agency: State Lands and Forestry

Object/Target: Bear Lake and Great Salt Lake - shorelines

1. Were you pleased with the product?

   Yes - natural color (oblique)

   No - color infrared (camera problem)

2. Has it been of value (how)?

   Yes - long term reference as needed

3. Do you anticipate need this year?

   Yes - shore of entire Great Salt Lake

4. Suggestions for a smoother operation.

   Yes - submit a concrete bid

5. Cost considerations:

   a. Film will cost $225/roll
   b. Plane and pilot (if not provided) will cost $50-$80/hr.
   c. Flight planning/installation/index/etc.
      1 roll mission cost $500-$700 (typical case)
      Does this present a problem?

      No - as long as accurate bid is submitted.

Response/Feedback from Participating Agencies

Agency: Division of Water Resources

Object/Target: Causeways on Luein and Antelope Island

1. Were you pleased with the product?

   Yes

2. Has it been of value (how)?

   Not yet - photography is mainly used for reference

3. Do you anticipate need this year?

   Yes - Bear River Reservoir

4. Suggestions for a smoother operation.

   No

5. Cost considerations:

   a. Film will cost $225/roll
   b. Plane and pilot (if not provided) will cost $50-$80/hr.
   c. Flight planning/installation/index/etc.
      1 roll mission cost $500-$700 (typical case)
      Does this present a problem?

      Will need to decide on a case-by-case basis.

Response/Feedback from Participating Agencies

Agency: Division of Wildlife Resources

Object/Target: High water level - Great Salt Lake and Utah Lake

1. Were you pleased with the product?

   G.S.L. - yes  Utah - underexposed

2. Has it been of value (how)? Yes

   Wetland evaluation

3. Do you anticipate need this year?

   No

4. Suggestions for a smoother operation.

   No - very satisfied with communication, etc.

5. Cost considerations:

   a. Film will cost $225/roll
   b. Plane and pilot (if not provided) will cost $50-$80/hr.
   c. Flight planning/installation/index/etc.
      1 roll mission cost $500-$700 (typical case)
      Does this present a problem?

      Maybe, cost sharing will help considerably.

Response/Feedback from Participating Agencies

Agency: Salt Lake County Flood Control

Object/Target: Jordan River high water

1. Were you pleased with the product?

   Yes

2. Has it been of value (how)?

   Yes - flooding documentation

3. Do you anticipate need this year?

   Yes as flooding occurs this spring.

4. Suggestions for a smoother operation.

   Have paperwork (prices, contracts, etc.) taken care of in advance in order to speed flight.

5. Cost considerations:

   a. Film will cost $225/roll
   b. Plane and pilot (if not provided) will cost $50-$80/hr.
   c. Flight planning/installation/index/etc.
      1 roll mission cost $500-$700 (typical case)
      Does this present a problem?

      No, but may want to compare prices. May provide aircraft.