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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

MISSION ANALYSIS AND
SYSTEMS ACQUISITION DIVISION

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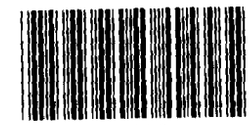
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The Honorable John R. Block
The Secretary of Agriculture

Dear Mr. Secretary:

Subject: Need to Reevaluate Helistat Program Objectives and Progress (MASAD-81-31)

We have completed a survey of the status and objectives of the Forest Service's Helistat program. Fundamental acquisition management principles that should have been applied in the Helistat program's development have not been applied. There is still an opportunity for you to take corrective actions, so we are bringing these matters to your attention now.

The purpose of the Helistat program is to demonstrate that aerial logging operations are economical in steep mountainous terrain. To do this, the Forest Service is developing a lighter-than-air vehicle consisting of a 343-foot long blimp envelope with a frame which has four SH34J helicopters attached to it.

In managing the program, the Forest Service has unnecessarily tied program milestones to land management planning time frames and moved too hastily, thereby overlooking essential considerations in planning a development strategy. For example, potential users were not contacted before beginning the program to get their participation and advice for determining the need for, uses of, and operational requirements for a Helistat concept vehicle. Information which we have developed from contacting potential users shows that it is questionable whether the Helistat concept under development will have practical application as a timber harvesting method.

Further, the system being developed cannot be reproduced without substantial redesign. Consequently, it will not be useful in demonstrating the economics of aerial logging, the principal objective of the development program.

Finally, the Navy, which is administering the development contract for the Forest Service, is being hamstrung in its efforts to obtain data that is necessary to evaluate the program's progress, particularly regarding the engineering adequacy and safety of the vehicle being developed.

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Therefore, we are recommending that you reevaluate the Helistat program before making any further funding obligations on the vehicle's development contract. This reevaluation should include the participation and advice of potential users to determine if the Helistat is needed, how it could be used, and the operational requirements for such a vehicle.

If after reevaluation you decide to continue the Helistat program, we recommend that (1) program milestones not be tied to land management planning time frames and (2) before any further funding obligations are made on the Helistat development contract, you direct the Chief, Forest Service, to

--restructure the development effort to include a complete state-of-the-art design and data package from which future Helistat concept vehicles could be built and from which more accurate estimates of the economics of aerial logging could be made;

--include as part of the program a requirement that estimates be made of the economics of private industry logging based on a state-of-the-art Helistat concept vehicle; and

--give the contract administrator, the Naval Air Development Center, sufficient freedom to use its authority to make decisions on the adequacy of Helistat contract performance and on the future funding obligations under the contract.

A detailed discussion of the program and the issues we identified is included in the enclosure to this letter.

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As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this letter to the Director, Office of Management and Budget; the chairmen, House and Senate Committees on Appropriations; the chairmen, Senate Committees on Governmental Affairs and Agriculture, Nutrition, and Forestry; the chairmen, House Committees on Government Operations and Agriculture; and the Secretaries of Defense and the Navy. Copies will also be provided to the Commander, Naval Air Development Center; the Commander, Naval Air Systems Command; and the Administrator, National Aeronautics and Space Administration.

We would appreciate being informed of the action you plan to take in response to our recommendations. If you have any questions or wish to discuss this report, please contact Raymond Hautala or Earl Morrison on 275-3195.

Sincerely yours,

W. H. Sheley, Jr.
Director

Enclosure

ENCLOSURE I

HELISTAT PROGRAM OBJECTIVES AND PROGRESS NEED REEVALUATION

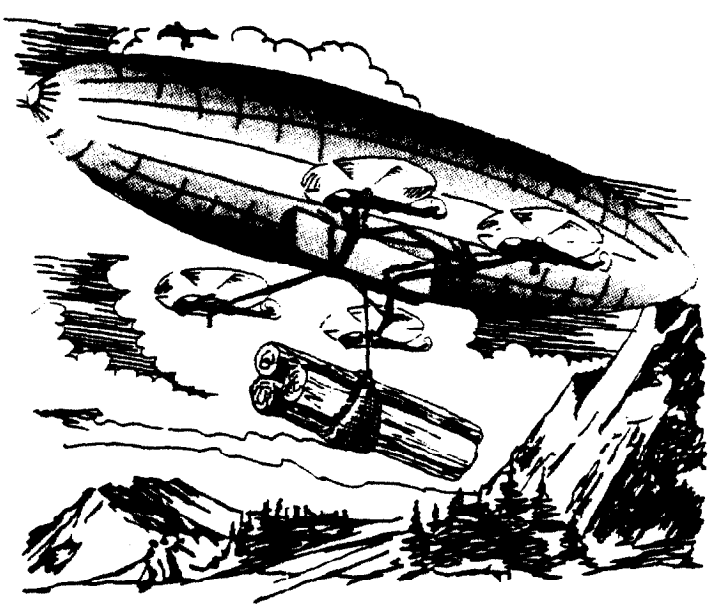
In January 1980 the Forest Service initiated a program to develop a lighter-than-air vehicle called the Helistat to be used for aerial logging. The vehicle is to consist of a 343-foot long blimp envelope with a frame which has four SH34J helicopters attached to it. (See fig. 1.) Based on analysis performed by the contractor that is constructing the vehicle, the Forest Service believes the Helistat could economically carry 25 tons (one truckload) of timber for distances up to 5 miles over steep mountainous terrain. According to the Forest Service, this is both a heavier load than heavy lift helicopters will currently carry and a longer distance than they can economically carry them. The Forest Service says that the Helistat will use less fuel than heavy lift helicopters and require less road building in the forests than would be the case with either heavy lift helicopters or cable logging systems. Vehicle construction and initial flight testing is to be completed by the Piasecki Aircraft Corporation at Lakehurst, New Jersey, by May 1982.

According to Forest Service program officials, the goals of the Helistat program are to:

--Demonstrate that aerial logging operations are economical in those steep mountainous National Forest areas which currently are economically and/or environmentally inaccessible for timber harvesting.

FIGURE 1

ARTIST'S CONCEPTION OF HELISTAT



--Get the Helistat built and timber harvesting demonstrations started early enough to be able to increase the amount of forest land classified as available commercial timberland in the land management plan required by the National Forest Management Act of 1976 (Public Law 94-588, Oct. 22, 1976). The act requires the Secretary of Agriculture to attempt to complete plans for all units of the National Forest System by September 30, 1985.

--Provide access to additional timber that might not otherwise be available to help meet the projected increased demand for timber in the 1990s and beyond.

As of April 1981, the Forest Service had obligated $4.7 million to the contractor for the Helistat development contract. The Naval Air Development Center (NADC) is administering the contract for the Forest Service, but NADC stated the Forest Service retains strong influence over decisions on adequacy of contractor performance and funding commitments under the contract.

The Forest Service estimates total program cost for the Helistat will be about $25 million. This consists of $11 million for vehicle construction and initial flight testing and about $14 million to fly the Helistat to the Pacific Northwest and test and demonstrate it for 3 years. The Forest Service projects, however, that it will recover $19.6 million from timber sales made as part of the demonstration.

Although we did not perform a detailed analysis of Forest Service cost estimates, we believe total program cost could be considerably more than $25 million. For example, no value for Government-furnished equipment, such as the four surplus SH34J helicopters which are being supplied by the Navy, is included in the estimates. Likewise, we realize the Forest Service's $19.6 million cost recovery estimate is dependent upon many factors, including the controllability, maneuverability, and overall reliability of the vehicle being constructed.

In performing our evaluation, we reviewed Helistat project files and interviewed the project manager at the Forest Service; the Commander, project manager, project engineer, and former project engineer at NADC; and the program manager for lighter-than-air systems at the National Aeronautics and Space Administration (NASA). We also reviewed pertinent technical reports from the Defense Technical Information Center, NASA, and the Massachusetts Institute of Technology and talked with 4 associations and 32 potential private industry users of Helistat technology. (This was not a scientific sample; therefore, views of potential users we contacted do not necessarily represent the views of all potential Helistat users.)

From this work we found that:

--The Forest Service did not contact potential users before beginning the Helistat program to get their participation and advice for determining the need for, uses of, and operational requirements for a Helistat concept vehicle. However, users we contacted see few opportunities for Helistat use and rate the concept poor as a timber harvesting method.

--The Forest Service has tied Helistat program milestones to land management planning time frames and moved too hastily with the program, even though the National Forest Management Act of 1976 provides the Secretary of Agriculture flexibility in preparing and amending land management plans for units of the National Forest System and Helistat development is not a requirement of the act. In addition to the lack of user participation and advice, this has led to a (1) plan to build the Helistat from old Navy equipment with no provision for a complete design and data package from which users could build another vehicle, thus making technology transfer more difficult, (2) program that will not directly demonstrate the economics of aerial logging, and (3) situation in which Navy contract administrators say they are hamstrung in their efforts to obtain data that they and their NASA consultant think is necessary to evaluate the programs progress, particularly regarding the engineering adequacy and safety of the vehicle being developed.

As a result, we believe that the Forest Service needs to obtain user participation and to reevaluate the objectives and progress of the Helistat program before continuing with it.

USER PARTICIPATION AND ADVICE NEEDED

The Forest Service did not contact potential Helistat users before beginning the Helistat program. Potential users we contacted, however, see little opportunity for Helistat use and rate the concept poor as a timber harvesting method.

The Forest Service offers timber sales to private industry bidders who either harvest it themselves or contract with heavy equipment firms for harvesting services. Although these organizations could have provided valuable advice on the need for, uses of, and operational requirements for an aerial logging vehicle, the Forest Service made no serious effort to contact them before beginning the Helistat program. The Forest Service based its determination of need for the program on

--the fact that of the 88.7 million acres of National Forest lands classified as commercial forest land, 20 million acres are subclassified as marginal because of steep terrain, poor access, low timber production capability, or for other reasons and that it estimates potential timber harvesting in these areas could yield 2.3 billion board feet of lumber annually;

--its estimate that 6 billion board feet of lumber is lost annually to insect infestation, disease, fire, floods, and so forth in the 187 million acres of National Forest lands and that a Helistat concept vehicle might help in salvaging some of it; and

--its projection that timber demand will rise over the next several decades and that an aerial logging vehicle could help in harvesting timber supplies to help meet that demand.

Program officials, based on studies performed for NASA, believe the basic concept of using a quad-rotor, lighter-than-air vehicle to lift heavy loads is sound. Although they do not know how much timber could be harvested using the Helistat concept, they believe the concept could contribute in harvesting a large amount because most National Forest timber is in the Pacific Northwest, some of which is in steep terrain and is currently economically and/or environmentally inaccessible for harvesting.

A consultant's study prepared in 1978 for NASA concluded that logging offers the greatest potential market for development and use of heavy-lift airships but cautioned that very close coordination with potential users was essential to prepare operational requirements that fully satisfy them. Helistat program officials said they did not solicit potential user views for this program because they knew from past experience and contacts that the logging industry is conservative and negative toward new technology. As an example, they said the Forest Service had to push the industry to institute helicopter logging. Further, one program official said the contractor who proposed the Helistat program to the Forest Service had already contacted private industry and found they were not interested in the Helistat development because they thought it was too expensive and too risky. We think this should have sparked Forest Service interest in getting potential users' views, but it did not.

We contacted 4 forest industry associations and 32 potential private industry users to obtain some input on industry's perception of the program. Even though our contacts did not represent

a random sample of the universe of potential Helistat users and may not be representative of all potential users' views, the results point out the need for their input. Their overall assessment of the Helistat concept as a method for harvesting timber in steep mountainous terrain was poor. They were asked to assess the concept by considering the following rankings: very good, good, fair, poor, and very poor. Eleven said the Helistat will not be usable much of the time because of bad weather and high winds in the mountainous terrain. Twenty commented that only a small percentage of timber in the Pacific Northwest is economically inaccessible for harvesting, and four of these said the Forest Service makes this small amount inaccessible by setting higher, more costly standards for road building in National Forests than are used on private forest lands. Another five said all the timber is accessible using current timbering methods. Thirty-three said the preferred method for harvesting this timber would be cable systems or heavy lift helicopters. Four commented that if the Forest Service develops the Helistat, it will force them to use the vehicle by specifying its use in future timber sales contracts. Only one said they would be willing to contribute any money toward Helistat development.

LAND MANAGEMENT PLAN DRIVES PROGRAM

The Forest Service is unnecessarily allowing the requirement for land management plans to drive Helistat program time frames and development procedures.

Section 6 (c) of the National Forest Management Act of 1976 states that the Secretary of Agriculture "shall attempt to complete" incorporation of standards and guidelines specified in the act into plans for units of the National Forest System by September 30, 1985. Section 6 (f) provides for amending and revising the plans, and section 6 (k) provides for returning lands presently classified as not suitable for timber production back to timber production. Helistat development is not required by the act, and the act's language permits flexibility in completing the plans and in amending or revising them. Nevertheless, the Forest Service considers September 30, 1985, as a deadline for the plans; has given little consideration to the fact that they can be amended or revised; and has tied Helistat program milestones to land management planning time frames.

To meet the statutory target date of September 30, 1985, the Forest Service awarded a sole-source contract for Helistat development. Instead of a carefully planned design and development program that would lead to a vehicle that could directly demonstrate the economics of aerial logging and would be easily reproducible, the Forest Service is allowing the contractor to use old surplus Navy equipment (a 20-year old blimp envelope and old helicopters) that will lead to neither. It is also allowing the contractor to begin vehicle fabrication concurrent

with vehicle design. These procedures could lead to problems with

--transferring the technology to potential users,

--determining the economic advantage of aerial logging, and

--evaluating the program's progress.

Technology transfer limited

Because they are using old equipment to build the Helistat and because it would require extra time and money to develop a design and data package for building a new state-of-the-art vehicle, the Forest Service is not requiring the contractor to develop a complete design and data package from which additional vehicles could be manufactured. Rather, it is only requiring a design and data package from which a new blimp envelope for use with the current configuration could be built. (This design is for an envelope that would be about 100 feet shorter in length than the 343-foot long envelope being used to build the current vehicle. NADC engineers say a shorter envelope could result in a more controllable vehicle.) This means that if the Helistat is successfully demonstrated and if potential users are interested in buying one, there will be no plans from which to build a complete system and a new development program will be required to produce a commercially acceptable vehicle.

According to Navy officials, if another Helistat were desired, it would take about 5 years for a new research and development program. While the estimated cost of such a program is not available, a different contractor had estimated an $85 million research and development program for a logging-type vehicle to be built with a new state-of-the-art configuration.

Economic benefit uncertain

Even though one of the Helistat program goals is to demonstrate that aerial logging operations are economical in steep mountainous terrain, the Helistat will not directly demonstrate this. Because the Helistat will not be a prototype of a vehicle that private logging companies would use, the economics of the concept would have to be extrapolated from the performance parameters of this one-of-a-kind vehicle to a reproducible, state-of-the-art prototype. The prototype will cost considerably more than the Helistat being built, and fuel efficiency is difficult to project. The time frame for developing a prototype and the consequences of inflation will also influence any extrapolation and estimate of the economics of private industry logging based on the Helistat concept.

Contract administration

By interagency agreement dated September 26, 1979, NADC committed itself to act as technical representative and contract administrator for the Forest Service's Helistat program. To date, however, NADC has had difficulty obtaining data that it and its NASA consultant think is necessary to evaluate program progress. NADC says the Forest Service has retained strong influence over decisions on adequacy of contractor performance and funding commitments under the contract, required reports from the contractor have not been timely or complete, the contractor has not provided NADC a complete set of drawings or technical analyses, scheduled design reviews have been delayed, and the Forest Service has not vigorously supported NADC in its efforts to get data it needs to evaluate the engineering adequacy and progress of the program. As a result, NADC is seriously concerned about this lack of information and cooperation and anticipates major delivery date slippages if the problems are not rectified. NADC believes the program is probably 5 or 6 months behind schedule already.

The lighter-than-air program manager at NASA, who is a consultant on the Helistat program, said that NADC is asking for the minimal amount of information needed and that they should be getting much more to enable them to adequately evaluate the development of the vehicle.

CONCLUSIONS AND RECOMMENDATIONS

The Forest Service has obligated $4.7 million to date for the Helistat program. Information obtained from potential Helistat users that have experience in timber harvesting in the Pacific Northwest indicates that they view the Helistat concept as poor for steep mountainous timber harvesting and think its development is unnecessary. Our examination of the National Forest Management Act of 1976 indicates that the Secretary of Agriculture has some flexibility in the date for completing the land management plans, the Secretary has flexibility for amending or revising them thereafter, and Helistat development is not a requirement of the act. Nevertheless, the Forest Service has tied program milestones to land management planning time frames and considers September 1985 as a deadline for the plans. This has resulted in

--a plan to build the Helistat from old Navy equipment with no provision for a complete design and data package from which users could build another vehicle, thus making technology transfer more difficult;

--a program that will not directly demonstrate the economics of aerial logging; and

--a situation in which Navy contract administrators are hamstrung in their efforts to obtain data that they and their NASA consultant think is necessary to evaluate the program's progress.

Therefore, we are recommending that the Secretary of Agriculture reevaluate the Helistat program before making any further funding obligations on the vehicle's development contract. This reevaluation should include the participation and advice of potential Helistat users to determine if the Helistat is needed, how it could be used, and the operational requirements for such a vehicle.

If after reevaluation the Secretary decides to continue the Helistat program, we recommend that (1) program milestones not be tied to land management planning time frames and (2) before any further funding obligations are made on the Helistat development contract, the Secretary direct the Chief, Forest Service, to

--restructure the development effort to include a complete state-of-the-art design and data package from which future Helistat concept vehicles could be built and from which more accurate estimates of the economics of aerial logging could be made;

--include as part of the program a requirement that estimates be made of the economics of private industry logging based on a state-of-the-art Helistat concept vehicle; and

--give the contract administrator, NADC, sufficient freedom to use its authority to make decisions on the adequacy of Helistat contract performance and on the future funding obligations under the contract.

We discussed the issues in this report with officials of the Helistat program, the NADC contract administrators, and the NASA consultant. The NASA consultant concurred with our concern about the Navy's contract administration problems. He also stated that the simultaneous development of a state-of-the-art design would be useful though costly to the program and that such an effort, if added, should be performed under a separate, competitively awarded contract. Contract administration managers at NADC agreed with our presentation of the Navy's role in the program and with our conclusions and recommendation regarding their role. Program managers in the Forest Service, however, (1) question the value of obtaining more user input to the program, (2) believe NADC contract administrators are seeking to impose data and test requirements on the contractor that are more demanding than called for, (3) believe time and funding restrictions require that the program remain structured as is, and (4) believe that they can coax

private industry into developing state-of-the-art Helistat concept vehicles following completion of the current demonstration program by offering future National Forest timber sales contracts which specify no road building within 5 miles of the timber stands.

We believe more fundamental acquisition management principles should be used in planning and managing the Helistat program. This will require user participation and advice to assure industry interest in the program and development of a vehicle that meets user needs. It will also require that contract administrators have access to the data needed to adequately evaluate program progress and that program milestone dates be based on the nature of and inherent uncertainties associated with the development work involved. Further, it is questionable whether potential users would develop state-of-the-art Helistat concept vehicles if the Helistat program is not structured to provide a reasonable basis for estimating the economics of private industry logging based on a state-of-the-art Helistat concept vehicle.