



United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-271044

February 6, 1996

The Honorable John J. Duncan
Chairman
Subcommittee on Aviation
Committee on Transportation
and Infrastructure
House of Representatives

The Honorable William J. Lipinski
Ranking Democratic Member
Subcommittee on Aviation
Committee on Transportation
and Infrastructure
House of Representatives

On June 8, 1995, we testified at your subcommittee's hearing to discuss our May 1995 report entitled, National Airspace System: Comprehensive Plan for Global Positioning System is Needed (GAO/RCED-95-26, May 10, 1995). On November 30, 1995, your subcommittee held a second hearing on the Federal Aviation Administration's (FAA) efforts to augment the Department of Defense's (DOD) Global Positioning System (GPS). At that hearing, attention focused on the FAA's wide and local area augmentation systems, which will enable aircraft to use GPS for civil air navigation in all phases of flight. DOD, FAA, Wilcox Electronics, Inc.--FAA's contractor for the wide area augmentation system (WAAS)--and the Air Transport Association presented testimonies. As requested by your offices, we attended the second GPS hearing and analyzed the witnesses' statements so we could provide you our views on the statements for the hearing record. This letter transmits the results of our analysis.

In summary, we have three major comments. First, FAA will not be able to meet its 1997 milestones regarding the use of GPS, augmented by the WAAS, as a primary means of civil air navigation in domestic airspace. As a result, the agency recently pushed back these milestones to mid-1998. We remain concerned about schedule slippage because the revised schedule still provides a tight timeframe for developing the WAAS and potential difficulties could affect the system's

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development and implementation. Second, FAA recently promised to complete a comprehensive plan for its GPS augmentations by the end of February 1996. As highlighted in our May 1995 report, it is very important that this plan includes schedule and cost estimates for both the wide and local area augmentation systems. Third, if DOD's security concerns about augmenting the accuracy of GPS through the WAAS result in a decision barring the use of WAAS to support precision approaches, the safety and cost implications for the aviation industry and FAA will be substantial.

FAA WILL NOT MEET ITS 1997 MILESTONES.

Based on FAA's and Wilcox's testimonies, we see that the agency will not meet its 1997 milestones regarding the use of GPS, enhanced by the WAAS, as a primary means of civil air navigation in domestic airspace for three phases of flight--air (en) route, terminal, and nonprecision approach. In 1994, in response to recommendations from government and industry groups, FAA modified its GPS schedule by accelerating these milestones from 2000 to 1997. Our May 1995 report cast doubt on FAA's ability to meet its new milestones; we found that the WAAS schedule did not seem to provide enough time for FAA to complete all necessary steps and that software-related and other problems posed potential difficulties. One schedule delay occurred immediately. Contract award did not occur until August 1995, some 7 months later than FAA had initially anticipated.

Wilcox's Chief Executive Officer, Donald Welde, testified that his company's contract with FAA calls for installing and implementing the initial WAAS by early 1998 after a 29-month development period. In his written testimony, FAA's witness, George Donohue, Associate Administrator for Research and Acquisitions, stated that by 1998, "WAAS will be available as a primary means of navigation for en route through non-precision approaches." Agency officials responsible for the GPS program recently told us that the WAAS would be commissioned by mid-1998, if project development and implementation are successfully completed as planned. As a result, FAA expects to accelerate GPS-based civil air navigation by two years, not the three years as committed to back in 1994. We remain concerned about schedule slippage because the revised schedule still provides a tight timeframe for developing the WAAS and potential difficulties could affect the system's development and implementation.

**FAA HAS NOT YET ANNOUNCED ITS MILESTONES
FOR THE LOCAL AREA AUGMENTATION SYSTEM (LAAS)**

Our May 1995 report recommended that FAA prepare a comprehensive plan for augmenting GPS. We emphasized that the plan should include, among other things, schedule and cost estimates for developing and implementing the wide and local area augmentation systems.

According to FAA's testimony and DOT's recent letter to the Congress in response to our recommendation (see enclosure 1 for a copy of DOT's letter), FAA will not establish LAAS milestones until the agency completes an assessment of the feasibility of using the system to support precision approaches, receives adequate funding, and determines the optimal configuration of local area systems. Yet in its letter, DOT announced that FAA would complete a "comprehensive" plan by February 29, 1996.

As highlighted in our May 1995 report, it is important that the comprehensive plan includes a LAAS timetable. The plan's purpose is to present the agency's best estimates of its implementation timeframes and funding needs for wide and local area augmentations. FAA determined LAAS feasibility by the end of 1995. Waiting to receive adequate funding and determining the "optimal" configuration of LAAS may unnecessarily delay establishment of a LAAS timetable. We recall that FAA established its original WAAS milestones in 1992 even before having assessed the feasibility of the wide area system and cancelled the Microwave Landing System acquisition because the agency was confident that the GPS--augmented by WAAS and LAAS--could support all types of precision approaches.

We noted in our May 1995 report that without LAAS schedule and cost estimates, among other things, decisionmakers in the administration and the Congress cannot evaluate the extent to which milestones being considered by FAA are timely and assess the agency's funding needs for GPS augmentations. We also stated that the plan would help aviation users map out their transition to GPS in terms of both equipping aircraft and training pilots. Consistent with our findings, the Air Transport Association's witness, Roger Fleming, highlighted in his November 30, 1995, testimony that the FAA needs to be more forthcoming about its plans for LAAS because they will have important implications for the aviation industry. He emphasized how the timing of the agency's efforts will impact the production of GPS avionics and the retrofitting of aircraft.

**DECISION ON THE ACCURACY ENHANCEMENT OF GPS
MAY HAVE MAJOR IMPLICATIONS FOR FAA**

DOD has expressed concern that GPS, when augmented by the WAAS, will provide highly accurate navigation data that could be used by hostile forces to pinpoint weapons delivery against U.S. military targets. DOD has agreed that development of the WAAS should continue but has turned to the President's Interagency Working Group, which includes DOT and DOD representatives, to resolve concerns about the accuracy augmentation being developed as part of the WAAS.

If DOD's concerns result in dropping the WAAS accuracy augmentation, the implications for the aviation industry and FAA will be substantial. One major implication of limiting accuracy is safety-related. The WAAS has the potential to enable aircraft to fly precision approaches, which provide aircraft with accurate guidance for descending safely to the runway, at virtually every airport in the country.¹ FAA currently provides these precision approach capabilities through instrument landing systems at some 500 airports nationwide. These airports comprise fewer than 20 percent of our country's public use airports. Dropping the WAAS accuracy augmentation would deny aircraft the safety benefits of being able to fly Category I precision approaches at any U.S. airport in poor weather conditions.

Another major implication is cost-related. Without the use of WAAS for Category I precision approaches, FAA will need to incur the added costs of maintaining existing instrument landing systems (ILSs) or installing LAAS units at hundreds of airports to maintain the current level of precision approach capabilities. In our June testimony, we reported that FAA spent an estimated \$170 million in 1993 in operation and maintenance expenses for existing navigation

¹GPS, augmented by the WAAS, is expected to support Category I precision approaches. Category I precision approaches allow aircraft to descend to a height of at least 200 feet above the ground when the runway visual range is at least 1,800 feet. Category II and III precision approaches allow an aircraft to descend when weather conditions are below Category I minimums. Category II approaches allow aircraft to descend to a height of at least 100 feet when the runway visual range is at least 1,200 feet. Category III approaches do not have a height minimum but they have three subcategories (a, b, and c) requiring runway visual ranges of at least 700 feet, 150 feet, and 0 feet, respectively.

equipment, including ILSs. We also noted that some 120 ILS are over 20 years old and since this aging equipment experiences twice the number of outages as expected under current design standards, these ILSs require more maintenance. FAA's ability to decommission its ILSs is related directly to whether the WAAS will be allowed to provide the level of accuracy needed for the Category I precision approaches. FAA's other option is to acquire sufficient local area augmentation systems to provide all precision approach capabilities rather than just the most demanding (Categories II and III). Although this option may prove less costly than maintaining and replacing existing ILSs, we believe it will prove far more costly than using the WAAS for Category I precision approaches.

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We discussed a draft of this letter with FAA's Integrated Product Team Lead for GPS/Navigation and the Satellite Program Manager. They generally agreed with the facts as presented, and we made revisions as necessary on the basis of their comments.

We are sending copies of this letter to the Chairmen and Ranking Members of the Senate Commerce, Science, and Transportation Committee's Subcommittee on Aviation and the House and Senate Appropriations Committees, Subcommittees on Transportation; the Secretary of Transportation; the Administrator, FAA; and other interested parties. Please contact me at (202) 512-2834 if you or your staff have any questions.



John H. Anderson, Jr.
Director, Transportation and
Telecommunications Issues

Enclosure

(341478)

The Honorable Ted Stevens
Chairman, Committee on Governmental Affairs
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

We have enclosed three copies of the Department of Transportation's reply to the General Accounting Office final report, "National Airspace System: Comprehensive FAA Plan for Global Positioning System Is Needed," RCED-95-26. The Department of Transportation was required to develop this response in accordance with Section 236 of the Legislative Reorganization Act of 1970.

We will gladly furnish additional information upon request.

Sincerely,

Melissa J. Spillenkothen

Enclosures

The Honorable Mark O. Hatfield
Chairman, Committee on Appropriations
United States Senate
Washington, D.C. 20510

The Honorable Robert L. Livingston
Chairman, Committee on Appropriations
U.S. House of Representatives
Washington, D.C. 20515

The Honorable William F. Clinger
Chairman, Committee on Government
Reform and Oversight
U.S. House of Representatives
Washington, D.C. 20515

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**DEPARTMENT OF TRANSPORTATION
STATEMENT ON GENERAL ACCOUNTING OFFICE (GAO) REPORT**

TITLE "National Airspace System: Comprehensive FAA Plan for Global Positioning System is Needed," RCED-95-26, May 1995.

DEPARTMENT OF TRANSPORTATION POSITION

The Department appreciates the GAO report's recognition of FAA's accomplishments in meeting all milestones to date and taking appropriate actions to strengthen global positioning system (GPS) management. While we recognize the challenges ahead in meeting future milestones, the public benefits to be derived from an accelerated schedule are worthy of the risk. In order to minimize risk, FAA has developed a set of plans for individual aspects of GPS which will lead to one consolidated comprehensive plan. FAA recognizes the economic and operational significance of transitioning from existing ground based facilities to space based systems and has drafted a carefully considered transition plan. A draft copy of this transition plan is under review and is expected to be completed by the end of the year.

Finally, determination of Local Area Augmentation System (LAAS) milestones will be considered once we have fully determined the feasibility of using LAAS to support Category II and III operations. The feasibility analysis will be completed on schedule this year. If the results are positive, and if there is adequate funding, the next step will be to determine the best mix of local area augmentation techniques to optimize the performance, and at the same time minimize unit cost. Once we have concluded that the system is feasible and identified the optimal configuration, then it would be appropriate to identify implementation milestones.

RECOMMENDATION AND RESPONSE

Recommendation: Prepare a comprehensive plan for augmenting GPS and transitioning to it and to update this plan regularly.

Response: Concur. FAA has completed a number of planning efforts that deal with each specific aspect of GPS. Efforts are underway, as these areas progress, to consolidate these plans into an overall comprehensive plan for GPS. The comprehensive plan will include information on cost, scheduling, and the overall transition effort. We anticipate that the comprehensive plan will be completed by February 29, 1996, and will be updated as appropriate.

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