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Report to Congressional Requesters

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AIR TRAFFIC CONTROL

Remote Radar for Grand Junction

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Resources, Community, and
Economic Development Division

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November 19, 1996

The Honorable Hank Brown
The Honorable Ben Nighthorse Campbell
United States Senate

The Honorable Scott McInnis
House of Representatives

In 1983, the Federal Aviation Administration (FAA) began a nationwide program of consolidating air traffic control facilities to gain the benefits of automation and any attendant cost savings.[1] As part of this program, FAA conducted several studies between 1992 and 1995 to determine the most cost-effective way to handle the radar-based air traffic control activities for the airport located at Grand Junction, Colorado.[2] The studies focused on two options: (1) a local option that would establish a terminal radar approach control facility in Grand Junction and (2) a long-distance option, referred to as "remoting," wherein the radar signal from the radar installation at Grand Junction would be transmitted and monitored at a terminal radar approach control facility located approximately 250 miles east in Denver, Colorado.[3]

In June 1995, FAA announced its final decision to remote the signal from the Grand Junction radar installation to a terminal radar approach control facility at Denver. According to FAA officials, the analyses conducted by the agency showed that remoting the radar signal was more cost-effective than establishing an approach control in the Grand Junction airport's tower (TRACAB) or in a separate TRACON facility in Grand Junction. As a consequence of the decision to remote the radar signal from Grand Junction, FAA will propose that the tower at Grand Junction and its remaining air traffic control functions be contracted out to the private sector.

[1]In 1993, the House and Senate Appropriations Committees reiterated their interest in having FAA consolidate more facilities.

[2]Staff Study, Grand Junction, CO, Radar Approach Control Service (June 26, 1995); Staff Study, Grand Junction, CO, Radar Approach Control Service (May 1994); and Staff Study, Grand Junction, CO, Radar Approach Control Service (1992).

[3]Remoting, part of consolidating the air traffic control functions for two or more airports, is routing each airport's radar signal to a single terminal radar approach control (TRACON) facility. Air traffic controllers stationed at the TRACON facility monitor and communicate with the aircraft that are using airspace in the geographic area associated with each radar signal.

You asked us to examine some concerns that representatives of the city of Grand Junction had raised about FAA's decision. As agreed with your office, we developed information to respond to three specific questions: (1) Did FAA choose the most cost-effective option for handling radar-based air traffic control activities at Grand Junction? (2) Would the safety and efficiency of the air traffic control system be compromised by remoting radar data and contracting out tower operations at Grand Junction? (3) What can be done to improve FAA's process for determining when and where to remote radar data?

Results in Brief

We agree with FAA's determination that remoting the Grand Junction radar signal to a TRACON facility in Denver is the most cost-effective option for handling radar data from the site. However, we believe that FAA's 20-year projected savings attributable to the remote option should be reduced by about $500,000, from $5.9 million to $5.4 million, because FAA overlooked certain telecommunications costs and did not utilize more realistic staffing scenarios. Our analysis of the available data disclosed no valid concerns about the safety and efficiency of remoting radar data or contracting out a tower's operation. FAA's process for deciding when and where to remote radar signals was generally sound but relatively ad hoc. A formal methodology for making such decisions would have helped the agency to (1) ensure that all relevant factors were properly considered and (2) communicate to the affected communities how its decision was made.

Background

FAA conducted a series of analyses to identify the most cost-effective way to use the radar data from Grand Junction.[4] On the basis of the results of a 1992 study, FAA decided that building a TRACON facility at Grand Junction was less costly than remoting the radar signal from Grand Junction to Denver. However, in May 1994 FAA conducted another cost analysis that factored in the use of a new technology for remoting radar signals known as video compression.[5] The results of this analysis showed that it would be less costly to remote the radar signal from Grand Junction to Denver, and in August 1994, FAA announced its choice of the less costly option.[6]

[4]In a related development, the House Appropriations Committee in fiscal year 1992 directed FAA to install state-of-the-art airport surveillance radar (ASR-9) equipment to serve the Grand Junction airport. FAA commissioned the radar installation on November 9, 1995, and on an interim basis began transmitting radar data to an Air Route Traffic Control Center located at Denver.

[5]Video compression allows the transmission of radar display data via telephone lines.

[6]FAA expects to move from the interim transmission of Grand Junction radar data to the Denver Air Route Traffic Control Center to the Denver TRACON in mid-1997.

FAA's decision to remote the radar signal also means that the tower at Grand Junction will be operated by a contractor. FAA's decision to provide approach guidance to aircraft through the Denver TRACON dictates that the Grand Junction tower be classified as a level-1 tower that operates using visual flight rules (VFR).[7] In 1993, the House and Senate Appropriations Committees directed FAA to contract out all level-1 VFR towers to the private sector.

In March 1995, Grand Junction community leaders and local air traffic controllers met with FAA to outline their concerns about FAA's analyses and conclusions. The major concerns of the controllers and the city's representatives were (1) the accuracy and completeness of the cost comparisons between the two options and (2) the considerations about safety and efficiency associated with remoting radar signals and contracting out a tower's operations. FAA agreed to conduct a new study that would consider two options—(1) a local option that would establish either a TRACON or a TRACAB at Grand Junction or (2) a long-distance option that would remote the radar signal to Denver—and found once again that remoting the radar signal to Denver was the most cost-effective option and that it would not compromise the system's safety and efficiency.

FAA Chose the Most Cost-Effective Option but Overestimated the Cost Advantage of Remoting

FAA's 1995 analysis of the costs of establishing a new TRACAB facility at Grand Junction or remoting the radar data to Denver was based on a comparison of the costs for facilities and equipment, telecommunications, staffing, and relocating staff over the 20-year life cycle of the project. FAA estimated that the cost of remoting the signal to the Denver TRACON would be about $9.4 million, while the cost of establishing a TRACAB in Grand Junction would be about $12.8 million,[8] a difference of about $3.4 million.[9] FAA also estimated that an additional $2.5 million would be saved over the same 20-year period by contracting out the tower at Grand Junction. According to FAA's estimates, these two actions would save about $5.9 million.

[7]About 460 towers are categorized at levels 1 through 5. Level-1 towers have the lowest activity and are the least complex. For example, the airport in Charlottesville, Virginia, has a level-1 tower that controls about 63,000 operations a year; Chicago's O'Hare International Airport has a level-5 tower that controls about 840,000 operations a year.

[8]This amount does not include the cost of the ASR-9 radar, which FAA views as a fixed cost whether the agency remotes this radar signal to Denver or establishes a TRACAB at Grand Junction.

[9]The costs of these two actions are expressed in 1995 present value dollars. We used 1995 present value dollars in all of our calculations.

To verify whether FAA chose the most cost-effective option for providing radar approach control to the Grand Junction airport, we performed an independent cost analysis of FAA's 1995 study.[10] While we agree that FAA's analysis identified the most cost-effective option, FAA did not take into account three factors that, in our opinion, are valid in evaluating the options studied. When these factors are considered, FAA's total projected savings attributable to remoting and contracting out the tower operation at Grand Junction are reduced by about $500,000, from $5.9 million to $5.4 million. The principal findings from our analysis are summarized below. (See app. I for a detailed presentation of our analysis.)

- FAA did not include a cost for establishing telephone lines between Grand Junction and Denver under the remoting option. The overlooked cost of annual telephone lines was $107,500, or, when discounted over the 20-year life cycle of the project, $853,000 in 1995 dollars . We revised FAA's estimated total telecommunications cost under the remote option upward by $853,000, from $618,000 to $1,470,000.
- FAA overestimated the cost of staffing under each of the options studied because the agency used authorized staffing levels—even though the positions were often unfilled. Using staffing levels that more closely approximate actual levels in the Northwest Mountain Region, we estimate that the annual staffing cost would be lower by $147,600 (about $1.82 million over 20 years) for the TRACAB option and by $168,900 (about $2.091 million over 20 years) for the remote option. The net effect of these changes increases the savings attributable to remoting by about $271,000 over 20 years. Moreover, when using staffing levels that more closely approximate actual levels in the field, we estimate that the TRACAB option's staff relocation and training costs would be lower and further reduce the savings attributable to the remote option by $174,000.
- FAA underestimated the savings associated with contracting out the air traffic control functions at Grand Junction. We estimate that contracting out saves about $2.7 million—or about $218,000 more than FAA estimates—over 20 years after factoring in FAA's previous experience with contractor-operated towers and the additional costs of relocating the Grand Junction controllers who choose not to work for the contractor.

[10]Representatives of the city of Grand Junction expressed concern about several specific cost items in FAA's analysis. Most of the concerns focused on FAA's costs for staffing and equipment. We examined each of the community's concerns and incorporated changes to our analysis where appropriate.

Radar Remoting and Contract Towers Are Safe and Efficient

The representatives of the city of Grand Junction expressed concern that by remoting the radar signal to Denver and by contracting out a tower's operation, FAA jeopardizes the safety and the efficiency of the air traffic control system at the Grand Junction airport. Specifically, the representatives questioned the implications for safety and efficiency of transmitting radar data over 250 miles and having Denver controllers provide Grand Junction's radar approach control. The city's representatives also questioned the safety and efficiency implications of contracting out Grand Junction's tower.

We discussed remoting and considerations about the safety and efficiency of a contractor-operated tower with officials at FAA headquarters and at FAA's Northwest Mountain Region, who have jurisdiction over the Grand Junction and Denver areas. We also discussed these issues with officials from major aviation-related associations.[11]

According to the air traffic officials in FAA's Northwest Mountain Region, the agency has successfully transmitted radar data hundreds of miles to its enroute centers for the past 30 years without compromising or affecting the system's safety.[12] Because FAA's ability to transmit radar data over 250 miles of mountainous terrain was a concern to the Grand Junction representatives, we reviewed FAA's information on the reliability and availability of radar data transmissions. The information showed that the reliability and availability of the transmissions averaged 99.98 percent nationally over the past 5 years and that they were unaffected by mountainous terrain.

According to FAA and aviation association officials, a controller's physical location is not a safety issue, and controllers routinely control air traffic safely without having visual contact with other air traffic controllers. The critical issue is that information be exchanged in a timely manner, not that two individuals be in visual proximity. Moreover, FAA officials told us that when normal modes of communication are disrupted, the agency adjusts its operating procedures—such as transferring the control of air space to an enroute center or using nonradar approaches—to ensure the timely flow of information.

[11]The Regional Airlines Association, National Business Aircraft Association, American Association of Airport Executives, National Association of State Aviation Officials, Airline Pilots Association, National Air Transportation Association, and Air Freight Association.

[12]Enroute centers provide enroute services for a large geographical area to aircraft between the departure and arrival phases of flight.

The city's representatives believed that remoting caused traffic delays at the Grand Junction airport because Denver controllers were not trained to manage the airport's air traffic. According to FAA Air Traffic officials in the Northwest Mountain Region, Grand Junction incurred initial start-up problems similar to those that other facilities incurred when FAA began to remote radar data. To eliminate these problems, FAA provided refresher briefings to the Denver controllers on managing Grand Junction's air traffic. Grand Junction air traffic controllers told us that the Denver controllers are now efficiently managing this air traffic and delays are no longer a problem. According to the aviation association officials, their members had not raised any concerns about efficiency associated with FAA's remoting of radar data.

In connection with private-sector controllers under contract to FAA, the manager of FAA's contract tower program told us that contract controllers are as well trained as FAA controllers. He provided documentation showing that contract controllers average 18 years of experience. The program manager also told us that contract controllers are certified by FAA and operate under the same regulations as FAA controllers. Additionally, officials representing various aviation associations told us that their members were provided with safe and efficient services by both FAA-operated and contractor-operated towers. As a result, these officials told us that they had no reason to question the safety and efficiency of FAA's contract tower program.

Experience With Grand Junction Suggests Considerations for FAA's Future Consolidations

The concerns raised by representatives of the city of Grand Junction have also been raised by citizens' groups in other communities where FAA has proposed to consolidate facilities and contract out a facility's operation. That other communities had similar concerns leads us to believe that FAA can do a better job of communicating the reasons for its future decisions on consolidating facilities.

The issues and concerns raised by the city's representatives—the reliability of cost data and the safety and efficiency of the airport—were similar to those raised in 1994 by a Yakima, Washington, citizens' group that also questioned an FAA remoting decision.[13]

In both the Grand Junction and the Yakima projects, FAA took a relatively ad hoc approach in deciding whether to remote radar data. In both cases, our review showed that while FAA chose the most cost-effective option, it

[13]Remote Radar for Yakima (GAO/RCED-95-106R).

did not include all relevant cost factors in its savings computation and did little to communicate the rationale for its decision to the affected communities, thereby contributing to subsequent misperceptions by community representatives.

We did not find any standard FAA guidance for officials to follow or analytical model for them to use when deciding what costs to include, how to compute those costs, and what documentation to maintain when analyzing candidate facilities for consolidation. In June 1996, FAA issued a report[14] that identifies the types of information to be considered in deciding whether to establish or consolidate TRACON facilities; however, the report does not specify how the various factors will be computed in the decision-making process. In the absence of standard guidance or an analytical model, FAA patterned its Grand Junction studies after earlier remoting efforts. Officials in FAA's Air Traffic Plans and Requirements Program said that the agency uses this approach because each potential consolidation and remoting situation is unique. However, this approach has led to the agency's omitting certain telecommunications costs and not reflecting the more realistic scenarios for staffing facilities and has raised concerns in the affected communities. These types of process problems can have the effect of undermining the agency's credibility, discouraging the community from accepting FAA's decision, and delaying implementation plans and the realization of projected cost savings.

Conclusions

While FAA chose the most cost-effective way to handle radar data for Grand Junction and Yakima, in both instances it overlooked relevant cost factors. Furthermore, in both cases FAA's decisions were challenged by the affected communities, thereby contributing to delays in implementing the decisions. A more structured decision-making process, based on formal guidance and an analytical model, could ensure that FAA considers all relevant factors when making a remoting decision. A more structured decision-making process could also help FAA defend its decisions to communities that protest the closure of an FAA-staffed facility. As FAA continues to remote radar data and consolidate facilities, it is to FAA's advantage to develop and implement a more structured decision-making process in conjunction with key stakeholders.

[14]Investment Criteria and Operational Requirements for Terminal Radar Approach Control (TRACON) Facility Projects (June 28, 1996).

Recommendation

We recommend that the Secretary of Transportation direct the Administrator, Federal Aviation Administration, to develop formal guidance and an analytical model for making its remoting decisions. The guidance should outline what costs to include, how those costs should be computed, and what documentation is required to support the analysis. It should also provide for early and continuous involvement of the major stakeholders, especially the affected communities.

Agency Comments

We provided a draft of this report to the Department of Transportation for review and comment. We met with officials of the Department, including FAA's Program Director for Air Traffic Plans and Requirements Program, who agreed with the draft report's conclusions and recommendation. The Program Director said that FAA does not normally conduct the level of analysis we recommended because of the wide difference in costs between remoting radar data and establishing a local terminal radar approach control facility. Nevertheless, FAA recognized that improvements can be made in its decision-making process. In our view, FAA's June 1996 report that identifies the types of information to be considered when deciding whether to establish or consolidate TRACON facilities is a step in the right direction for improving its decision-making process. However, the report does not specify how the various factors will be computed in the decision-making process.

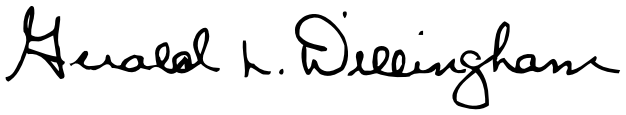
Scope and Methodology

We interviewed FAA officials in Washington, D.C., and the Northwest Mountain Region and obtained specific documentation on the cost of each option and the associated safety information. To verify the figures FAA used in its most recent cost analysis, we conducted an independent cost analysis. We also met with representatives of the city of Grand Junction and officials from major aviation associations to discuss their concerns and obtain their opinions on the potential operational and safety impacts associated with remoting and contracting out the Grand Junction tower. We discussed our findings with FAA officials, including the Program Director, Air Traffic Plans and Requirements Program.

We performed this review from October 1995 through October 1996 in accordance with generally accepted government auditing standards.

We are sending copies of this report to the Secretary of Transportation; the Administrator, Federal Aviation Administration; and representatives of

the city of Grand Junction. We will also make copies available to others on request. Please call me at (202) 512-4803 if you or your staff have any questions about this report. Major contributors to this report are listed in appendix II.



Gerald L. Dillingham
Associate Director, Transportation and
Telecommunications Issues

GAO's Estimates of the Cost of Locating a TRACAB Facility at Grand Junction or Remoting the Signal to a TRACON Facility at Denver

FAA cost category	TRACAB at Grand Junction	Remote radar to Denver	Cost savings for remote option
Facilities and equipment cost	**$992,329**	**$425,016**	**$567,313**
Plant engineering	$44,200	$34,200	$10,000
Electronic engineering	$24,500	$14,900	$9,600
Construction	$168,037	$169,226	($1,189)
Electronic installation	$755,592	$206,690	$548,902
Telecommunications cost[a]	**NA**	**$1,470,824[b]**	**($1,470,824)**
Salary cost[a]	**$9,621,789**	**$6,310,252**	**$3,311,537**
Manager (GS-13) Salary = $866,695/20 yrs.	$866,695 (1 position)	NA	$866,695
Supervisor (GS-12) Salary = $728,845/20 yrs.	$1,457,690 (2 positions)	$728,845 (1 position)	$728,845
Staff Specialist (GS-11) Salary = $608,117/20 yrs.	$608,117 (1 position)	NA	$608,117
Controller (GS-11 for TRACAB option; GS-10 for TRACON option) Salary = $553,526/20 yrs.	$4,864,936[c] (8 positions)	$3,321,156 (6 positions)	$1,543,780
Controller (GS-14) for Denver Salary = $1,044,017/20 yrs	NA	$1,044,017[c] (1 position)	($1,044,017)
Facilities Technician (GS-11) Salary = $608,117/20 yrs.	$1,824,351[c] (3 positions)	$1,216,234 (2 positions)	$608,117
Staff relocation cost (1 move = $50,000)[d]	**$150,000**	**NA**	**$150,000**
Training[e]	**$98,925**	**NA**	**$98,925**
Subtotal	**$10,863,043**	**$8,206,092**	**$2,656,951**
Savings from contract tower program[a]	**NA**	**($2,700,000)[f]**	**NA**
Total cost over 20 years	**$10,863,043**	**$5,506,092**	**$5,356,951**
Cost per year for 20 years	**$543,152**	**$275,305**	**$267,847**

(Table notes on next page)

[a]The costs for telecommunication, salary, and savings from the contract tower program were discounted over 20 years.

[b]We revised FAA's telecommunication cost for the remote option upward by $852,776 to $1,470,824 to account for the costs that FAA omitted from its 1995 study.

[c]We used staffing levels that more closely approximate actual staffing levels in the Northwest Mountain Region. As a result, we used eight controllers and three technicians under the TRACAB option. We also used one Denver controller under the remote option.

[d]We believe $50,000 per move is reasonable because FAA now projects $56,200 as the average cost per move for its Northwest Mountain Region.

[e]Because we eliminated one technician under the TRACAB option, we reduced the cost of training by $23,900. FAA training academy officials told us that this is the cost for training one technician.

[f]We found that FAA's contract tower program is now projecting annual savings of about $255,000 per tower because the average personnel and benefits costs for FAA-operated level-1 towers have increased more rapidly than costs for contracted towers. As a result, we revised upward FAA's annual savings estimate attributable to the contract tower program by $50,000 and then adjusted this figure for inflation over the next 20 years to an estimated $3.1 million savings. We then revised downward the $3.1 million savings attributable to the contract tower program by $400,000 to account for the cost of relocating Grand Junction controllers who choose not to work for the contractor. FAA did not include the cost to relocate controllers to other facilities in its contract tower savings.

Major Contributors to This Report

Resources, Community, and Economic Development Division

Linda S. Garcia
Dana E. Greenberg
Robert E. Levin
Peter G. Maristch

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