W June 10, 1999

TO: R/Associate Administrator for Aero-Space Technology

FROM: W/Assistant Inspector General for Auditing

SUBJECT: Final Report on the Review of Advanced Air Transportation Technologies Project
Assignment Number A9902400 (P&A-98-009)
Report Number IG-99-030

The subject final report is provided for your use. Please refer to the Results in Brief for the overall review results. In response to the draft of this report, management provided minor editorial comments, which we incorporated as appropriate.

If you have questions concerning the report, please contact Ms. Karen VanSant, Program Director for Aero-Space Technology Audits, at (256) 544-1149, or Mr. William Falter, at (301) 286-3356. We appreciate the courtesies extended to the staff. See Appendix C for the report distribution.

[original signed by}
Russell A. Rau

Enclosure

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IG-99-030

REVIEW REPORT

ADVANCED AIR TRANSPORTATION TECHNOLOGIES PROJECT

JUNE 10, 1999

National Aeronautics and Space Administration

OFFICE OF INSPECTOR GENERAL

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Acronyms

AATT	Advanced Air Transportation Technologies
FAA	Federal Aviation Administration
RTCA	Radio Technical Commission for Aeronautics

NASA Office of Inspector General

IG-99-030 **June 10, 1999**
A9902400

Advanced Air Transportation Technologies Project

Introduction

The NASA Office of Inspector General completed a review of the Advanced Air Transportation Technologies (AATT) Project. The objectives of the review were to determine whether: (1) project objectives, milestones, and performance measures are being achieved; (2) the partner relationship with the Federal Aviation Administration (FAA) and industry is effective; and (3) Air Traffic Management research funds are being effectively used.

To satisfy our objectives, we reviewed project plans, milestones, and monthly reports; interviewed management, AATT project staff, NASA Headquarters personnel, and the Director of the FAA Research and Development Office at Ames; reviewed contractor documentation; and attended an Interagency Integrated Product Team (Product Team)[1] Technical Interchange meeting and an Interagency Management Team meeting. We performed field work from September 30, 1998, to March 19, 1999.

Results in Brief

The AATT Project is fulfilling the project objectives and meeting the project milestones as of March 19, 1999. The AATT Project performance is measured by whether the decision support tools being tested increase aviation throughput capacity and whether the project meets its milestones. Three of the project's decision support tools are being deployed by the FAA during the Free Flight Phase I Project. Project milestones for 1997 and 1998 have been met in a timely manner. NASA has a good partner relationship with FAA, due to the formation of the Product Team, and with industry as evidenced by the work of the Product Team, the Interagency Integrated Management Team, and the Air Traffic Management Executive Steering Committee. The Air Traffic Management research funds are effectively used as evidenced by the findings of

[1] The FAA and NASA established the Product Team to strategically manage the research and development efforts under the Memorandum of Understanding on Airspace System User Operational Flexibility and Productivity to meet free flight technology needs and to provide new capabilities by the year 2005. The Product Team consists of an Interagency Integrated Management Team and six Area Work Teams. The projects in the plan are worked cooperatively with NASA, FAA, the MITRE Corporation, Massachusetts Institute of Technology/Lincoln Laboratory and the Volpe National Transportation Systems Center.

the Product Team, the Air Traffic Management Executive Steering Committee,[2] and the FAA/NASA Executive Board,[3] benefit studies on AATT efforts, and a review of the NASA Research Announcement Contracts.

Background

The AATT Project is one element of the Aviation System Capacity Program managed by the Office of Aero-Space Technology at the NASA Ames Research Center. The goal of the Program is to develop high-payoff technologies in cooperation with the FAA and the U.S. aeronautics industry. These technologies should benefit the civil aviation industry and the flying public by increasing the capacity of the airspace system, increasing safety, reducing civil aircraft impact on the environment, and ensuring that new technology development is compatible with those primary objectives.

The primary objective of the AATT Project is to fully explore the possibilities of the "Free Flight" concept.[4] AATT products will enable substantial increases in the effectiveness of national and global air transportation systems. These increases will be achieved by developing and testing automation aids that can assist in the decision-making process among air traffic controllers, pilots, and airlines' flight dispatchers.

The AATT Project is responsible for defining, exploring, and developing advanced air traffic system concepts to a level suitable for pre-production prototype assessment by the FAA which, if successful, will result in full-scale deployment by the FAA. These decision support tools will allow all airspace users to choose the best flight path for their own purposes within the constraints of safety and the needs of other users. To do this, several goals must be met: allow users to minimize operating costs by making trade-offs between time and routing; improve the effectiveness of high-density operations on the ground and in the air; enable safe operation in a smooth and efficient manner across boundaries of free flight and capacity-constrained flight regions; provide system improvements that are easily deployable worldwide; and improve the ability to simulate advanced capabilities in the airspace system.

Project Objectives and Milestones Are Being Achieved

The AATT Project within the Aviation System Capacity Program consists of six subelements (see Appendix A). Each subelement manager has responsibility for a series of critical milestones that must be met for the project to achieve its objectives. The subelement managers monitor these

[2] The Air Traffic Management Executive Steering Committee is a subcommittee of the Aeronautics and Space Transportation Technology Advisory Committee, a standing committee of the NASA Advisory Council. The Steering Committee is chartered to provide advice and recommendations to the Technology Advisory Committee on NASA activities in air traffic management and related research and technology.

[3] The FAA/NASA Executive Board is responsible for the executive direction and oversight of the FAA and NASA joint aviation and commercial space transportation research and development efforts.

[4] Free Flight is intended to be a safe and efficient flight operating capability under Instrument Flight Rules in which the operators have the freedom to select their own path and speed in real time. Air traffic restrictions are imposed only to ensure aircraft separation, to preclude exceeding airport capacity, to prevent unauthorized flight through special use airspace, and to ensure flight safety.

milestones and provide comprehensive, monthly status reports to the Project Manager. The status reports address both the cost and technical aspects of the respective subelements. The funding profile for the various subelements within the AATT Project is in Appendix B.

We reviewed the Air Traffic Management Concept Definition and the Terminal/Surface Systems and Operations subelements to determine whether project objectives are being achieved. This review consisted of discussions with appropriate subelement managers as well as an analysis of the respective monthly status reports and supporting documentation. In each instance, the subelement was consistently within targeted deadlines for achieving its milestones in support of the overall project objectives.

Also supporting the AATT objective is the deployment of three decision support tools by the FAA during Free Flight Phase I: Traffic Management Advisor, Surface Movement Advisor, and Passive Final Approach Spacing Tool. Both NASA and FAA have expended considerable efforts to ensure the success of these tools. Because the technology is so complicated, the transfer of these tools cannot be accomplished successfully without NASA's assistance. NASA has agreed to assist the FAA with the transition. We want to emphasize the importance of NASA assisting the FAA to ensure the decision support tools are successfully deployed. To ease the transition, NASA is developing a technology transfer plan that will provide for coordination with the FAA and will be consistent with the FAA technology transfer plan.

Partner Relationship with FAA and Industry

The partner relationship with the FAA and industry is effective. We based our conclusion on discussions with NASA and FAA personnel, observation of two Product Team meetings, and review of the activities of the Air Traffic Management Executive Steering Committee.

The AATT Project, as part of the Aviation System Capacity Program, contributes to the Aero-Space Technology Enterprise Goal of tripling the aviation system throughput within 10 years, while maintaining safety in all weather conditions. Both NASA and FAA support the national safety goal to reduce the fatal aviation accident rate by 80 percent in 10 years. While both agencies share a common mission and some aviation safety and air traffic management goals, each has its own research roles. FAA's research is generally short-term and intended to refine existing technology, systems, designs, and procedures that directly support its operational and regulatory responsibilities. NASA primarily conducts basic scientific research that is focused, long-term research and development in aeronautics and related technologies.

On November 17 and 18, 1998, we attended a Product Team Technical Interchange and an Integrated Management Team meeting, respectively. Personnel from NASA, FAA, the MITRE Corporation, Massachusetts Institute of Technology/Lincoln Laboratory, and Volpe National Transportation Systems Center normally attend the meetings. The meetings are a good forum to exchange and understand information about each organization’s progress. The exchange of information through presentations and questions is useful for all the attendees. We believe the meetings provide evidence that NASA coordinates and cooperates with its partners.

Through the Air Traffic Management Executive Steering Committee, NASA has a positive relationship with the people who operate and build aircraft and aircraft systems. The committee consists of personnel from FAA, NASA, Department of Defense, airframe manufacturers, airline associations, and other industry personnel. The AATT Project reports to the Steering Committee at least twice a year and receives recommendations for the AATT Project after each meeting. While the AATT Project is not required to implement the recommendations, it considers them and reports on the status of the recommendations at the next committee meeting. The AATT provides an explanation for all recommendations that are not implemented. At the last meeting, the committee was complimentary of the AATT Project. Committee members stated that they were "pleased to see the passion and ownership of the AATT Project and encourage NASA managers to keep up the enthusiasm. We are counting on them."

The AATT Project personnel and the Director of the FAA Research and Development Office at NASA Ames Research Center stated that the FAA and NASA have a good working relationship. The Product Team has been effective in coordinating the research for the two agencies and for the individual area work teams for each element.

Research Funds Effectively Used

NASA Air Traffic Management research funds appear to be effectively used. Our conclusion is supported by the findings of the committees to which the AATT Project reports progress, benefit studies on AATT technologies, and a review of the NASA Research Announcement Contracts.

The research focus of the AATT Project is affected both directly and indirectly by the Radio Technical Commission for Aeronautics (RTCA), Product Team, Air Traffic Management Executive Steering Committee, and the Goals Division recently formed by the Associate Administrator of Aero-Space Technology. The RTCA is a not-for-profit industry advisory corporation that functions as a Federal Advisory Committee and develops consensus-based recommendations on contemporary aviation issues. The RTCA, like the Executive Steering Committee, helps direct NASA towards the research needed by the aviation industry. The Director of the NASA Ames Research Center is a member of the RTCA Free Flight Committee, and the Aviation System Capacity Program Director is a member of the Steering Committee and the RTCA Program Management Committee. As committee members, these individuals gain insight into the type of aviation research that industry intends to develop. The committee members then incorporate that information into NASA research projects.

The Product Team is responsible for the strategic management of joint Air Traffic Management research and development efforts associated with the integrated plan. The plan identifies resources and responsibilities of each agency by project. The projects in the plan are intended to produce air traffic control decision support tools. Benefit studies are performed on all decision support tools in an attempt to quantify capacity, flexibility, and safety impacts on the National Airspace System. All the AATT Project research is included in the Product Team integrated plan. Furthermore, the FAA/NASA Executive Board meets twice a year and has oversight responsibilities of the Integrated Product Team activities. The Product Team periodically briefs the FAA/NASA Executive Board on the status of its activities.

In November 1998, the Office of Aero-Space Technology established a Goals Division. The roles and responsibilities of this division are to perform strategic planning, investment planning, outreach to industry, and advocacy. The Goals Division will also be working with FAA and industry to determine the focus of future aviation research.

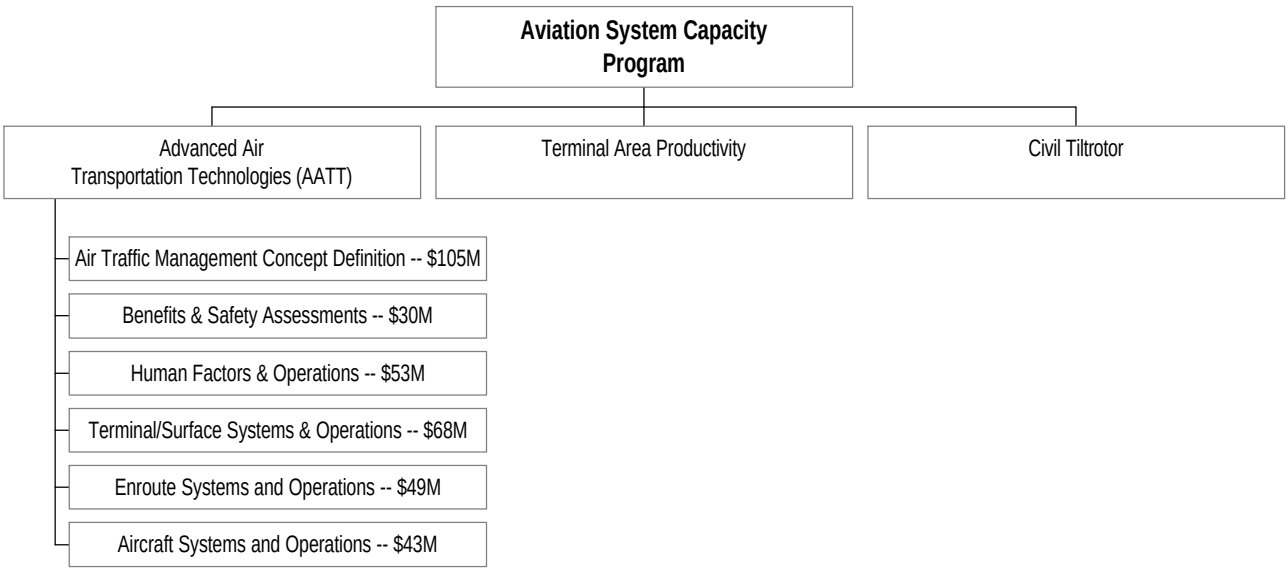
Our review of NASA Research Announcements showed no technical problems, and AATT personnel stated that all contractors have completed their respective tasks on time and with acceptable quality.

Summary

The AATT Project consistently achieved its milestones in support of the overall project objective as of March 19, 1999. Supporting AATT's objective is the deployment of three decision support tools by FAA that were developed by both NASA and the FAA. NASA has a positive relationship with FAA and industry due to the Interagency Integrated Product Team, the Executive Steering Committee, and the FAA/NASA Executive Board. These associations are also responsible for the project funds being utilized effectively. FAA, NASA, and industry are cooperating to make this a successful project.

Appendix A. AATT Organization Structure

The chart below shows the AATT Project within the Aviation System Capacity Program and identifies each of the six subelements of the project and the approximate funds associated with each of the subelements, estimated over the life of the Project (1996 through 2004).



Appendix B. AATT Funding Profile

The table below shows the funding of the AATT Project. Figures for fiscal years 1996 through 1998 are actual dollars (expressed in thousands), and fiscal years 1999 through 2004 are projected amounts.

Subelements	FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	TOTAL
Concept Definition	$7,327	$2,730	$4,710	$7,850	$8,885	$11,505	$16,424	$25,750	$20,149	$105,330
Benefits & Safety Assessments	3,000	1,585	3,745	3,800	4,170	4,330	4,320	3,815	1,365	30,130
Human Factors & Operations	1,800	2,350	3,460	4,300	6,295	7,785	11,735	9,515	6,625	53,865
Terminal/Surface Systems & Operations	2,900	4,125	7,038	6,440	7,750	8,335	12,320	10,665	8,870	68,443
Enroute Systems & Operations	73	3,060	4,465	3,760	4,465	7,400	10,015	8,295	7,585	49,118
Aircraft Systems & Operations	800	1,850	2,440	2,500	6,660	8,515	13,670	4,294	2,740	43,469
Research Subtotal	15,900	15,700	25,858	28,650	38,225	47,870	68,484	62,334	47,334	350,355
Institutional Support	0	0	0	2,500	2,000	3,080	4,260	4,460	1,010	17,310
Program Support	0	300	4,142	3,850	4,775	4,850	4,856	4,806	4,756	32,335
Total	**$15,900**	**$16,000**	**$30,000**	**$35,000**	**$45,000**	**$55,800**	**$77,600**	**$71,600**	**$53,100**	**$400,000**

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Professional Assistant, Senate Subcommittee on Science, Technology, and Space
Inspector General, U. S. Department of Transportation

Appendix C

Chairman and Ranking Minority Member – Congressional Committees and Subcommittees

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Senate Subcommittee on VA, HUD, and Independent Agencies
Senate Committee on Commerce, Science and Transportation
Senate Subcommittee on Science, Technology, and Space
Senate Committee on Governmental Affairs
House Committee on Appropriations
House Subcommittee on VA, HUD, and Independent Agencies
House Committee on Government Reform and Oversight
House Subcommittee on National Security, Veterans Affairs, and International Relations
House Committee on Science
House Subcommittee on Space and Aeronautics

Congressional Member

Honorable Pete Sessions, U.S. House of Representatives

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