

**Research, Engineering and Development (R,E&D) Advisory Committee
Holiday Inn Rosslyn Westpark Hotel
1900 North Fort Myer Drive, Arlington, VA 22209**

September 12-13, 2000

On September 12 and 13, 2000, the Federal Aviation Administration (FAA) Research, Engineering and Development (R,E&D) Advisory Committee (REDAC) held a meeting at the Holiday Inn Rosslyn Westpark Hotel in Arlington, Virginia. Attachments 1 and 2 provide the meeting agenda and meeting attendance, respectively.

Tuesday, September 12

Welcome and Introductory Remarks

Dr. Herman Rediess, Executive Director and Designated Federal Official of the Committee, read the public meeting announcement.

Mr. Robert Doll, Chairman of the Committee, welcomed members and visitors. Mr. Doll noted that the Strategic Planning briefing, which appeared on the agenda at 10 a.m., would be rescheduled for Wednesday's session.

Mr. Doll introduced Mr. Steve Zaidman, FAA Associate Administrator for Research and Acquisitions. Mr. Zaidman provided the Committee with an update on recent developments related to the FAA's budget hearings and a status report on several major aviation programs.

Most of the aviation-related congressional hearings in the next month will focus on industry and passenger satisfaction including a review of the status of air traffic service during the past year and the passenger Bill-of-Rights. Because this is an election year, most people expect a continuing resolution rather than an early conference decision on the fiscal year (FY) 2001 budget. The FAA Administrator expects a report in early January 2001 from the Global Positioning System/Wide Area Augmentation System (GPS/WAAS) Independent Review Board for the Institute of Defense Analysis. The Senate recently confirmed seven members of the FAA Management Advisory Council. The agency also hired an executive search firm to find a new Chief Operating Officer (COO), and with the help of the Management Council, the Administrator hopes to have the COO in place within the next year.

Meeting Process and Objectives

Dr. Herman Rediess introduced his Deputy Director of Aviation Research Ms. Mary Powers-King, noting that she will have future interaction with the REDAC.

Dr. Rediess provided a review of the meeting objectives. One of the primary objectives of the meeting was to develop Committee guidance for FAA's FY 2003 R&D program including hearing reports from the six standing subcommittees in the areas of air traffic services, airports,

aircraft safety, security, human factors, and environment and energy. In addition, the Committee would hear reports from its two ad hoc subcommittees: the Small Aircraft Transportation System (SATS) Subcommittee and the Tiltrotor and Advanced Rotorcraft Subcommittee. Finally, there would be a status report on the joint subcommittee known as the Federal Transportation Advisory Group (FTAG) co-sponsored by REDAC and the NASA Aero Space Technology Advisory Committee (ASTAC) to develop the "Transportation System After Next".

Dr. Rediess provided an R&D budget update, which included a historical FAA R&D funding, a synopsis of the FY 2001 R&D budget and its progress through the House and Senate, and a review of the FY 2002 R&D budget proposal.

Dr. Rediess reviewed the FY 2003 budget process, which involves the REDAC providing guidance in September 2000 and a final review in April 2001. During the February timeframe, the REDAC standing subcommittees review the FAA's proposed budgets in their respective areas of air traffic services, airports, aircraft safety, security, human factors, and environment and energy. The subcommittee chairs then report their findings to the REDAC at the Committee's April 2001 meeting.

R&D Strategic Planning and R&D Process Update

This presentation was postponed until Wednesday, September 13.

BREAK

Subcommittee on Tiltrotor and Advanced Rotorcraft Technology in the NAS

The Subcommittee on Tiltrotor and Advanced Rotorcraft Technology in the National Airspace System (NAS) is an ad hoc subcommittee that was initiated by the Committee on April 8, 1997, for two years as the Subcommittee on General Aviation and Vertical Flight. On January 21, 1999, the Committee voted to extend the subcommittee's terms of reference for two years. On April 12, 2000, the Committee approved the current name of the subcommittee and a revised terms of reference to reflect its new focus. Currently, Mr. John Olcott and Mr. John Zugschwert, a former REDAC member, co-chair the subcommittee.

The objective of the subcommittee is to determine the research activities and criteria necessary to establish the means of exploiting the combination of Global Positioning System (GPS), tiltrotor and advanced vertical flight technology to serve the air traveling public and air commerce. The subcommittee will address issues in the areas of safety, performance and technology.

Mr. Zugschwert and the subcommittee's working group leaders Dr. John Leverton, Mr. Robert Wilkens, Mr. Charles Stancil and Mr. Ron Reber presented the Subcommittee's report. Mr. Zugschwert requested the Committee's review and comment so that the Subcommittee could incorporate these into their final report, which he plans to present for Committee vote at the April 2001 REDAC meeting. Attachment 3 provides the Committee's comments.

Subcommittee on the Small Aircraft Transportation System (SATS)

On September 14, 1999, the Committee initiated a working group to examine the National Aeronautics and Space Administration (NASA) SATS program and recommend whether the REDAC should form an ad hoc SATS Subcommittee to study the program in-depth. Upon recommendation by the working group, the Committee voted on April 12, 2000, to approve the terms of reference to form an ad hoc Subcommittee on SATS as a joint subcommittee with the NASA Aero-Space Technology Advisory Council (ASTAC). Its purpose is to review the NASA SATS program in-depth and monitor FAA, NASA, and National Research Council (NRC) activities through April 2001. Mr. Paul Fiduccia of the REDAC and Capt. Robert Buley of the ASTAC co-chair the Subcommittee.

Mr. Fiduccia presented a change to the Subcommittee's terms of reference for vote by the Committee. Specifically, an eighth issue was added at the top of the previous seven issues, that is, it forms a new issue number one. Also, the word "environment" was removed from the previously numbered issue six, newly numbered issue seven. This is because environment is now included in the newly added issue one. The new issue number one reads as follows:

1. The value of SATS to the nation, by improving transportation system safety, capacity and efficiency and considering the political, operational, economic, environmental, technical, and social impacts of SATS.

Mr. Fiduccia presented the Subcommittee's report and recommendations for the Committee's review and approval. Mr. Doll delayed the vote on the recommendations and terms of reference until Wednesday, September 13, in order to allow members to review them overnight. Attachment 4 provides the recommendations from the Subcommittee on SATS.

LUNCH

Aerospace Transportation System After Next Transportation Vision 2050

Dr. Rediess and Dr. Fenton Carey presented an update on the Aerospace Transportation System After Next and introduced the Transportation Vision 2050 effort.

On April 12, 2000, at the joint meeting of the FAA REDAC and NASA ASTAC, the committees voted to approve the formation of a joint working group with the objective of developing a vision for the Aerospace Transportation System After Next to address the 2020 to 2050 timeframe.

Dr. Rediess presented the proposal to the Department of Transportation's (DOT) Research and Technology Coordinating Council (RTCC), which is responsible for coordinating multi-modal transportation research. At that time, Dr. Fenton Carey was the head of RTCC and was in favor of a vision that emphasized transportation solutions, not just aviation solutions. Dr. Carey took the plan to the National Science and Technology Council's (NSTC) Subcommittee on Transportation, which was chaired by Mr. Mort Downey, the Deputy Secretary of

Transportation. After review, the NSTC Subcommittee on Transportation agreed that the plan should emphasize the transportation system. This led to the formation of a “Transportation Vision 2050” Interagency Working Group (IWG) under the NSTC Subcommittee on Transportation. The IWG involves Federal government executives from all modes of DOT; NASA; the Departments of Defense, Commerce, Justice, Treasury, Energy, and Health and Human Services; the Office of Management and Budget (OMB); and the White House Office of Science and Technology Policy (OSTP). This group of Federal executives will work together to jointly develop the transportation vision. Dr. Fenton Carey and Dr. Oliver McGee from DOT head the group.

The non-Federal government transportation stakeholders are organized as an advisory committee working group under joint REDAC and ASTAC sponsorship as an expansion of the group formed around the Aerospace Transportation System After Next. The group is known as the Federal Transportation Advisory Group (FTAG) and is composed of representatives of air, sea, land, and multi-modal transportation stakeholders.

The FTAG plans to meet four times: first, in September following the Futurist Conference in Seattle, Washington; second, in October following the Secretary of Transportation’s International Transportation Symposium in Washington, DC; third, in December following a Concepts Workshop in Memphis, Tennessee; and fourth, in January 2001 at the Transportation Research Board’s annual meeting in Washington, DC. The effort will yield two products: first, a white paper in November that briefly describes the vision; and second, a vision document in January describing the vision in more depth.

Standing Subcommittee Reports

Each year in September, the Committee provides guidance on how FAA should invest its R&D funds. This year’s guidance applies to FY 2003 R&D investments. FAA uses these recommendations to prepare its investment portfolios, which are presented to the standing subcommittees in the February timeframe and the REDAC at its April meeting.

Each standing subcommittee chair presented guidance on behalf of his/her subcommittee. Attachment 5 provides these reports. The presentations included the following:

Aircraft Safety	Dr. Lou Mancini
Air Traffic Services	Mr. Paul Drouilhet
Airports	Ms. Angela Gittens
Security	Mr. Viggo Butler
Human Factors	Dr. Debbie Boehm-Davis
Environment and Energy	Mr. Jim DeLong

Wednesday, September 13

R&D Process Update

This presentation was rescheduled from Tuesday, September 12, to Wednesday, September 13. Mr. Randy Stevens presented the FY 2003 research and development (R&D) budget process including its participants, changes since last year, Congressional requirements, and process improvement areas. Changes in the process since last year will not impact the involvement of the Committee or its subcommittees. Their involvement remains the same as last year.

Mr. Stevens asked the REDAC to consider where the new PPT for Information Technology, which is focused on information security, should reside within the R&D structure. He explained that in this case information security applies to the integrity of databases and their protection. This activity was started from REDAC recommendations, but was moved into the F&E budget. Unfortunately, it has not grown there, and FAA believes it needs a new activity within the R,E&D budget.

Mr. Stevens said the REDAC is required, by public law, to review research from FAA's Regional Centers of Air Transportation Excellence (COE). He emphasized that members give special attention to the COEs during their subcommittee reviews. FAA will provide any needed information to members. A new General Aviation COE will be added this year. It will be managed by the Aircraft Safety organization (AAR-400) at the William J. Hughes Technical Center in Atlantic City, New Jersey, and will be put out for competitive bid.

Mr. Stevens asked members to provide him with specific recommendation for process improvement.

R&D Strategic Planning portion

This presentation was rescheduled from Tuesday, September 12, to Wednesday, September 13. Mr. Stevens presented a proposal for an R&D Strategic Plan. The plan would fill the gap between current research and the 2025 timeframe with short-term (3-5 year) and longer-term (6-15 year) needs. The Vision After Next effort would address needs beyond 2025. FAA requires REDAC participation.

After Committee deliberations, FAA agreed to provide a brief statement about what specifically it was asking the Committee to do. FAA will distribute this to members in November.

Committee Discussion

The Committee discussed process improvements. Topics included the need for FAA to identify specific issues for REDAC to address and provide these issues to members before meetings to produce more efficient use of the Committee. Also, the Committee should define a template of the minimum set of information to be presented by FAA at meetings. In addition, some members suggested that the full Committee focus on looking across the six research investment areas to identify priorities and suggest reallocation. There was not agreement on this proposal,

as the Committee found it difficult to implement this approach in the past. Additional discussion focused on the subcommittees. Subcommittees should focus on the details within their research area; however, they should clearly identify how the full Committee can help them. It would help if the subcommittees used a template when presenting reports to the full Committee. Also, a template may be useful for the subcommittees' review of the Centers of Excellence. Finally, there was a suggestion that subcommittee members remain for the full Committee discussion sessions.

BREAK

Committee Discussion (continued)

Subcommittee on SATS

Mr. Doll asked Mr. Fiduccia to present the SATS statements from Tuesday's meeting, for REDAC approval. Mr. Fiduccia presented changes to the SATS terms of reference and the SATS recommendations for Committee vote. The Committee voted to approve the changes to the terms of reference and also voted to approve the recommendations of the SATS Subcommittee and have Mr. Doll forward these recommendations to the FAA Administrator on behalf of the Committee.

Information Technology Placement Issue

Mr. Doll asked how the Information Technology PPT should be absorbed into the Committee. He polled members. After much discussion and varied opinions, Mr. Doll said this issue could be tabled until the April meeting, because no decision was necessary until after the budget formulation in November.

Subcommittee on Tiltrotor and Advanced Rotorcraft Technology in the NAS

Mr. Doll polled members for their statements and recommendations about Mr. John Zugschwert's Tiltrotor presentation. Attachment 5 provides these comments.

Future Committee Activity

Mr. Doll announced the FY 2001 REDAC meeting schedule. There will be two meetings: April 17-18, 2001, and September 11-12, 2001. Mr. Doll adjourned the meeting at 12:10 p.m.

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Research, Engineering & Development (R,E&D) Advisory Committee
 Holiday Inn Rosslyn Westpark Hotel
 1900 North Fort Myer Drive, Arlington, VA 22209
 (703) 807-2000 Fax: (703) 522-7480

September 12-13, 2000

Agenda

Tuesday, September 12

9:00 am - 9:30 am	Welcome and Introductory Remarks	Mr. Robert Doll, Chairman Mr. Steve Zaidman, FAA Dr. Herman Rediess, FAA
9:30 am – 10:00 am	Meeting Objectives Update on R&D Investments Response to Recommendations	Dr. Herman Rediess, FAA
10:00 am – 10:30 am	R&D Strategic Planning R&D Process Update	Mr. Hugh McLaurin, FAA
10:30 am	BREAK	
10:45 am – 11:45 pm	Tiltrotor & Advanced Rotorcraft Technology in the NAS – Draft Report Discussion	Mr. John Zugschwert Mr. Robert Wilkens Mr. Ron Reber Dr. John Leverton Mr. Charles Stancil
11:45 pm – 12:15 pm	Update Ad Hoc Subcommittee Small Aircraft Transportation System (SATS)	Mr. Paul Fiduccia
12:15 pm	LUNCH	
1:15 pm – 2:00 pm	Update on Aerospace Transportation System After Next Transportation Vision 2050	Dr. Herman Rediess, FAA Dr. Fenton Carey, FAA
	<u>Subcommittee Reports</u>	Subcommittee Chairs
2:00 pm - 2:30 pm	Subcmte. on ATS	Mr. Paul Drouilhet
2:30 pm - 3:00 pm	Subcmte. on Airports	Ms. Angela Gittens
3:00 pm - 3:30 pm	Subcmte. on Aircraft Safety	Dr. Louis Mancini
3:30 pm - 4:00 pm	Subcmte. on Security	Mr. Viggo Butler
4:00 pm - 4:30 pm	Subcmte. on Human Factors	Dr. Deborah Boehm-Davis
4:30 pm - 5:00 pm	Subcmte. on Env. & Energy	Mr. Jim DeLong

5:00 pm Adjourn

Wednesday, September 13

8:30 am	Convene Meeting	Mr. Robert Doll, Chairman Dr. Herman Rediess, FAA
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8:30 am - 10:30 am	Committee Discussion and Report on FY 2003 Guidance	Mr. Robert Doll, Chairman
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10:30 am – 10:45 am	BREAK	
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10:45 am- 12:00 noon	Future Committee Activity	Mr. Robert Doll, Chairman Dr. Herman Rediess, FAA
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12:00 noon	Adjourn	
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**Research, Engineering & Development (R, E&D) Advisory Committee
September 12-13, 2000**

Attendance

Members

Mr. Robert Doll, Chairman	Dr. Deborah Boehm-Davis	Mr. Viggo Butler
Mr. James DeLong	Mr. Paul Drouilhet	Capt. Chester Ekstrand
Dr. Wilson Felder	Mr. Paul Fiduccia	Ms. Angela Gittens
Dr. John Hansman	Dr. Joseph Jackson	Mr. John Kern
Dr. Louis Mancini	Mr. John O'Brien	Mr. John Olcott
Mr. Dennis Roberts		

Audience

Satish	Agrawal	FAA
Dave	Balderston	
Jeff	Breunig	Arthur Little
Fenton	Carey	FAA/NASA
Kenneth	Cobb	TRW
Don	Collier	ATA
Sharon	Darnell	FAA
Denise	Davis	FAA
Gloria	Dunderman	CSSI
Virginia	Embrey-Brock	FAA
Rhett	Flater	AHS
Tony	Freck	GE Aircraft
Troy	Gaffey	Bell Helicopter
Mike	Gallivan	FAA
Edward	Gervais	Boeing
Peggy	Gilligan	FAA
Gregory	Gottlieb	Cargolifter, AG
George	Greene	FAA
Annie	Hall	SAMA
Hooper	Harris	FAA
Walter	Hett	WHA
Arnold	Holscher	DOT/OIG
Steve	James	British Embassy
Quinten	Johnson	FAA
Paul	Jones	FAA
Betty Ann	Kane	Betty Ann Kane & Co.
Dennis	Kershner	JHU/APL
Theresa	Kohler	OST, Budget
Peter	Kostiuk	LMI
Nancy	Lane	FAA
John	Leverton	AHS
Patrick	Lewis	FAA
Wesley	Link	MITRE/CAASD
Kolie	Lombard	FAA

George	Marania	FAA
Aston	McLaughlin	FAA
Geoff	Memford	American Psychological Assoc.
Calvin	Mitchell	FAA
Paul	Murphy	SETA
Keith	Murray	FAA - SETA
Thomas	O'Brien	FAA
Lee	Olson	FAA
Lynne	O'Rourke	FAA
Allan	Overbey	DOD
Rick	Page	FAA
Steve	Pansky	FAA
Cindy	Peak	ATCA
Mai	Peterson	SRI, Int'l
Jim	Poage	Volpe
Paul	Polski	FAA
Marshall	Potter	FAA
Mary	Powers-King	FAA
Tom	Proeschel	FAA
Ron	Reber	Bell Helicopter
Herm	Rediess	FAA *DFO
John	Rekstad	FAA
Mark	Rodgers	FAA
Marcie	Romagnoli	TRW
Chuck	Ruehle	FAA
John	Rybka	FAA
Bennie	Sanford	FAA
Carole	Schmidt	CSSI
Chris	Seher	FAA
David	Smith	FAA
Charles	Stancil	
Earl	Stein	FAA
Randy	Stevens	FAA
Nick	Stoer	
Tony	Vanchieri	FAA
Mike	Versage	FAA
Kenneth	Ward	FAA
Michael	Webb	FAA
William	Weiss	CSSI
Russ	Wertenberg	NASA
Howard	Wesoky	FAA
Jim	White	FAA
Eugene	Wilhelm	MITRE
Ryan	Wilkins	Boeing
Richard	Young	Avnet
Steve	Zaidman	FAA
John	Zugschwert	

Research, Engineering, and Development (R,E&D) Advisory Committee
Guidance for FY 2003
Research and Development Investments

September 12-13, 2000

1. Subcommittee on Air Traffic Services

Mr. Paul Drouilhet, Chairman

Subcommittee Meeting August 30-31

- Primary objective of meeting - Provide subcommittee guidance relative to building the FY2003 R&D portfolio
- Received briefings on:
 - Airport Surface Safety
 - Safe Flight 21
 - NASA SATS
 - Free Flight Phase 2
 - Aviation Weather Research
 - Wake Turbulence
 - R&D Linkage to NAS Architecture
 - Human Factors
 - System Capacity Initiatives
 - Flagship Initiatives
 - Aviation System After Next
 - R&D Budget Plans/Projections

Airport Surface Safety R&D

- Progress on ASDE-X, using:
 - Primary radar
 - Multilateration
 - ADS-B
- FAA plans to issue BAA, with substantial funding, to seek relevant new technologies
 - Subcommittee concerned that BAA will divert attention and resources from moving ahead with established technologies
- Subcommittee recommendation
 - Develop and execute implementation program based on established technologies
 - View BAA as supplement

Safe Flight 21

- Includes Capstone (AK) and Ohio River Valley initiatives
- Capstone
 - 12 ground stations
 - 40 single/twin engine aircraft in Part 135 service

- Technology demo - August 2000
 - Use of ADS-B for radar-like separation - January 2001
- Ohio River Valley - partnership with CAA
 - Op Eval 2 - Louisville, October 2000
 - Op Eval 3 - Memphis, May 2001
 - Agreed to focus on
 - Approach spacing
 - Runway and final approach occupancy awareness
- ADS-B link selection
 - On schedule for joint FAA/Eurocontrol decision by June 2001
- Modest FY01 and FY02 funding shortfalls

Small Aircraft Transportation System (SATS)

- As previously stated, strong FAA involvement is required in the operational, regulatory, and certification aspects of SATS
- FAA involvement will require NASA support
- There are budget uncertainties in both NASA and FAA
- NRC study in progress - recommendations will be key
- Separate report from SATS Subcommittee

Free Flight Phase 2

- Expanded AOZ role includes development and implementation of FFP2
 - AOZ must broaden its approach to effectively manage R&D activity
- Program appears to be emphasizing en route over terminal
 - Rationale not clear
- AOZ looking to users to establish priorities
- Weather is principal cause of delay - FFP2 DSTs must be enhanced to assist controllers in dealing with weather
- Subcommittee recommendations:
 - Maintain balance between terminal and en route
 - Emphasize mitigation of weather-induced perturbations

Weather

- Major capacity and safety issue
- Program emphasizes products related to
 - Icing
 - Turbulence
 - Ceiling and visibility
- The Subcommittee is pleased with the continuing success of the Aviation Weather Research program and encourages the FAA to fully support this work
 - Integrate emerging products with automation tools
 - Expedite making the products available to pilots, especially in flight

Wake Turbulence

- Wake turbulence is a major capacity-limiting factor
 - Potential for significant improvement
- FAA has established new initiative with strong program manager
- NASA program provided useful results, but terminated prematurely
- Funding uncertainties at both FAA and NASA
- Subcommittee recommendation:
 - Aggressive joint FAA/NASA program, with strong FAA involvement
 - Program should support near-term capacity initiatives such as at SFO, as well as longer-term work on direct vortex measurement and understanding of transport and decay mechanisms

Human Factors

- Primary emphasis on human factors aspects of specific projects
 - Matrixed support
 - Not all projects covered
- Subcommittee sees need for work on broader, more fundamental issues
 - Effects of stress with increased workload
 - Introducing new systems in heavily-loaded environment
 - Responsibility sharing between controller and pilot
 - Human as monitor of highly-automated systems

Aviation System Capacity

- There is no capacity plan or focal point
- Capacity work fragmented
 - System Capacity Office - ASC
 - FFP2
 - Other AUA activities
 - CAASD
 - NASA
- ASC facilitates short-term capacity enhancing initiatives at specific airports
 - Subcommittee endorses this important activity
 - However, it is not an R&D activity, and should not be managed or funded as such
- There needs to be more explicit attention to increasing capacity
 - Capacity roadmap
 - Relate to architecture

Flagship Initiatives

- Collection of unrelated R&D and implementation projects
- Appear to be response to question “What would you do if you had more money?”
- Requires more definition, prioritization before Subcommittee can make useful response
- As Subcommittee has commented in the past, the term “Flagship” seems inappropriate for such proposed efforts

RE&D Budget

- As in the past, the Subcommittee found it very difficult to understand the funding and resources associated with each area of research
 - Need better way to present the people (including CAASD) and dollars for each R&D project
- Although FAA has embraced the concept of “Spiral Development”, it frequently doesn’t appear to budget for the continuing R&D activities required after initial production and deployment

Advanced ATM Technologies

- Incremental enhancements of the current system will not meet future demand
 - A new approach to ATM will be required
- NASA has the lead, but a strong and continuing FAA involvement is required
 - NASA is currently framing AvSTAR program
 - Should learn from initial SF21 activities, and perhaps can use later phases of SF21 for operational testing of new concepts
- Transition will be a (if not the) core issue

2. Subcommittee on Airports

Ms. Angela Gittens, Chair

The Airports Subcommittee held a meeting on August 15, 2000 at the William J. Hughes Technical Center in Atlantic City to review progress on Airports Technology research projects and consider plans and priorities for FY 2003 research.

AIR 21 has several provisions that will impact Airport Technology Research in FY 00 and FY 01 including:

- Section 157 requires a report to Congress on use of recycled materials in pavement used for runways, taxiways, and aprons.
- Section 160 requires a report to Congress on evaluation of options for improving the quality of information available to FAA on airfield pavement condition.
- Section 743 requires a report to Congress on impact of alkali silica reactivity distress on airport runways and taxiways.
- Section 905 requires FAA to consider awards to nonprofit pavement research foundation to improve design, construction, rehabilitation and repair of ridged pavement. Both the House and Senate reports add \$2.0M for this work in FY 01.
- Section 906 requires a study in consultation with National Academy of Sciences and representatives of airports to evaluate the techniques used to fund research under the National Highway Cooperative Research Program and the National Transit Research Program and the applicability of these approaches to airport research.

Both the House and Senate have moved airport technology research from AIP in the President’s FY 01 budget request to F&E. They also both added \$2.0M to fund section 905 of AIR 21 for research to improve design, construction, and rehabilitation of pavement.

The anticipated expenditures by FAA in the Airport Technology area for FY 2003 represent an attempt to get the necessary airport related research that has been minimized and down played for the past five years or so, back on track. A number of issues need to be resolved in the near-term, that relate to airport safety and operations, that can have tremendous system impacts. FAA's Airport Master Planning guidance hasn't been updated since the mid-80's and the impacts of the modern widebody fleet and the coming larger aircraft need to be implemented into FAA Advisory Circulars. Airport Wildlife Abatement, Airport Visual Guidance, Improved Friction and Fire Fighting all require increased spending over the levels of the past few years in order to capture the technology gains that potentially promise overall system improvements.

The subcommittee was pleased with the quality of briefings received from the FAA project managers and engineers. Discussion among the subcommittee members indicated support for the ongoing research and agreement that significant increases are justified for FY 2003, particularly in the safety area. Increased funding is required to move research from the laboratory into demonstration of prototype systems.

Major increases are supported for

- wildlife hazard abatement to conduct research on radar detection and warning of bird hazards in the vicinity of airports
- visual guidance and runway safety to conduct prototype evaluation of the advanced taxiway guidance system
- ARFF to conduct research on firefighting for new large aircraft and new environmental friendly firefighting chemicals
- additional research in airport design and planning
- increases in research for pavement technology
- initiatives in airport lighting for airports using satellite approaches.

The subcommittee discussed the large increases requested for FY 03. While we support them we alert the FAA to mobilize effectively so that the output matches the level of support, particularly since some of the legislative mandates require contracting. There was, however, general support to continue to increase the level of funding for airport technology research and to move from incremental research spread out over many years to prototype demonstrations in order to make broader-reaching, more definitive advances. Specific prototypes in the advanced taxiway guidance system and the radar bird detection and alerting system are two projects, which can push our understanding. There was also continued support for operation of the pavement test facility to maximize our investment. In particular, we need to modify the test machine to have the capability to test 6 and 8 wheel landing gear configurations that may be part of planned aircraft designs from manufacturers. There was some concern that the aircraft manufacturers should pay for this research but there was also a recognition that these new aircraft would be landing at U.S. airports.

The Subcommittee recommends that FAA continue its vital program for research in airport technology and develop plans for FY 2003 at the \$19.8M level in the areas shown on the attached spread sheet.

Attachment 3

FY-00-03 Funding	Enacted FY00	President's FY01	Proposed FY02	Proposed FY03
<u>AIRPORT TECHNOLOGY R&D</u>		\$9.3 M	\$12.00 M	\$19.8M

<i>BY RPD TITLE</i>	(\$K)	(\$K)	(\$K)	(\$K)	RPD
Advanced Airport Pavement Designs	1,784	2,130		2,000	144
National Dynamic Airport Pavement Tests	640	1,150	1,250	2,750	138
Improved Paving Materials	50	75		900	136
Non-destructive Pavement Testing	50	75		480	143
Pavement Maintenance/construction				250	
AIR 21, section 905, Airfield pavement improvement	0	2,000		2,000	
Airport Planning and Design Technology	400	500	900	1,800	132
Airport Wildlife Hazard Abatement	500	500		1,800	150
Runway Visual Guidance	400	500		4,000	146
Improved Runway Friction	175	200		900	148
Rescue and Fire Fighting	200	250		1,000	152
Totals	4,199	7,380		17,880	
in- house	2,358	2,000		2,000	
Total	6,557	9,380	12,000	19,880	

3. Subcommittee on Aircraft Safety

Dr. Louis Mancini, Chairman

eSAS Update

Where are we with the SAS IPO?

- Excellent customer relations
- Good products in the current environment
- Ventured well--leveraging our capital with government, industry, academia
- Data-driven, repeatable portfolio development
- ...However, insufficient long-term products to insure continued economic viability

Purpose

- Present resource status and constraints
- Provide SAS program feedback
 - funding opportunities
 - recommendations for future direction
 - program enhancements
 - policy concerns

General Comments

- Aircraft Safety R&D is over-arching and at the very center of the FAA's research program
- There is close and growing connection in the program between researchers and customers for the research

In light of TWA 800 the aging nonstructural systems research program is timely and valid

Funding Opportunities

Two areas are especially noteworthy for additional funding consideration

- Fire Safety -- better acknowledgement of importance of this work and corresponding funding needs
 - explains recent accidents, e.g., TWA 800 and Swiss Air
 - develops more fire resistant materials
- Software/Digital Systems Research -- important area for proactive research
 - COTS
 - Object Oriented Technology
 - Old technology--fly-by-wire

Program Enhancements

Aging Non-structural Systems

- Wire safety research is good & well coordinated
- Ground-based fuel tank inerting research is solid
 - questions on cost and benefits

- Additional non-structural systems research needs better data and more analysis

Leveraging Our Work

- Share intellectual capital -- explore and exploit all means to leverage with other countries
 - FAA with other authorities such as JAA and TCCA
 - Industry with their overseas counterparts
 - Continue coordination and integration with NASA Aviation Safety Program

Future Direction

- Apply a data-driven approach to research
 - More realistic tools to support ATOS
 - Research must be driven by safety, not political priorities

Policy Recommendations

- Support basic research/forward thinking initiatives
 - 15% of portfolio about right for basic research initiatives
 - Current funding levels inadequate to achieve basic research goals
 - SAS embraces safety research program goals and accomplishments; current meager funding levels are scarcely adequate

eSAS: The Bottom Line

Our investment banker's advice:

- Excellent customer relations
- Ventured well--leveraging our capital with government, industry, academia
- Good products in the current environment
- Data-driven, repeatable portfolio development
- Look ahead 5-10 years for long-term products to ensure continued economic viability
- Higher initial public offering if we fill our last void: GA membership (we've recently resourced with an avionics member)

4. Subcommittee on Security

Mr. Viggo Butler, Chairman

Above Target Program (Full Flagship)

- Full Flagship Meets 2010 Requirements
- Meets Requirements - Based upon Realistic Assessments
 - Meets requirement for 100% Checked Baggage screening by technology to be initiated in 2008
 - Improves Checkpoint by 2010 for people and bags
 - Meets requirements for Argus (EDS-lite) deployment by June 2004
 - Meets research needs to build next generation systems

Flagship II buys us

- Full Argus (Higher Risk)
- Little Mid/Long term Research
- Increased Risk on Checkpoint
- Increased risk on non-detection of new and reduced size threats

Target Program (Base)

- Target Level does NOT meet requirements for 2010
- This cannot be met in the Straight-Line Budget
- Requirements are not met at the target level program
 - Lower quantity threats not detected with possible catastrophic possibilities.
 - Checkpoint development is on hold leaving more vulnerability.
 - No requirements are being done in Chem/Bio
 - Limited research initiatives for next generation aviation security

Answer to REDAC Concerns

1. In what areas should FAA invest its R,E,&D resources?
 - In any given year, there should be a mix of Detection/Protection.
 - Detection of threats at vector entry points - checked baggage, carry-on, and cargo
 - Protection - mitigation of effect of explosions, chemical attacks, etc.
2. In what areas is FAA not investing that it should be?
 - Mid term research for next generation
 - Revitalization of Laboratory and Infrastructure
 - Hazardous cargo detection
3. In what areas is FAA investing that it should *not* be?
4. What should be the priorities among the areas where FAA should be investing?

Committee will evaluate priorities based on outcome of Argus program development

5. Subcommittee on Human Factors

Dr. Deborah Boehm-Davis, Chair

In what areas is FAA not investing that it should be? “Over the horizon” problems

Addressing Future Needs

- Set aside a fixed portion of the budget (e.g., 5%) for addressing anticipated future problems
- Identification of these future problems should be driven by AAR, in conjunction with
 - Internal sponsors
 - External organizations
 - Industry
 - REDAC

In what areas is FAA investing that it should not be?

- Within areas they are investing in, focus is on the right issues overall

- Quality of execution varies

What should be the priorities among the areas where FAA should be investing?

- Increased focus on “over the horizon” issues
- Increased funding of work not being done elsewhere
- Funding should not be based on “historical” allocations of funding

Summary

- Need to invest more heavily in future problems
- Need to evaluate quality of ongoing problems and make adjustments
- Need to expand priority-setting to include input from a wider variety of sources

6. Subcommittee on Environment and Energy

Mr. Jim DeLong, Chairman

Questions for September Subcommittee/Committee Guidance

Q: In what areas should FAA invest its R,E&D resources?

A: Assessing aviation’s environmental compatibility and proposing mitigation measures.

Q: In what areas is FAA not investing that it should be?

A: Assessing aviation’s environmental compatibility and proposing mitigation measures.

Q: In what areas is FAA investing that it should not be?

A: N/A

Q: What should be the priorities among the areas where FAA should be investing?

A: Environmental compatibility must become a higher priority, it is a critical aspect of NAS efficiency.

Subcommittee Recommendation

The Subcommittee proposed that FAA budget for and manage a study by either the National Research Council Transportation Research Board, an appropriately informed university, DOT Inspector General, or GAO to accomplish the following:

1. Assess the validity and timetables for prior noise and emissions technology goals established by NASA or the National Science & Technology Council and adopted by the FAA.
2. Establish what is currently being done by all interested parties (e.g., FAA, NASA, academia, aircraft and engine manufacturers, air carriers, airport authorities) to facilitate accomplishment of these goals.
3. Assess whether or not these initiatives will result in achievement of the goals per the indicated timetables.
4. If these efforts are failing to collectively achieve the goals, recommend plans that better promise success, including organizational responsibility, budgets and schedules.

Estimated cost: \$500,000

FAA System-Wide Environmental Performance Models

Noise

- *Integrated Noise Model (INM)*: Assesses the impacts of aircraft noise on airport communities.
- *Noise Impact Routing System (NIRS)*: Assesses noise exposure effects of air traffic operations, including large scale multi-airport airspace redesigns.
- *Model for Assessing Global Exposure to the Noise of Transport Aircraft (MAGENTA)*: Estimates worldwide population exposure to aircraft noise.

Emissions

- *Emissions and Dispersion Modeling System (EDMS)*: Required model for analyzing local air quality impacts of proposed FAA actions (e.g., new or expanded runways or terminals, op spec approvals).
- *System for assessing Aviation's Global Emissions (SAGE)*: In early planning stages to estimate and evaluate global aircraft emissions for all phases of flight (LTO cycle and cruise).

All require considerable further development!!!!!!

Models for Evaluating the ATM Environmental Impact FAA/EUROCONTROL COOPERATIVE R&D

Objectives

- To provide data, analytical tools, models and validated best practices in the field of ATM-related environmental impact, including local air quality, global emissions and noise.
- To build upon the ongoing efforts within Europe and the U.S. to improve current computer analytical techniques for studying the impact of aircraft noise and gaseous emissions both locally and globally.
- To start work on next generation methods based on new technologies to provide improved accuracy and reliability.
- To support and take the lead in providing resources to and managing international projects within the framework of the International Civil Aviation Organisation Committee on Aviation Environmental Protection (ICAO-CAEP).

Where are we?

- Air traffic rapidly increasing
- Environmental concerns similarly increasing
 - EPA
 - Local authorities
 - NGO's
 - International authorities
 - Federal investment in aeronautical R&D decreasing

Recommendations from the
Subcommittee on Small Aircraft Transportation System (SATS) of the
Research, Engineering and Development (R,E&D) Advisory Committee
As approved by the Committee

September 13, 2000

1. The four elements planned for SATSLab have the potential to produce substantial benefits for the national air transportation system, including increased access to more communities, and safety, capacity and efficiency benefits for the entire National Airspace System (NAS).

The four SATSLab Proof of Concept elements are:

- Higher volume operations at non-towered, non-radar airports
 - VFR-like access to most landing facilities in near-all-weather conditions
 - Reduced flight technical error
 - Enhanced en route operations and system capacity
2. NAS modernization programs, including Free Flight, would be enhanced with additional FAA engagement in SATS.
 3. This requires selectively applied FAA resource commitments, focused on SATS planning activities in fiscal year (FY) 2001.
 4. The personnel assigned must be sufficiently capable of representing FAA requirements for aircraft certification, flight standards operational approvals, capacity, airports, environment, air traffic, etc.
 5. NASA must structure its SATS activities to efficiently utilize these FAA resources.

Informal Comments on the Report of the
Subcommittee Tiltrotor and Advanced Rotocraft Technology in the NAS
from the Members of the Research, Engineering and Development Advisory Committee

September 13, 2000

1. The report did not give answers on the overall economic impact to the overall transportation system—the cost side—or the marketability side. What markets will it serve? It must have commercial viability; we need to see a business plan. It hasn't worked in the past; what will make it work now? However, having a safe, comfortable vehicle to cut transport time might be commercially viable.
2. We didn't get a good answer to the issue of public acceptance. The concept seems to go against the trend, not toward a trend; that needs to be addressed for both helicopters and tiltrotor. The approach is focused on the relatively short haul, for example, the Boston to New York market, not using 767-type resources to address congestion problems—by off-loading relatively short-haul runs. The hypothesis is that an environmentally and economically acceptable vehicle is here, for passengers. There is no evidence for this assumption; the subcommittee needs to bring evidence to the table. There is as much evidence as in the case of SATS vehicles. As in the SATS case, it is the chicken and egg thing; you need an environment to try it.
3. Over time, the main benefit is change—corporate-to-corporate location, to off-loading—essentially taking turboprop off the runways at LaGuardia, Logan, and National and having tiltrotors operating from airport ramps. This will open up capacity on runways for larger aircraft. That is attractive, from a capacity standpoint. The chicken and egg problem is that there is no way they can prove the commercial viability of this without essentially [dealing] with these things that are in the operational considerations document, under requirements. They can't show that it works because, with a propeller, it will have more vibration than something without [one], but if you can get from Gaithersburg to downtown Manhattan in one hour instead of three, a lot of people will choose a little vibration.
4. They cannot prove it out until they make it work in the IFR system. Maybe we should recommend they come back with an operational evaluation, along the lines of SATS; they need to prove this thing commercially, so that the FAA will be willing to do all the things in their numerous DRs. Maybe that's the next step. We need a more specific plan for the next step, for the full committee to act, as in the case of SATS.
5. They made a strong plea for a NAS system that includes vertical flight aircraft as fully integrated users. We are not ready to embrace that goal. There are not enough resources, collectively, to deal with the immediate needs of the NAS. Integrating their needs does not seem realistic, at this point in time. They have a burden: they have yet to identify obstacles to their participation in the NAS. We need that, and then, we can deal with it. Right now, we cannot embrace the need to fully integrate them.

Although if we could separate 40% of aircraft onto the apron or other location, such as, a heliport between Philadelphia and New York, it would instantaneously free up capacity for larger aircraft. We need to accelerate this, otherwise, the airports will go down for the third time. However, the subcommittee has not proven the viability so that we can devote resources to helping them solve problems related to their aircraft. That's the case they have to make.

6. I would hope the military experience with the Osprey—parallel with 707—after military testing, commercial application came shortly thereafter. Even though the military makes tremendous use of vertical flight, now, it has never become [a mode] of mass transportation vehicle.
7. The economics of rotorcraft have never panned out. FAA spent much time creating R-NAV routes along the East Coast, supporting operations out of Philadelphia, New York, and Dulles. Ultimately, the economics never worked. We've all heard similar briefings for 20 years. If they found a new niche, it might work, economically. We need to hear that. The only thing they asked FAA for yesterday was—they said there is a lack of rotorcraft-specific TERPS and a policy decision that rotorcraft would be treated equally as fixed-wing aircraft. The fact that there are more IFR-capable helicopters and, now, the tiltrotor, might make a difference. We need to see the final report. Developing TERPS and procedures are relatively simple.

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