Research, Engineering & Development (R,E&D) Advisory Committee

RECOMMENDATIONS ON FISCAL YEAR 2001-2005 R,E&D INVESTMENT PORTFOLIO AND MEETING MINUTES

APRIL 21, 1999

Table of Contents

On April 21, 1999 the Federal Aviation Administration (FAA) Research, Engineering and Development (R, E&D) Advisory Committee held a meeting at the Holiday Inn Rosslyn Westpark Hotel in Arlington, Virginia. Attachment 1 and 2 provide the meeting agenda and meeting attendance, respectively.

Welcome and Introductory Remarks

Dr. Herman Rediess, Executive Director and Designated Federal Official of the Committee, read the public meeting notice. Mr. Robert Doll, Chairman of the Committee opened the meeting by welcoming the attendees. Dr. Rediess recognized the members leaving the Committee: Mr. Robert Helmreich, Mr. David Crow and Mr. Bruce Landsberg. He thanked them for their dedication and valuable contributions to many Committee efforts.

Dr. Rediess welcomed the new members of the Committee: Dr. Wilson Felder, Vice President of Aviation

Services at TRW; Dr. John Hansman, Professor of Aeronautics and Astronautics at Massachusetts Institute of Technology; Mr. Eric Schwartz, Senior Manager at Boeing's Commercial Airplane Group; Mr. John Kern, Vice President at Northwest Airlines; Dr. Michael Benzakein, General Manager at General Electric Aircraft Engines; Mr. James DeLong, General Manager, Regional Airport Authority;

Dr. Louis Mancini, Vice President at United Airlines; and Mr. John O'Brien, Director at Air Line Pilots Association.

Mr. Steve Zaidman, Associate Administrator for Research and Acquisitions spoke on the growing trend toward more collaboration between FAA, users, and industry, pointing out that the Administrator has been largely responsible for this trend. He applauded FAA Administrator Garvey and National Aeronautics and Space Administration (NASA) Administrator Goldin for their efforts to organize the FAA/NASA day, recently held to highlight both agencies' combined research development efforts.

Review of Joint Meeting with NASA's ASTAC

Mr. Doll stated that the R,E&D Advisory Committee (REDAC) members met with NASA's Aero-Space Technology Advisory Committee (ASTAC) members on

January 21-22, 1999 to review how the two organizations may restructure to greater collaborative advantage. This plan to restructure comes as the result of Congressional and community desire to avoid duplicated research between the two organizations.

Mr. Doll pointed out the benefits of overlapping membership between the two advisory committees and fewer meetings for members of both organizations to attend.

FAA's Response to Committee Guidance on FY 2001-2005 Research and Development Investments dated November 18, 1998

Each year in September, the Committee provides recommendations on how FAA should invest its R,E&D funds. The Committee provided guidance for FAA's planned fiscal year 2001-2005 research and development investments in a letter to the Administrator dated November 18, 1998. The recommendations and FAA's responses are provided in Attachment 3.

FAA's Response to Recommendations from the Report of the Air Traffic Services' Subcommittee dated March 5, 1999

The Air Traffic Services (ATS) Subcommittee is one of six standing subcommittees established in January 1997 to provide recommendations to the FAA on its proposed R,E&D investments portfolio and to conduct annual reviews of FAA's research and development programs. FAA's ATS program includes air traffic

management (ATM), communications, navigation and surveillance (CNS), and weather systems.

On November 12-13, 1998 the ATS Subcommittee meet to discuss the purpose of the ATS Subcommittee, the National Airspace Systems (NAS) Architecture database, the Concept of Operations, and a 10-year outlook of research. Ms. Nancy Price, Chair, provided the Committee with a report from the Subcommittee's meeting. On January 21, 1999, the Committee approved the report and forwarded the recommendations to the Administrator in a letter dated March 5, 1999.

Dr. Rediess provided FAA's response to the recommendations. The recommendations and responses are provided in Attachment 4.

FAA FY 2001 R&D Strategy & Portfolio

Dr. Rediess reviewed FAA's mission which is to provide a safe, secure and efficient global aerospace system that contributes to national security and the promotion of U.S. aerospace safety. He stated that the R,E&D program supports the FAA's strategic goals of safety, security, and system efficiency, emphasizing that system efficiency, in its broader sense, means meeting the needs of the user community.

Dr. Rediess introduced "Flagship Initiatives," which are initiatives based on guidance from the Department of Transportation, as part of the fiscal year (FY) 2001 R,E&D budget strategy. These initiatives represent funding proposals totaling $99.7 million dollars over and above the Office of Management and Budget (OMB) base program funding level of $186 million. They are initiatives to do high priority work and they may not contain any part of base program work.

The budget process remains essentially the same as last year with some minor adjustments. Dr. Rediess suggested that the Committee meet two times per year instead of three times per year.

Discussion on Proposed Subcommittee on General Aviation and Vertical Flight

The Subcommittee on General Aviation and Vertical Flight is an ad hoc Subcommittee established in April 1997 to investigate general aviation and vertical flight issues. When the terms of reference for the Subcommittee expired in September 1998, the Committee agreed to review and vote on an extension of the terms of reference at the January 1999 meeting. The review of the terms of reference had not been completed by January and the Committee agreed to vote on the new terms of reference at the April meeting.

Mr. John Zugschwert, retired Committee member, presented the "Terms of Reference" for the proposed ad hoc Subcommittee on General Aviation and Vertical Flight. He clarified that the terms of reference will address "tiltrotor and advanced rotorcraft technology in the National Airspace System." The objective of the Subcommittee is to determine how the combination of the Global Positioning System (GPS) and tiltrotor technology can be exploited to better serve the air traveling public and air commerce by addressing issues such as safety, criteria for take off and landing areas, and program requirements for the V-22 Osprey.

After a discussion, the "Terms of Reference" for the Subcommittee were approved by the Committee. Dr. Wesley Harris agreed to co-chair the Subcommittee with Mr. Zugschwert.

Update On the Runway Incursion Subcommittee

The Runway Incursion Subcommittee was established as an ad hoc Subcommittee in September 1997 to develop recommended runway incursion preventive actions that would contribute to developing a runway incursion action plan.

Mr. Bruce Landsberg, Subcommittee Chairman, provided an update on the progress being made on the recommendations in the Committee's report dated January 29, 1998. Mr. Doll, Dr. Rediess and the Committee thanked Mr. Landsberg for his outstanding leadership as Chairman of the Subcommittee and agreed that the Subcommittee's work had been completed and the Subcommittee should be disbanded.

Subcommittee Presentations

In February and March 1999, the six standing Subcommittees reviewed FAA's six research and development (R&D) investment areas including air traffic services; airport technology; aircraft safety; security; human factors; and environment and energy. The Subcommittee's reviewed their respective target area team's (TAT's) proposed investment portfolio and provided comment on it. Each Subcommittee Chair presented the recommendations on the FY 2001-2005 investment portfolio process. The Subcommittee recommendations are provided in Attachment 5. The standing Subcommittee chairs, who presented the recommendations, included the following:

Air Traffic Services Mr. Paul Drouilhet

Airport Technology Mr. Robert Doll (Acting)

Aircraft Safety Mr. Robert Doll

Security Mr. Dale Atkinson (Acting)

Human Factors Dr. Deborah Boehm-Davis

Environment & Energy Dr. Wesley Harris

Mr. Doll opened the floor for discussion on remaining issues. The Committee held discussions and generated

comments, which are provided by Attachment 6. The comments were provided to Administrator Garvey in a letter from Mr. Bob Doll dated June 11, 1999.

Closing Remarks

Mr. Doll recommended two REDAC meetings each year instead of three, with perhaps two or three Subcommittee meetings at appropriate times that fit with the budget cycle. The Committee agreed. He recommended that these be two-day meetings to provide sufficient review time, with the next meeting scheduled for September 14 and 15, 1999. Mr. Doll will attempt to schedule a joint meeting with NASA on September 15.

Dr. Rediess said he will outline a revised budget process.

Mr. Doll said he plans to meet with Steve Zaidman and then with the Administrator, in the very near future to discuss Committee members' concerns. He said he also wants to make them aware of the Committee's cadre of aviation expertise, and its desire to make that expertise available to the Administrator and to the R&D community.

Mr. Doll thanked the members and adjourned the meeting at 3:00 p.m.

Attachment 1

Research, Engineering & Development (R,E&D) Advisory Committee

Holiday Inn Rosslyn Westpark Hotel

1900 North Fort Myer Drive, Arlington, VA

(703) 807-2000 FAX: (703) 522-7480

April 21, 1999

AGENDA

8:00 am	Welcome and Introductory Remarks	Mr. Robert Doll, Chair
	- Farewell to Retiring Members	Mr. Steve Zaidman, FAA
	- Welcome New Members	Dr. Herman Rediess, FAA

8:30 am	FAA REDAC & NASA ASTTC Interactions	Mr. Robert Doll, Chair
8:45 am	FAA FY 2001 R&D Strategy & Portfolio	Dr. Herman Rediess, FAA
9:45 am	BREAK	
10:00 am - 10:15 am	Subcommittee Presentations	Mr. Paul Drouilhet
10:15 am.- 10:30 am	- Subcommittee on Air Traffic Services	Mr. Robert Doll
10:30 am - 10:45 am	- Subcommittee on Airports	Mr. Robert Doll
10:45 am - 11:00 am	- Subcommittee on Aircraft Safety	Mr. Dale Atkinson
11:00 am - 11:15 am	- Subcommittee on Security	Dr. Deborah Boehm-Davis
11:15 am - 11:30 am	- Subcommittee on Human Factors	Dr. Wesley Harris
	- Subcommittee on Env. & Energy	
11:30 am - 11:45 am	Discussion on the Proposed Subcommittee on General Aviation & Vertical Flight	Mr. John Zugschwert
11:45 am-12:15 pm	Update on the Runway Incursion Subcommittee	Mr. Bruce Landsberg
12:15 pm	LUNCH	
1:15 pm	Committee Discussion	Mr. Robert Doll, Chair

2:00 pm	Finalize Committee Recommendations	Mr. Robert Doll, Chair
3:30 pm	Adjourn	

Attachment 2

Federal Aviation Administration

Research, Engineering & Development (R,E&D) Advisory Committee

April 21, 1999

Attendance

Members

Mr. Robert Doll, Chair Dr. Deborah Boehm-Davis Mr. Paul Drouilhet

Dr. Wilson Felder Dr. Aaron Gellman Dr. John Hansman

Dr. Wesley Harris Mr. John Kern Mr. Bruce Landsberg

Mr. Eric Schwartz Mr. Craig Bolt (representing Mr. David Crow)

Audience

John Rybka, FAA Chuck Friesenhahn, FAA Anne Harlan, FAA

Oscar Cisueros, ESI Brenda Courtney, FAA Dennis McGee, NATCA

Anthony Fainberg, FAA Tish Colvin, SRI Betty Ann Kane, NOISE

Lee Olson, FAA Dennis Kershner, FAA Randy Stevens, FAA

Jerry Welch, MIT LL Charles Huettner, NASA Kenneth Cobb, TRW

Charles Harrison, FAA Jim Hevelone, FAA Geoff Mumford, APA

Peggy Gilligan, FAA Thomas O'Brien, FAA Armen Sahagian, FAA

Calvin Mitchell, FAA Terri Rose, Ntl. Safe Skies Mark Rodgers, FAA

Bobby Sexton, FAA Barbara Ellen, FAA Richard Young, FAA

Keith Murray, SETA Ed Harris, FAA Nancy Lane, FAA

Mike Galliva, FAA Gerard Spanier, FAA Gary Rixmann, FAA

John Zugschwert Don Sussman, Volpe Steve Pansky, FAA

Howard Wesoky, FAA Roy Reichenbach, NASA Carol Russo, NASA

Joseph McCormick Jim White, FAA David Smith, FAA

Chuck Ruehle, FAA Tom Proeschel, FAA Paul Polski, FAA

Rick Page, FAA Sieg Poritzky George Marania, FAA

Lauren Grace, FAA B.R. Climie, Honeywell Dale Atkinson

Herb Bachner, FAA Jorge Fernandez, FAA J.A. Evans, NBAA

Hugh Bergeron, FAA Chuck Hedges, FAA Warren Fellner, FAA

C.A. Freck, GE Russ Benel, MITRE Dave Goehler, Jeppesen

Sue O'Brien, FAA Gary Martendell, FAA Steve Zaidman, FAA

Nick Stoer, Stoer & Assoc. Denise Davis, FAA Megan Lombard, Crown

Marci Romagnoli, TRW June Lidder, TRW Carole Schmidt, Crown

Gloria Dunderman, Crown

Attachment 3

FAA's Response to Committee Guidance on FY 2001-2005 Research and Development Investments dated November 18, 1998

Each year in September, the Committee provides recommendations on how FAA should invest its R,E&D funds. The Committee provided guidance for FAA's planned fiscal year 2001-2005 research and development

investments in a letter to the Administrator dated November 18, 1998. FAA's response to these recommendations follows.

Recommendation #1: The FAA should develop a plan for ATM modernization expressed in terms of quantitative goals for evolving operational capabilities and user benefits.

Response: The FAA agrees and is in the process of quantifying benefits for the NAS Architecture. Benefits are first being identified qualitatively for the capability provided in terms of flexibility, predictability, delay reduction, etc. Quantitative evaluations of benefits are part of Concept Validation, which just began in fiscal year (FY) 99.

Recommendation #2: The Committee recommends that the FAA continue to fund the Airport Pavement Program.

Response: The FAA concurs and will continue to support this program. However, at the current R&D budget levels, funding may be less than desired for an effective program.

Recommendation #3: The Committee recommends that FAA continue to concentrate R&D efforts in FY 2001 and beyond on the issues arising from aging aircraft fleets.

Response: The FAA concurs and will continue to pursue this program and expand it to include non-structural systems.

Recommendation #4: The Committee recommends that programs dedicated to prevention and containment of fire, both on board and post crash, continue to receive the highest priority in funding.

Response: The FAA agrees that fire is an important risk factor and will continue to support a strong R&D program. However, FAA disagrees that fire safety should receive higher priority than other safety issues that place passengers at greater risk. These include crew errors and weather. FAA will also urge NASA to fund efforts in this area.

Recommendation # 5: The Committee recommends that the FAA should give priority to increasing environmental assessment capability in the areas of engine emission certification as well as model development for mandated requirements.

Response: The FAA plans to sustain the environment and energy program with only modest growth. Currently, FAA is in the process of increasing the program's R&D staffing with operations researchers for the purpose of model development. To increase funding significantly would take away from higher priority areas of safety, NAS efficiency and/or security.

Recommendation #6: The Committee recommends that FAA reconsider diverting 20 percent of its planned investments in aviation security to high priority requirements for ATS research. (Note: the Security Subcommittee disagreed with this recommendation.)

Response: Aviation security R&D remains a high interest area in Congress. We do not believe Congress would support shifting funds from security to other R&D programs. We believe the multidimensional threat environment requires a strong R&D program that supports future security equipment deployment and training.

Attachment 4

FAA's Response to Recommendations from the Air Traffic

Services Subcommittee dated March 5, 1999

The Air Traffic Services (ATS) Subcommittee is one of six standing subcommittees established in January 1997 to provide recommendations to the FAA on its proposed R,E&D investments portfolio and to conduct annual reviews of FAA's research and development programs. FAA's ATS program includes air traffic management systems; communications, navigation and surveillance systems; and weather systems.

On November 12-13, 1998 the ATS Subcommittee meet to discuss the purpose of the ATS Subcommittee, the NAS Architecture database, the Concept of Operations, and a 10-year outlook of research. Ms. Nancy Price, Chair, provided the Committee with a report from the Subcommittee's November meeting. In January 1999, the Committee approved the report and forwarded the recommendations to the Administrator in a letter dated March 5, 1999.

Dr. Herm Rediess, Director, Office of Aviation Research, presented the following FAA responses on April 21, 1999.

GENERAL RECOMMENDATIONS

Recommendation (a): The FAA lacks any real long-range ATS R&D.

Response: There are several efforts devoted to long-range ATS R&D. These include human factors R&D, which addresses long-term issues in air traffic and airway facilities, and aviation weather R&D. Mid- and long-range ATC automation decision support tools R&D are part of a joint FAA/NASA ATM R&D program, which includes substantial efforts by NASA, FAA, CAASD, MIT/LL and Volpe Center. However, we agree that the ATS R&D program has not been presented to the REDAC in a cohesive manner and could be improved.

Recommendation (b): The transfer of funds from R&D to F&E weakens and confuses the R&D program.

Response: The FAA agrees it may cause confusion, particularly to those outside FAA. FAA is trying to minimize confusion by coordinating the R,E&D and F&E Advanced Technology and Prototyping planning processes to produce a balanced R&D program. The ATS Subcommittee will continue to have overview of both elements. It is uncertain at this time whether the R&D program will be weakened or not.

Recommendation (c): There is virtually no focus on the major challenge of system and airport capacity, of which capacity-increasing technologies and procedures are a part.

Response: Although we may not be doing all we should, FAA is pursuing several capacity-increasing programs.

- Technologies to increase capacity in the terminal airspace and airport surface include TMA, FAST, CDM, SMA & other advanced tools under development.
- Capacity-increasing R&D are included under the Ops Concept Validation Program & System Capacity Program.
- Capacity issues are being addressed at NEXTOR.

We welcome specific recommendations for additional high payoff R&D in systems and airport capacity.

SPECIFIC RECOMMENDATIONS

Recommendation #1: Without a vigorous R&D program now, there will be nothing ready for implementation after Free Flight Phase 1(FFP1).

Response: The FAA concurs with this comment. Products resulting from a vigorous R&D program from 1991-1995 allowed FAA to pursue FFP1. However, over the last four years, FAA's ATM R&D budget has decreased substantially. NASA and CAASD continue developing advanced tools but there is little FAA investment, if anything, to be prepared for implementation beyond FFP1.

Recommendation #2: The FAA must find a way to convince Congress that the R&D budget must be increased, or FAA will not be able to accomplish NAS modernization.

Response: The FAA agrees with the need for an increased R&D budget. Unfortunately, part of the price of balancing the United States budget is reduced spending. Right now, FAA R&D cannot compete with the other pressing priorities of our constrained budget.

Recommendation #3: The Committee strongly supports the internal and external use of the new Architecture "tool" and cautions against the temptation to hide it due to its realistic portrayal of the effects of inadequate funding, organization, and systems engineering.

Response: The FAA notes the Committee's concern but we are promoting its use not hiding it. FAA plans to provide the tool to the desktop of all FAA executives as a decision support system.

Recommendation #4: The close melding of the NAS Architecture and Ops Concept is unraveling a bit. It is important for these to remain in unison with each other and with the new Architecture "tool."

Response: We believe this is a misperception. The Architecture and Ops Concept are closely coupled. The Architecture Tool database is continuously updated to reflect changes in budget or the Joint Government Industry Concept and FAA 2005 Concept.

Recommendation #5: The Committee strongly supports the Safe Flight 21 program and offers its services to assist with the R&D aspects of it.

Response: The FAA appreciates the Committee's support and its offer of assistance.

Recommendation #6: FAA requires additional in-house technical competence in the areas of program and technical managers and system and software engineers.

Response: The FAA agrees. We are in the process of hiring several highly experienced Chief Systems Engineers and a few program and technical managers. With a new staffing approach, we have more flexibility to hire personnel based on requirements and available budget; however, because of tight budgets, FAA has not been able to fill all of its staffing requirements.

Recommendation #7: The FAA must give its unflagging attention to NASA's research efforts to ensure that useful and timely products are produced.

Response: The FAA agrees with the Committee's observations and is working to increase FAA's involvement with NASA R&D. The new FAA/NASA Executive Committee will facilitate a closer partnership, coordinated planning, and executive-level monitoring.

Attachment 5

Recommendations on FAA's FY 2001-2005 R&D Investments - April 21, 1999

Report from the Air Traffic Services (ATS) Subcommittee

Chairman: Mr. Paul Drouilhet

The ATS Subcommittee provided their report on two previous meetings: (1) The Subcommittee reviewed the Research Project Descriptions (RPDs) on March 9-11, 1999; and (2) participated in NASA's Aviation System Capacity (ASC) Program meeting on April 6-7, 1999.

After presenting the principal components of Federal ATM R&D, Mr. Drouilhet provided the following Subcommittee comments and recommendations for each ATM research project.

1. William J. Hughes Technical Laboratory Facility: This facility develops and tests new ideas, concepts, and systems before fielding them.

Recommendation: Form a multiagency team to develop a plan for the needed capability, and fund and execute the plan.

2. Aviation Weather: This program is important to safety and efficiency, is well run and focused on important, well-defined goals; it has produced substantial accomplishments.

Recommendation: Continue support for aviation weather program at no less than current levels; provides additional support if available.

3. SOCRATES: This program is mandated by Congress. Its focus has shifted from airborne CAT detection to ground-based wake turbulence detection, and appears to be a technology in search of an application.

Recommendation: Minimize support until/unless there is evidence of an important aviation-related application.

4. ATS Human Factors (HF): This program is a reservoir of HF expertise, supporting development program HF issues, and is a small component of "general" HF research. This work is most effective when focused on specific problems.

Recommendations:

- Make sure the effort is addressing well-defined problems.
- If additional funding is needed, obtain as "sub-contract" from supported programs.

5. Safe Flight 21: This program, evolved from Flight 2000 and still evolving, has nine RTCA Select Committee-defined goals which are applied to two somewhat disparate components: (1) The Ohio River Valley (ORV) component augments the Cargo Airlines Association's investigation of three ADS-B link applications; and (2) the Alaska component equips up to 200 commercial aircraft to evaluate ADS-B, FIS, and terrain warning in typical Alaska operations.

Recommendations:

- Develop detailed test plans matched to program goals.

-Augment instrumentation as required.

- Develop plans for transition to operational service

-Equipage issues - operation with mixed equipage

-What additional tests/operational evaluations are required?

-Need for simulation experiments -WJHTC?

6. NEXTOR - National Center of Excellence for Aviation Operations Research: This program was established in 1996 with government, academic and industry partnerships. The FAA committed to long-term base funding of $0.5 million dollars a year with partners matching these funds. Now FAA base funding has decreased to nearly zero.

Recommendation: Support NEXTOR at originally agreed to level of 0.5M/year.

7. CASSD (MITRE) - Center for Advanced Aviation System Development: This program costs approximately $25 million dollars a year - 140 sy/y, and is designed to provide NAS characterization, modeling/ simulation, CNS technology development, decision support systems, and solutions to specific operational problems. The program provides much good work but the results are not widely disseminated.

Recommendation: Emphasize timely publication and dissemination of reports on R&D activities.

8. NASA Aviation System Capacity Program: This has become NASA's forward-looking R&D program; it has three elements: (1) the base program which is expected to go to zero as a result of NASA's aerospace budget scale-back; (2) the Terminal Area Productivity Program (TAPP) which is terminating; and (3) the Advanced Air Transportation Technology (AATT) which is now the primary vehicle.

AATT has two elements: Decision Support Systems DSS, (controller aids) which is short-term focused; and the Distributed Air Ground (DAG) element, which is not well defined and is not given much emphasis.

Recommendations:

1. NASA near-term program should be re-planned jointly with FAA to match the FAA's ability to implement and absorb new techniques. A major player in defining these next steps will be RTCA/FFP2. This plan should be reflected in updated versions of the Concept of Operations and Architecture.

2. NASA should put increased emphasis on advanced concepts. This work should be

   unconstrained by the current architecture -- rather, it should provide options for future modernization plans.

3. Separate multi-agency planning and coordination teams should be established for the

near/mid-term activities and the advanced concepts activities.

Recommendations on FAA's FY 2001-2005 R&D Investments - April 21, 1999

Report from the Security Subcommittee

Chairman: Mr. Dale Atkinson (Representing Mr. Viggo Butler)

Portfolio Content:

- Research addresses needs of community

- Requirements for specific deliverables
- Need operational Vision
- Emphasis switch appropriate

RPD Funding:

- Funding for projects is appropriate
- Panel concerned with budget cuts
- Preserve funding in

Technology Integration

Human Factors

Checkpoint

- Future generation aircraft survivability

Partnerships:

- Very strong partnering

Industry

Academia

Government Laboratories

International Allies

Federal Agencies

Process:

- FAA needs more Goal Definition
- What will the future look like
- Too much technology focus, not enough implementation

Additional Recommendations:

- Feel good about research team focus
- Equipment deployment is helping
- Technology development needs exit criteria
- Cross discipline communication is necessary

- Air cargo vision needs clarification

Discussion:

- Who are industry program partnership?

Answer: Northwest Airlines in Detroit, American Airlines in Dallas-Ft. Worth, America

West in Phoenix, and local law enforcement units, with the goal to involve more airports.

- What has come out of it what are the objectives of the research?

Answer: Quality of detection, product, and policy to improve security. We want to work with all 474 airports with commercial flights. Our focus is now shifting from checkpoint to check-luggage which is people and carry-ons. There are many technical challenges but not enough money.

- The Security Program should be tackling the problem at system level.

Answer: We have not seen the FAA's systems, systems, approach.

- With the limited funding over all of R&D, it is reasonable to ask the Security Program to prepare a Prospectus of research results with precise objectives. The RPDs are not as sharp as they are in some of the other areas.

Answer: Admiral Flynn and his staff gave us a detailed 42-page requirements plan, which you have not seen. This plan is used to formulate our performance objectives for this year. Each person in the group is performing on metrics with goals, strategies, achievements. We are also on a paper performance basis. Ours is the only shop operating like that. (Mr. Polski offered to have the Committee review the plan.)

Recommendations on FAA's FY 2001-2005 R&D Investments - April 21, 1999

Report from the Human Factors Subcommittee

Chairman: Dr. Deborah Boehm-Davis

Dr. Boehm-Davis said the Human Factors Subcommittee met on March 11, 1999, for Air Traffic Services presentations of Human Factors in acquisitions, aviation medicine, and overall funding requirements, generating the following recommendations and comments.

Recommendation - 1

- The agency must develop mechanisms for identifying human factors needs, both from outside

organizations and from inside the FAA.
- There is a critical need to develop baseline human performance data.
- It is incumbent on senior management to continue and expand their program incorporating human factors into the acquisition process.

Recommendation - 2

- The agency should consider similar processes for the integration of human factors into areas such as flight standards, rules making, and procedures.
- The office of the Chief Scientific Officer and Technical Advisor should provide advice to the policy level of the government, especially in regard to the control and mitigation of human error.

Recommendations on FAA's FY 2001-2005 R&D Investments - April 21, 1999

Report from the Environment & Energy Subcommittee

Chairman: Dr. Wesley Harris

The Environment & Energy Subcommittee's FY 2001 Security budget portfolio (1) recommendations, (2) Subcommittee Charter, and (3) Subcommittee Statement. The Subcommittee met in February and again on April 20, 1999, with NASA participation. Some Subcommittee members also met at Glenn Research Center in Cleveland, Ohio to review the Ultra Efficient Energy Technology (UEET) program. These meetings produced the following:

1. Recommendations

Portfolio Content:

Proposed outcomes, outputs, time frames in RPDs appear to be correct. The proposed program, topics 1-4 appear complete. The proposed total program is not inflated; all components are needed.

RPD Funding:

- Several changes in priorities are recommended. See backup charts.

  -More emphasis should be placed on modeling, e.g., Emissions and Dispersion

  Modeling Systems (EDMS), NIRS.

-Less emphasis should be placed on development of engine exhaust emission measurement techniques.

Partnerships:

- Other FAA offices: General noise modeling, helicopter noise near heliports
- Other government: Worldwide noise impact models
- Industry/Academe: Cruise altitude certification, engine exhaust emissions standards (14 CFR, Part 34.)

Process:

- Subcommittee would be able to offer more useful recommendations if more complete definitions of program content and budget were presented or made available.
- Subcommittee would benefit greatly by having additional representatives from the civil airframe and general aviation industries, EPA, DoD, and environmental NGOs.

Additional Guidance:

Due to the severe erosion of the NASA Aeronautics program, FAA should identify additional (i.e., non-NASA) partners.

1. Statement by the R,E&D Subcommittee on Environment & Energy

For consideration of the R,E&D Advisory Committee

- The White House sponsored National Science & Technology Council noted in its 1995 report Goals for a National Partnership in Aeronautics Research and Technology that:

  > "Past research investments in technologies to reduce engine noise and emissions are paying dividends today. But more needs to be done. Environmental issues are likely to impose the fundamental limitation on air transportation growth in the 21st century."

- Thus, a key goal is to:

  > "Ensure the long-term environmental compatibility of the aviation system."

- And government sponsored research and technology for aviation environmental compatibility is essential to frame and support national and international aviation policy.
- Government participation is also important for the U.S. to remain competitive in the global economy.
- The R,E&D Subcommittee on Environment & Energy recognizes the importance of a balanced Federal budget and the related implications to the FAA and NASA.
- However, the federal budget for civil aeronautics R&T should support a vision for an expanding air

transportation system that is:

-Free from community noise impacts,

-Contributing to improvements in local air quality, and

-Advancing understanding of and mitigating effects of global climate change.

- We, therefore, strongly support allocation of sufficient government funds to support this vision, and call on all stakeholders to join in partnerships to advance the related goals.

1. Subcommittee on Environment & Energy – Proposed Charter

- FAA's Research, Engineering and Development (R,E&D) Advisory Committee, established in 1989, advises the Administrator on research and development issues and coordinates the FAA's research, engineering and development activities with industry and other government agencies. The committee considers aviation research needs in air traffic services, airport technology, aircraft safety, aviation security, human factors, and environment and energy.
- Proposed charter for R,E&D Subcommittee on Environment and Energy:

  "Advise the FAA Administrator, through the R,E&D Advisory Committee (REDAC), on research, engineering, and development issues regarding aircraft noise and emissions that affect the environment, assuring coordination of related activities with industry, universities, and other government agencies."

Discussion topics:

- Are we addressing the Kyoto Protocol issues?

Answer: This committee is not, although we've discussed it. It has tremendous impact on the U.S. ability build, sell, and service our airplanes.

- Is the R&D investment in FAA and NASA sufficient to protect the U.S. aviation industry?

Answer: No. We are in peril of losing our competitive advantage in modeling, standards, techniques, etc.

- We need to make sure that other agency regulations do not threaten the aviation industry. DOT and FAA should take steps to protect again irrational and hurtful regulations.

Dr. Harris proposed that the Environment & Energy Subcommittee's charter statement be accepted.

Recommendations on FAA's FY 2001-2005 R&D Investments - April 21, 1999

Report from the Airports Subcommittee

Chairman: Mr. Robert Doll (Representing Ms. Angela Gittens)

The Airport Technology Subcommittee met on March 16 at the HughesTechnical Center in Atlantic City. We viewed the operation of the pavement test machine, which will be commissioned on April 12, and we received briefings on the RPD's.

In addition to our continuing concern over the inadequate level of funding for airport-related research projects, we are particularly distressed that the airport technology research program is now sited in the Facilities and Equipment budget of the FAA. Although the pavement test machine is a facility involving equipment, the function of the expenditure is to conduct research and, in any case, the remainder of the budget is directed to research and the entire staff is dedicated to ongoing research and development; any acquisition is incidental to that mission. We observe that the REDAC is looked to provide FAA with industry focus for research projects to enhance airport safety and enhance capacity not to advise on the acquisition of facilities and equipment. We urge the FAA to relocate airport technology research to the research and engineering budget.

Regarding the portfolio content for FY01, we are pleased that the FAA is planning to invest again in the wildlife hazards, aircraft rescue and firefighting, planning and traction, and lighting and marking areas. Due to the straitened budget and need to persevere on the pavement test facility, these other elements of the airport technology portfolio have been left to founder. Specific guidance on the proposed '01 budget, in order of the Subcommittee's recommended priority order, is provided below:

PRIORITY 1: RPD #138/144 National Dynamic Airport Pavement Tests/Advanced Airport Pavement Designs

Again we applaud the FAA for following through on a high priority research/development effort in the face of severe budgetary constraints, as well as its use of partnerships, and international involvement. The funding for '01 provides for new pavement and sensor installation after the initial eighteen-month test period. The spiking pattern for funding for this RPD will affect every other fiscal year. At the proposed $10 million funding level, the spikes will not adversely affect other programs. RPD#144 Advanced Airport Pavement Designs seeks to develop computer-based design procedures for airfield pavements to meet the requirements of new large aircraft. The project has numerous partners and includes a Center of Excellence with the University of Illinois and Northwestern Universities.

Recommendation: Fund as proposed

PRIORITY 2: RPD#150 Airport Wildlife Hazard Abatement

This has been the Subcommittee's second priority for several years but it has essentially gone unfunded this year. The FAA has contracted with the USDA to provide database maintenance but needs to begin making more of an inroad than this arrangement can provide. The original FY '99 nonlabor budget of $650, 000 was

reduced to $200,000 when the airport technology budget was reduced from $7.2 million to $5 million. The proposed ’01 budget restores the research portfolio and will permit development of a "center of excellence" type of arrangement. We observe again that aviation has a unique interest in wildlife hazard abatement as an issue of safety; if we don’t lead the effort, it won’t happen.

Recommendation: Fund as proposed

PRIORITY 3: RPD#152 Improved Aircraft Rescue and Firefighting Equipment and Agents

This is another program that has been relegated to "barely breathing" status in the wake of the phenomena described above. We concur with the FAA’s proposal to resume development of an aircraft rescue vehicle anti-rollover standard. This will involve sufficiently rigorous testing to withstand industry pressure as this will be an economic issue for manufacturers. As well, the proposed funding level will permit continued research in equipment and procedures for quick in-cabin fire and smoke abatement.

Recommendation: Fund as proposed

PRIORITY 4: RPD# 132 Airport Planning and Design Technology

The Subcommittee has up to now assigned a lower priority for FAA’s participation in airport planning and design on the basis that airports and industry have a great deal of expertise and interest in airport planning and design technology and that, therefore, significant progress in civil aviation can be made with little leadership from the FAA. What has led us to elevate the priority order for this RPD is twofold: one, with the new large aircraft likely to come on stream in the next 5 to ten years, the FAA’s industry guidance becomes a significant capacity issue. Two, the major increases in airport capital funding, fueled by passenger facility charge revenue and necessitated by the sustained growth in passenger and cargo demand, have led the industry to look to the FAA for neutral, fact-based, guidance on airport capital development. For example, the current industry debate on the use of PFC and other airport funds for ground access has significant implications for airlines and airports. Although we prefer that FAA R&D funds be used exclusively to advance safety and capacity, its Congressionally-mandated function of evaluating billions of dollars in airport financing decision-making, as a practical matter, there is no other agency that can or will perform this role. The FAA works with airport proprietors, aircraft manufacturers and industry professional associations in conjunction with their research.

Even at that, the Subcommittee believes that research into airside capacity, specifically the acceptance of new large aircraft is the higher order role for the RE&D effort.

Recommendation: Fund as proposed

PRIORITY 5: RPD#146 Improved Lighting, Signing and Marking

Again, this is an area of research that has stalled due to lack of funding. Staff has supported the FAA’s runway incursion task force and is working on an on-demand airfield lighting guideway system to reduce the potential for runway/taxiway deviations. This system would use either an existing aircraft identification scheme or develop an additional one. While the Subcommittee thinks the further development of a vehicle identification system is needed and appropriate for airport ground vehicles, we are concerned that the airport technology

section is not the appropriate champion for aircraft guidance schemes. We recommend that efforts be redirected to ground vehicle identification.

A more appropriate project is the development of guidance to airports for evaluating the visibility of their airfield marking although we recommend that the FAA both pursue industry partnership opportunities to assist with funding.

Recommendation: Continue runway incursion task force support and airfield marking visibility; redirect efforts on automated, on demand aircraft guidance to ground vehicle identification.

PRIORITY 6: RPD #148 Improved Runway Friction

Within this section is research on traction, runway overruns, deicing, anti-icing and friction-testing. Working with a token amount of funding and a great deal of partnering and cooperative relationships, including a memorandum of understand with NASA for joint research, the FAA has made considerable progress in its research agenda. A major effort for the portfolio is a request from the industry to devise airfield maintenance guidelines to be employed during winter-weather operations.

Recommendation: Fund as proposed.

PRIORITY 7: RPD#143 Non-destructive Pavement Testing The goal of this research project is to develop standardized procedures for conducting non-destructive evaluations of airport pavements. As the last FAA Advisory circular on non-destructive testing devises was issued in 1976 and highway standards are not suited to airfield pavements, this project is overdue. The FY ’01 budget amount is half the amount needed to keep the project on schedule but, in view of the other priorities for the airport technology budget, the Subcommittee concurs with the reduction.

Recommendation: Fund as proposed

PRIORITY 8 RPD#136 Improved Paving Materials

The research project seeks to develop specifications and procedures for using paving materials with improved performance and to incorporate new construction techniques and new pavement structures in the design of airport pavements. This project includes the Denver International Airport instrumentation project, a partnership with the Canadian government at the Prince George Airport in British Columbia and the development of a national airport pavement registry. The industry cost-benefit potential of successful results is considerable but in view of other projects with impacts on safety, the Subcommittee concurs with the lower priority assigned to the project by the FAA.

Recommendation: Fund as proposed

PRIORITY 9: RPD#589 Next Generation Airport Lighting System

This research project seeks to respond to concerns about increased electromagnetic interference experienced at some airports, possibly due to advanced lighting systems. The FAA sees this as an imperative focus of investigation. The Subcommittee feels that the FAA should pursue lighting industry partnerships to defray a good portion of the costs since industry will have a major stake in the event of any changes in standards or findings affecting their systems.

Recommendation: Pursue industry partnerships

Mr. Doll commented that the Committee should strongly state the adverse effects of cutting and transferring wildlife research funding, in its letter to the Administrator.

Recommendations on FAA's FY 2001-2005 R&D Investments - April 21, 1999

Report from the Aircraft Safety Subcommittee

Chairman: Mr. Robert Doll

Mr. Doll, referring to his current position as REDAC Chair and Safety Subcommittee Chair, stated that Mr. Louis Mancini has tentatively agreed to Chair the Aircraft Safety Subcommittee in the future.

Mr. Doll reported that the Subcommittee reviewed over 50 RPDs in meetings March 1 and 2, 1999, while implementing new, more efficient review procedures. He said a hard copy report was not currently available but would be circulated to Subcommittee members at a later date before being presented to the full Committee. In reporting on the Subcommittee's FY 2001 budget portfolio review, Mr. Doll said the following themes emerged:

- Initial review of new projects dealing with computer technology in the cockpit and on the ground, reveals a deficiency in software research.
- Large expenditures for Air Transport Oversight System (ATOS) and Safety Performance Analysis System (SPAS) is cause for concern. These programs are currently being implemented with continued funding requested in the RPDs.
- Congress must realize that with continuously limited budgets, the U.S. is in danger of losing its lead in aerospace lead. Aviation seems to have no dramatic drive to catch up.
- The people in Oklahoma City are doing a good job; Human factors is very critical.

Half Moon Bay, CA 94019
Tel: 650 726 9494
Fax: 650 726 9678
Email: redoll@earthlink.net

June 11,1999

The Honorable Jane Garvey
Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Ms. Garvey:

We recently concluded our first round of meetings for 1999 of the Research, Engineering and Development Advisory Committee and its Subcommittees. Another round of subcommittee meetings will be held between now and September 14, 1999 when we will convene our last REDAC meeting for this year. We hope that you will be able to attend the opening session of the September meeting when perhaps you could share your views on the Agency's progress in RE&D and particularly about free flight and its attendant programs.

We are now working with the appropriate people in NASA to assure the maximum coordination of our respective advisory committee efforts and RE&D programs we are charged to oversee. A coordinating committee composed of members of the REDAC and NASA's ASTAC has been formed for the purpose of coordinating the goals of the agencies. An initial meeting of the new committee will be held June 22 through June 24.

All of the concerns that have been underlying the REDAC's efforts for the past few years are still prevalent and, in fact, growing in many areas. Of particular concern is the continuing lack of funds appropriated to the FAA and NASA to support research for aviation and the shift of significant RE&D budget allocations to F&E accounts.

Not a meeting goes by without a discussion of the serious consequences of the continued under funding of the RE&D aviation budget. The comparative level of RE&D expenditures within the European Union continues as a topic of interest to the REDAC. The U.S. aviation industry produces hundreds of billions of gross revenue dollars annually and accounts for a large proportion of our foreign trade revenues. The percentage of the gross revenues that the U.S. aviation/aerospace industry spends on RE&D is scandalously small. The responsibility lies with both the government and the private sector.

If we do not pay attention to developing the systems, facilities and equipment needed to handle the growth that our economy demands of the air transportation system, the growth of our economy will be adversely affected. This is a very simple equation.

I understand from industry sources that a major new study of European aviation related expenditures, including RE&D expenditures, is about to be released. I believe that this report will show that the US continues to be dramatically outspent in absolute terms by the EU in all areas of aviation RE&D.

We face the very real prospect of losing our lead in air traffic management systems and standards and the related hardware that we have traditionally supplied to the global aviation community. The potential impact to our economy of the loss of industry leadership is difficult to estimate.

A visit by a high level FAA team will take place with European leaders this month. We understand that US interests are entitled by treaty to share in the results of European RE&D efforts. We need to take advantage of this right to access the RE&D work in Europe. We strongly support this meeting.

The idea that the portion of RE&D expenditures funding needed for facilities and equipment is not related to RE&D but to project implementation is a bad idea. Equipment and facilities acquisitions are an integral part of the RE&D process. To remove these expenditures from the RE&D budget incurs a high risk of the money disappearing from RE&D availability over the longer term. It is imperative that any RE&D funds that have been moved to the F&E Budget be effectively "fenced" for RE&D like activities.

In our eyes, the acquisition of facilities and equipment for RE&D outside of the purview of RE&D personnel is fraught with danger. We fear that the research requirements for specific features of that equipment could be lost on F&E acquisition personnel.

This is a major concern in the Airport Technology RE&D budget where all of the dollars were moved to F&E. What may not be apparent to the decision-makers is that the Pavement Test Facility is completed. There will be very little spending required on F&E in the future for Airport Technology RE&D. Therefore there is no rationale for having Airport Technology funding in the F&E budget.

The REDAC supports the FY 2001 RE&D budget as constructed by the roll-up of the individual RPD requirements. We believe that a strong effort to meet this funding level is required of the FAA before the GAO and Congress. We hope that the idea of Flagship Initiatives is pursued to provide a significant boost to FY 2001 funding

The high-level budget requirements for FY 2001 were presented to us in our April meeting. The FY 2001 requirements and the comparable previous year request and authorizations are:

- * FY 1999 Safe Flight Funds are in the F&E Account
- ** All Funding is in the F&E Account
- *** Funds are provided from the RE&D and F&E Accounts

Congress has essentially mandated the level of the Aviation Security expenditure. The explicit Human Factors portion of the entire budget is significant and includes monies dedicated to Aircraft Safety and ATM RE&D projects. We would like to see more money spent in Human Factors but the practicalities of anticipated funding and mandates do not allow reallocation of money from other RPDs into the explicit Human factors efforts. We

believe that industry must step up to supporting efforts such as Human Factors and Aircraft Safety to bring themselves more in line with the benefits they derive from those efforts.

The severe budget cuts proposed for NASA are truly alarming to the REDAC. The prevailing view in the industry is that NASA may need to be renamed NSA, dropping any reference to "Aeronautics" in their name if the present budget cuts are sustained. NASA's leaders have stated that they will eliminate efforts related to aeronautics in order to maintain their space program expenditures.

The REDAC believes that progress on aircraft engine emissions and noise-related research will be severely impacted as NASA is forced to wind down current research efforts. The cessation of funding for noise and emission research is not in the public interest. The FAA will be hampered in its future efforts to effectively certify new systems and to produce effective regulation for the air transport system.

Discontinuities in basic research can't be recovered. The simple fact is that, even if money could be transferred from the NASA research budget to the FAA RE&D budget, the money would not be effectively spent as the FAA is not equipped or staffed to accomplish basic RE&D.

We look forward to meeting with you in the near future to pursue discussion on the course of the REDAC and the important work of our subcommittees.

Sincerely,

Robert Doll

Chairman, FAA Research, Development, and Advisory Committee