

November 13, 2006

The Honorable Marion C. Blakey
Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Administrator Blakey:

On behalf of the Research, Engineering and Development Advisory Committee (REDAC), I wanted to again thank you for your participation in the September 20 meeting.

Enclosed are the recommendations of the standing REDAC Subcommittees on Aircraft Safety, Environment and Energy; Airports, and Human Factors.

As you know, the REDAC has also been addressing specific topics of identified importance to the agency. Recent activities:

- The working group on Separation Standards led by Sarah Dalton has completed its report which has been forwarded to you under a separate cover. Per your discussion with Sarah, she looks forward to meeting with you and discussing the report in more detail.
- The working group on Financing the Next Generation Air Transportation System led by Jerry Thompson has disseminated the results of their preliminary cost estimates of NGATS.
- A working group has been formed to evaluate weather information needs in current and future NAS environments based on user operational requirements to provide guidance for the development of aviation weather products. The working group is being led by William Leber and Ray LaFrey.
- A working group is being formed to evaluate policy and procedure implications of NGATS. It will include regulatory and human factors considerations as well as other factors which will be critical to NGATS implementation.
- The JPDO Subcommittee led by John Hamre will continue to support the JPDO efforts at the strategic level.
- The Aircraft Safety Subcommittee looks forward to working with the Systems Safety TCRG to improve the plan for the development of a systematic approach to safety management based on data mining and rigorous risk assessment.

The REDAC and the communities which the members represent are committed to maintaining the health and viability of our air transportation system as we face the technical, operational and financial challenges ahead. We stand ready to help in this regard.

Thank you again for your interest and participation. I, and the other members of the REDAC, are available if you would like to discuss these, or other, issues in more detail.

Sincerely,

R. John Hansman
Co-Chair
FAA Research, Engineering and Development Advisory Committee

Enclosure

Subcommittee Guidance for FY 09**Subcommittee on Airports**

The Airport Subcommittee appreciates the response of the Administrator in her letter of September 5th, that is largely supportive of the Subcommittee's FY 2008 recommendations from last Spring.

The Subcommittee met in August 2006 and has affirmed the following ongoing recommendations for FY 2008:

The Airport Subcommittee:

1. Recommends close cooperation between the FAA Technical Center and the Airports Cooperative Research Program for any and all projects that relate to airports, so as to avoid duplication of effort and/or redundancies.
2. Continues to recommend an increase in staffing at AAR-410 (Airport Technology) in order to allow for the above cooperation to be thoroughly carried out, in addition to the tasking that is entailed in the increased funding levels that Congress has approved.
3. Among the many projects that the Technical Center are carrying out, the Subcommittee especially supported the proposed research tasking on:
 - a) Foreign Object Damage (FOD) detection radar,
 - b) Fire fighting techniques for second level (upper deck) fires,
 - c) Wildlife hazard mitigation, and
 - d) Airfield pavement behavior and longevity research.

A number of added topics were discussed and considered during the summer meeting of the Subcommittee and a few were singled out for special attention.

(I) The results of the study of visual screens for applications at airports that are installing end-around taxiways, should be more widely disseminated in order to encourage the use of the excellent research that was performed by the Technical Center.

(II) The effort to instrument a section of concrete taxiway at the Atlanta airport to collect real-world data from a live-use installation was strongly encouraged.

(III) The installation of g-load sensors aboard the FAA-owned fleet of jet aircraft be considered, for application to the surface ride quality (runway roughness) research task.

Subcommittee on Environment and Energy

The following specific issues were identified as matters that should be raised to the attention of the Administrator.

Issue 1: The subcommittee members once more expressed their concern about the imbalance of FAA environmental investment in mitigation (via the Airport Improvement Program Noise/Emissions set aside) versus research to address better management of the environmental issues of aircraft noise and engine emissions.

Recommendation 1: Given the relative benefit of each investment, the subcommittee recommends that FAA seek ways of expanding the uses of noise/emissions mitigation funding activities through the upcoming reauthorization process. This expansion should include allowing airports to propose the demonstration of new operational procedures or technologies to mitigate environmental impacts.

Issue 2: The subcommittee expressed a general sense that developing the NexGen system will require substantial additional environmental RE&D resources. The committee noted that there are program gaps (the termination of NASA's Quiet Aircraft Technology (QAT) and Ultra Efficient Engine Technology (UEET) efforts before meeting their goals) as well as funding gaps caused by new demands from NexGen. Members also noted that in view of Clean Sky (Europe's new initiative to invest in noise and emissions RE&D), which is funded \$300M per year, the leadership goal of NexGen in the environment area was also in question if FAA does not step up and makes the necessary investments.

Recommendation 2: The subcommittee recommends that the Administrator seek budget authority through the upcoming FAA Reauthorization, and follows through with appropriations requests, to meet the RE&D needs of NexGen. This includes a potential additional investment of \$40 million on environmental RE&D.

Issue 3: The subcommittee members noted that issues associated with aviation's impact on earth's climate are increasingly coming to the forefront worldwide. The US is frequently placed in a defensive position against European policy proposals that are not always based on scientific facts. Given that the U.S. is responsible for 40% of the world's aviation activity and needs aviation as a form of mass transit, the nation must have a robust research program to be in a position to ensure any actions undertaken to mitigate aviation's climate impact are based on solid science and will have the desired outcome.

Recommendation 3: The subcommittee recommends that the Administrator establish a robust RE&D effort toward addressing the uncertainties associated with aviation's impact on earth climate. This effort should be accomplished not only by providing new FAA resources, but also by engaging the senior leadership of the Federal agencies participating in the U.S. Climate Change Science Program (CCSP) to ensure their investments address this important issue.

Issue 4: Subcommittee members commended the FAA for actions taken in the last six months to address fuel availability/energy independence. The subcommittee feels this is a key strategic issue and needs continued focused attention and resources. Members also expressed that it is important to continue working this area, even if fuel prices drop in the short term.

Recommendation 4: The subcommittee recommends that the Administrator direct AEE to continue and augment its efforts to work with DoD, DoE, and NASA to advance the use of alternative fuels in aviation. The agency should also augment resources in this area, and look beyond environmental issues to also address reliable energy supply and any safety issues associated with the use of aviation alternative fuels.

Issue 5: The subcommittee commended recent efforts under the Airports Cooperative Research Program (ACRP) to address pressing particulate matter (PM) and hazardous air pollutants (HAPs) research issues. However, the subcommittee members feel that there are still many needs and that the ACRP efforts only scratch the surface.

Recommendation 5: The subcommittee recommends that the Administrator continue to seek additional resources to address PM and HAPs RE&D issues. This includes ensuring that ACRP efforts have a strategic long term view toward addressing PM and HAPs issues that affect airports, beyond the present limited scope.

Subcommittee on Aircraft Safety

The subcommittee would like to thank the FAA for supporting the subcommittee's request for a review of 2009 R&D requirements before they were finalized in the TCRG process. The subcommittee appreciates that the presentations had been prepared in the requested format. Subcommittee is also grateful for the review provided by the FAA of the TCRG process of establishing priorities and funding levels.

The Subcommittee realizes that the FAA staff is responsible for defining R&D requirements are investing significant effort in the process of defining them. FAA staff is obviously passionate about their R&D requirements. Unfortunately, due to severe funding constraints, a significant fraction of the requirements can not be funded. The Subcommittee is of the opinion that overall projected 2009 FAA R&D funding is inadequate and that the FAA should seek to leverage it with contributions from other government agencies and the private sector where possible.

SAS Recommendations

1) **System Safety Management TCRG:** The Subcommittee has historically been supportive of the development of a systematic approach to safety management based on data; data mining and rigorous risk assessment because it believes that such an approach, if successfully implemented, would offer significant safety benefits in the long term. At the same time, the Subcommittee has been consistently critical of the lack of technical performance on past projects in this area as well as the lack of a clear definition of how such a system would be implemented.

Nevertheless, SAS cannot support at this time the plan of the System Management TCRG, as presented, for the following principal reasons:

- a) The plan does not describe how such a system would be implemented and what the FAA's commitment is to full implementation.
- b) Since the plan represents a key element of the future of the FAA's safety management, it needs to be coordinated with the JPDO. It was not apparent that such coordination was part of the plan.
- c) The plan should include all aviation sectors, including GA.
- d) The poor past technical performance record in this area – more than \$35 million have been spent over the past 14 years on projects ranging from SPAS to SASO without major safety benefits having become visible.
- e) Funding the plan would divert major resources from other areas of FAA aircraft safety research. The plan does not provide an argument for such a redirection of priorities based on a comparative cost-benefit analysis.

Because the Subcommittee suspects that a System Safety Management approach along the lines proposed, if properly conceived and executed, would provide major safety benefits long into the future, it recommends that the plan be subjected to an in-depth review by a competent review

panel of experts. The Subcommittee suggests that such a review panel be established under the auspices of the National Academy of Sciences. A successful review would not only provide a solid basis upon which to make the needed difficult funding choices but it would also enhance the credibility of the entire program, which might result in stronger congressional support.

- 2) **JPDO:** The TCRG's should ensure that they remain informed about short-, medium- and long-term R&D needs. For the long-term component they need to stay informed about the JPDO's plans. While the latter appeared to be generally accepted, some presentations did a more convincing job than others to describe how JPDO informed their requirements planning.
- 3) **Upset Recovery Simulator Software:** Such software would undoubtedly bring safety benefits. However, in view of the severe shortfall in FAA R&D funding, the FAA should try to get the private sector to contribute to the development of such software.
- 4) **Human Factors:** Head-up displays for synthetic vision should be capable of integrating enhanced vision information. Enhanced vision systems are about to enter regular service on transport aircraft; it would be impractical to have two separate head-up displays, one for synthetic vision, the other for enhanced vision.
- 5) **Electrical Systems:** All high-energy batteries should be included, not only lithium ion ones.
- 6) **Mil Handbook 17:** Continued FAA support is necessary.
- 7) **UAS:** The FAA needs to limit its activities to establishing standards and regulations and leaves actual product development to the private sector.
- 8) **Aging Aircraft:** The term "Aging Aircraft" as a budget line item and program area needs to be changed to what it has de facto been for many years: "Continued Airworthiness" or something similar. The old term has outlived its usefulness in the congressional budget process. Instead of encouraging Members of Congress to consider funding a familiar program it has turned into the negative connotation of an old program that should have completed its mission and should no longer is in need of funding.

Subcommittee on Human Factors

1. Training: Simulator Motion Requirements

Committee Recommends: Reconsideration of motion standards in Part 60 rewrite & ICAO Doc. 9625 and extension of work to advanced maneuver simulation including upset recovery

2. Safety Data

Committee Recommends: Review and coordination of data bases & programs with reference to tracking and coordinating human factors issues.

3. Performance Measurement

Committee Recommends: Develop a transition plan for previously NASA funded databases and critical human factors efforts (e.g., LOSA, Flight Automation Issues, Team Performance Modeling, Concurrent Task Management) to industry or other FAA program support bases to avoid loss of critical information and expertise

4. Weather Research and Development Integration

Committee Recommends: a systematic study across domains of what weather related decisions need to be made to assure appropriate presentation of weather information to decision makers in current and future systems.

5. NGATS Policy and Procedures

Committee Strongly Recommends: Strongly recommends that the Human Factors Research and Engineering Group be involved in JPDO committees associated with the development of policy and procedure and the coordination of near term R&D, to assure human performance capabilities integration, identify human-system failed-mode and safety issues, develop procedure requirements for training, and to assure appropriate functional allocation among human and automated systems.