U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of the Administrator

800 Independence Ave., S.W.
Washington. D.C. 20591

July 26, 2019

Dr. R. John Hansman, Ph.D.
Chair, Research, Engineering and
Development Advisory Committee
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, MA 02139

Dear Dr. Hansman:

Thank you and the Research, Engineering and Development Advisory Committee (REDAC) members for your May 2, 2019 letter and the wide-ranging observations and recommendations offered by the subcommittees. I appreciate the insights and valuable dialog they stimulate to address critical issues, emerging challenges and research needs across the aviation industry. The perspectives offered by the RED AC provide increased understanding of critical drivers that we must consider within the broader aviation research landscape to build and shape a portfolio that responds to the needs of our very dynamic industry.

I have reviewed the committee's recommendations and herein enclose the Agency's responses. We will continue to consider the Committee's recommendations as we maintain a research portfolio that helps sustain a safe, efficient and environmentally sustainable aviation system.

We look forward to continuing our valuable dialog and collaboration.

Sincerely,

Daniel K. Elwell
Acting Administrator

Enclosure

FAA Response to Research, Engineering and Development Advisory Committee (REDAC) Recommendations for the Fiscal Year (FY) 2021 Research and Development (R&D) Portfolio

Subcommittee on Human Factors

Recommendation (1): The FAA should use the Human Factors (HF) Subcommittee emerging issues list to inform both the Research and Development Landscape drivers as well as the requirements for the HF research portfolio. The FAA should ask the Subcommittee for additional guidance or specificity on the HF emerging issues where it would help them understand the HF issues to be addressed.

Consequences: Addressing the emerging issues list will proactively reduce safety risks in the aviation system. Conversely, not addressing the emerging issues list will result in adding safety risks into the system, especially as new features and operations are added to the system.

FAA Response: The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. The FAA looks forward to what the aviation community shares for our consideration. The HF Subcommittee's most recent emerging issues list will be provided to: a) the William J. Hughes Technical Center Office under the NextGen Organization, which is responsible for the research & development landscape; b) the NextGen Portfolio Management and Technology Development Office, Human Factors Division; c) the Office of Aviation Safety technical sponsors who develop research requirements; and d) the Air Traffic Organization Human Factors Research Requirements Roundtable program manager within the Management Services unit. The FAA will continue to brief the HF Subcommittee at future meetings with status and rationale for funded and unfunded research.

Recommendation (2): The FAA should ensure the proposed FY2021 Enterprise Air Traffic Control (ATC) Human Factors research plan is in fact funded as planned and if there are gaps in the research, that are not covered under the current plan, they are identified and added to the proposed work for 2022.

Consequences: If the FAA does not fund the proposed research it will jeopardize the early identification of HF opportunities and assessments needed to minimize program costs, enhance safety, and minimize operational risks.

FAA Response: The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. The FAA will continue to brief the HF Subcommittee on the status of the proposed FY 2021 Enterprise ATC HF research plan, including rationale for any changes in the plan or its execution.

Subcommittee on Aircraft Safety

No Findings and Recommendations Report during the Winter-Spring 2019 reporting cycle due to truncated schedule.

Subcommittee on Environment and Energy

Recommendation (1): The Subcommittee strongly supports the prioritization of the noise research that will support informed decision-making and enable NextGen Deployment. We believe that the focus should be on impacts of Subsonic, Urban Air Mobility /Unmanned Aircraft Systems (UAM/UAS), Supersonics and then Commercial Space vehicles, in that order. The FAA should aggressively move forward with its research efforts as research is the key to establishing sound policy.

FAA Response: The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. Aircraft noise-related concerns continue to pose a challenge to enhancing safety, capacity, and efficiency, and accommodating growth. UAM/UAS supersonic aircraft, and commercial space vehicles all present economic opportunities for the U.S. We have been working for many years to better understand the issues associated with noise from subsonic airplanes and helicopters and identify solutions that could help address noise concerns. For example, we are continuing to explore operational procedure concepts that could help mitigate noise issues while also improving the Aviation Environmental Design Tool (AEDT) to ensure it can quantify aircraft noise at further distances from airports, where some communities are expressing concerns. We are also working in close collaboration with National Aeronautics and Space Administration (NASA) to address noise from subsonic and supersonic aircraft, helicopters, UAS and UAM. This includes domestic efforts as well as efforts in the International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP). Noise reduction from gas turbine powered fixed wing aircraft will also be an area of emphasis for the third phase of the Continuous Lower Energy, Emissions and Noise (CLEEN) Program, which will start in 2020 and is included in the FY 2020 President's budget request.

Recommendation (2): The Subcommittee recommends the prioritization of all research efforts/programs that will allow the FAA and the U.S. to maintain its current global leadership position at ICAO/CAEP and to expedite university research grants that support the U.S. work in ICAO/CAEP. It is the belief of the Subcommittee that if the FAA/U.S. does not maintain its leadership position at ICAO/CAEP, it will not be able to influence policy/rulemaking and this could have a significant negative impact on the U.S. aviation industry.

FAA Response: The FAA concurs with the Committee's recommendation and is undertaking the following actions to address it. The FAA appreciates the support of the Subcommittee for our ICAO/CAEP activities and the impor1ance of continued U.S. leadership therein. We concur that it is critical for FAA to have robust participation in the ICAO/CAEP process and we have devoted resources such that we can provide leadership in many of the working groups of CAEP. FAA prioritized research efforts include developing the modeling capabilities and generating the data to support the decision-making process within ICAO/CAEP. We are currently working with U.S. stakeholders and the international community to develop noise standards for supersonic aircraft. These aircraft will need the operational flexibility to be able to take off and land in other countries, which will require international agreement at ICAO on takeoff and landing noise levels. As the Aviation Environmental Design Tool (AEDT) is the primary tool for supporting decision making at International Civil Aviation Organization (ICAO)/Committee on Aviation Environmental Protection ICAO/CAEP, we are working with the Volpe Center to enhance its capabilities to include supersonic aircraft. We are also working with industry, NASA and Aviation Sustainability Center (ASCENT) Center of Excellence universities to develop the data that will inform the decision-making process of ICAO/CAEP. This includes efforts to ensure that a wide range of aviation fuels can receive credit under the ICAO Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). In the past, we made considerable investments with industry and academia to develop an engine Particulate Matter test database and modeling capabilities. Because of these investments, we were able to reach an international agreement on a cost-effective engine particulate matter emissions standard at the CAEP/11 meeting.

Recommendation (3): Since the maturation of the Alternative Jet Fuel (AJF) program will be a major environmental benefit for the public, will create a new industry within the U.S. that benefits rural America, and will benefit the U.S. aviation industry, we strongly support funding for the continuation of research on AJF.

FAA Response: The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation(s). The FAA continues to conduct research & development on the topic of AJF. We recently convened the Commercial Aviation Alternative Fuels Initiative (CAAFI) Biennial General Meeting, which brought together nearly 200 people from industry, government, and academia to discuss progress in the deployment of alternative jet fuels. We are also happy to note several research and development projects to conduct testing and analysis on alternative jet fuels within the ASCENT Center of Excellence have been executed. These projects are key to ensuring that innovative new fuels are indeed safe for use by the commercial fleet as well as ensuring that domestically produced aviation fuels can be used by airlines towards meeting their offsetting requirements under CORSIA. We also recently convened an industry day in preparation for a solicitation for the third phase of CLEEN and had much industry interest in research on alternative jet fuels.

Recommendation (4): The Subcommittee continues to endorse the robust funding of Public Private Partnerships like the CLEEN, CAAFI and ASCENT that leverage scarce resources. The Subcommittee is also pleased with the close collaboration between NASA and the FAA. AEE presented an overall plan on how to get much needed new research ideas and to expedite the grant approval process. The Subcommittee endorses this plan. In order to not interrupt the much needed work that is being accomplished, we request that the FAA adopt this plan and expedite the approval of university grants.

FAA Response: The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. The FAA supports the Administration's vision to maximize the impact of taxpayer dollars by improving the efficiency of Federal programs through partnerships with industry and creating benefit for the American public. The vast majority of the Environment and Energy Research and Development (R&D) program has been leveraging resources from the private sector via public-private partnerships. CLEEN, CAAFI and ASCENT have all been successful because of their strong engagement with industry. ASCENT builds on the Partnership for Air Transportation Noise and Emission Reduction (PARTNER) Center of Excellence, which also had strong engagement with industry. Each of these programs, CLEEN, CAAFI, and ASCENT/PARTNER, have had strong partnerships with, and support from, industry for over a decade. We also appreciate the recognition of our close partnership with NASA and its value. We are also working in close collaboration with a number of federal agencies in the area of alternative jet fuels. We have worked hard to develop these partnerships over many years. Appropriations for the Environment and Energy R&D Program have enabled private sector innovation through partnerships with industry, academia, private sector, and other government agencies and coordinate initiatives across federal agencies to maximize collaboration and avoid duplication of efforts.

To help expedite the grant process, we have developed an approach that directly incorporates senior FAA leadership decision-making into the process, and does so at an early stage of the grant development. We are currently using this new approach for the first time and look forward to reporting on it at a future Subcommittee meeting.

Recommendation (5): The Subcommittee recommends the FAA continue the simultaneous balanced development of usability improvements, enhanced features, and increased accuracy of the AEDT in the near term. The FAA should make a point of emphasis to improve the dispersion modeling that is used by AEDT to evaluate air quality impacts. We also recommend that the FAA reach out to airports that use air quality and noise monitors and partner with them in order to get their emissions and noise data that would support their modeling efforts.

FAA Response: The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. The FAA appreciates the support of the Subcommittee to improve the air quality modeling capabilities within AEDT. As required by the Environmental Protection Agency (EPA), AEDT uses Atmospheric

Dispersion Modeling (AERMOD) to model the dispersion of criteria pollutants. However, AERMOD was not designed for aircraft emissions. For example, it cannot accurately capture the three-dimensional effects of a rising aircraft plume. The FAA has awarded a grant to the University of North Carolina under the ASCENT Center of Excellence to help us determine an appropriate and efficient approach to address the dispersion modeling deficiencies that are currently in the AERMOD tool. In the interim, we are working to develop solutions to improve the accuracy within the limits of the current EPA model and identify means for airports to show their projects are in compliance with air quality standards through the use of their monitoring data.

Subcommittee on Airports

Recommendation (1): The Subcommittee recommends that the FAA proceed with updating its 10-year airport pavement research plan in coordination with both the Subcommittee and the more specialized airfield pavement Technical Advisory Group. We also request a progress report concerning the I 0-year plan at our Summer 2019 meeting.

FAA Response: The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. The Airport Pavement Research Section will keep coordinating the final phases of the I 0-year pavement research plan with the Pavement Research Technical Advisory Group, addressing all the comments that have been provided by this Technical Advisory Group, and will provide a progress report at the Summer 2019 meeting.

Recommendation (2): The Subcommittee recommends that the FAA work with the Subcommittee members and other subject matter experts both within the airport industry and. more broadly, in the fields of technology, urban planning, and transportation planning to better understand the evolving field of "smart airports" and narrow its research focus to areas that are (1) associated with FAA’s statutory remit and (2) not otherwise being researched or developed by industry.

FAA Response: The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. The Airport Technology Research Branch will work with various subject matter experts and others in the aviation industry to stay abreast of the most recent developments in the rapidly evolving '·smart airport" field. A dedicated part of this effort will be to identify specific areas that, in the future, will require FAA’s involvement as smart airport concepts and applications mature and take hold at various locations.

Recommendation (3): The Subcommittee reiterates its recommendation that the FAA proceed with all due speed with defensible research into the performance and use of alternatives to

Aqueous Film Forming Foam (AFFF) in the civil aviation sector including completing and commissioning its new fire research facility at the Technical Center.

We also reiterate our recommendation that the Airport Technology Research Programs perform a gap analysis of research regarding the health and environmental hazards associated with fluorinated AFFF use at airports and work with the Subcommittee to determine how these gaps can be addressed either within or externally to these FAA Research Programs.

FAA Response: The FAA concurs with the Committee's finding and recommendation and is undertaking the following actions to address its recommendation. The Airport Technology Branch is closely monitoring the on-going construction of the Aircraft Rescue and Firefighting (ARFF) Research Facility located at the FAA Technical Center. Completion of the facility is on schedule for completion in early Fall of 2019. If feasible, a visit to this facility will be organized at the next Summer 2019 Subcommittee meeting. Once the facility is complete, the FAA will have at its disposal a state-of-the-art tool to test, in a full-scale mode, possible alternatives to traditional AFFF.

The Airport Technology Research Aircraft Rescue and Fire Fighting (ATR ARFF) Research Program has already initiated a gap analysis of research regarding the health and environmental hazards associated with fluorinated AFFF use at airports. The gap analysis is being performed concurrently with a literature review search for fluorine-free alternatives that was started in the first quarter of calendar year 20 I 9. The gap analysis is scheduled for completion at the end of the second quarter of calendar year 2019. The results of the gap analysis will be presented at the Summer 20 I 9 Subcommittee meeting, where discussion can take place on how to best address potential gaps.

Subcommittee on NAS Operations

Recommendation (1): The Subcommittee recommends that the Enterprise Concept Development project for Notice to Airmen (NOTAM) modernization engage HF experts to help develop and validate effective concepts that adequately address human performance issues.

FAA Response: The FAA partially concurs with the Committee's recommendation(s) with the noted exceptions and clarifications intends to undertake the following actions to address its recommendation.

- The FAA will accept the recommendation to address HF aspects into the NOTAMs modernization effort to yield principles for information display and sharing.
- The FAA will determine the appropriate budget line to address human factors aspects in support of the NOT AMs modernization effort.
- The FAA will continue to provide the Subcommittee with status and rationale on the portfolio priorities for funded research in order to obtain feedback on areas that require reconsideration.

Recommendation (2): Weather Technology in the Cockpit (WTIC) should include research activities in their FY2021 portfolio that address weather information requirements and minimum service criteria for pilotless passenger aircraft, particularly when these operate in urban airspace over people, structures or ground vehicles. Unique meteorological aspects of the urban environment, for example blockage and/or channeling of winds which could affect safety of ascent or descent should be considered.

FAA Response: The FAA concurs with the Committee's finding and recommendation, and with the noted exceptions intends to undertake the following actions to address it. The recommendation is consistent with the WTIC Program's overall objective to produce Minimum Weather Service recommendations for all part/type aircraft. However, the WTIC Program will consider the Committee's recommendation against already high priority activities during the FAA's budget formulation process. At such time that this research is identified as a high priority during budget formulation, the WTIC program will incorporate the research into their program planning and execute accordingly.