Airport Technology Research Overview & Airport Noise and Environmental Research Update

To: REDAC Subcommittee on Environment & Energy

By: Dr. Michel Hovan, Branch Manager, ATR

Tom Cuddy, Airport Planning and Environmental (APP-400)

Date: March 7, 2018

Agenda

- ATR Research Overview – Michel Hovan
- PFC Research within Aircraft Rescue Firefighting (ARFF) – Michel Hovan
- Airport Noise & Environmental Research Update – Tom Cuddy

William J. Hughes FAA Technical Center

- 3,000 Fed/Contractor
- 1,000 non-FAA Tenants
- Over 5,000 Acres

Airport Technology Research

19 Research Program Areas (RPAs)

Airport Safety R&D Section

Airport Pavement R&D Section

Research Sponsored by:

- **FAA Office of Airport Safety and Standards**
  - Airport Engineering Division (AAS-100)
  - Airport Safety and Operations Division (AAS-300)
- **FAA Office of Planning and Programming**
  - Planning and Environmental Division (APP-400)
- **FAA Office of Environment and Energy**

Provide support for development of FAA pavement and safety standards (Advisory Circulars).

Airport Safety RPAs

- **S1 - Airport Planning & Design**
  - Trapezoidal Grooves, FOD Detection, Taxiway Deviation, Airport Planning Tools, RIM
- **S2- Airport Safety Database**
  - Safety data from various sources

- **S3- Aircraft Rescue and Fire Fighting (ARRF)**
- **New Large Aircraft Strategies & Agent Methodology, ARFF Vehicles, Firefighting Systems, Agents, Tools, Composites**

- **S4- Wildlife Mitigation**
  - Avian Radar, Wildlife Strike Database, Wildlife Management
- **S5- Visual Guidance**
  - Lights, Signs, Paint/Markings, LEDs, Other Visual Cues, Incursions
- **S6- Runway Surface Operations & Technology**
  - Friction, CFMEs, Winter Ops, TALPA, Deicing, EM
- **S7- Airport Safety and Surveillance Sensors**
  - Low cost surveillance, Aeromacs

Airport Safety RPAs

- **S8 – Reserved**
- **S9 – Research Taxiway**
  - Outdoor Facility located at Cape May Airport

- **S10- UAS Integration at Airports and Detection**
  - Airport Applications and Detection
- **RPA N1-5 Airport Noise / and RPA Environmental**
  - Annoyance, Sleep Disturbance, NLR, GIS Tools, Air Quality

Overall Branch Budget

- **ATR Budget stable around 33M for FY-18 to FY-20**
  - 90% of budget is contract dollars
  - 38% on Pavement Research
  - 37% on Safety Research
  - 8% on Noise and Environmental Research
  - 17% on Facilities

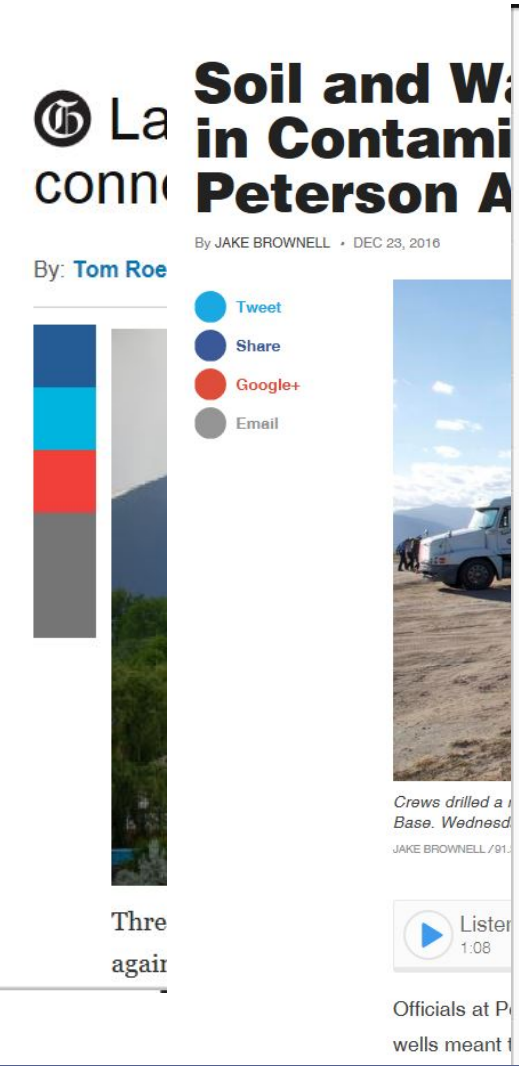
ARFF Program - Environmental Effects of AFFF

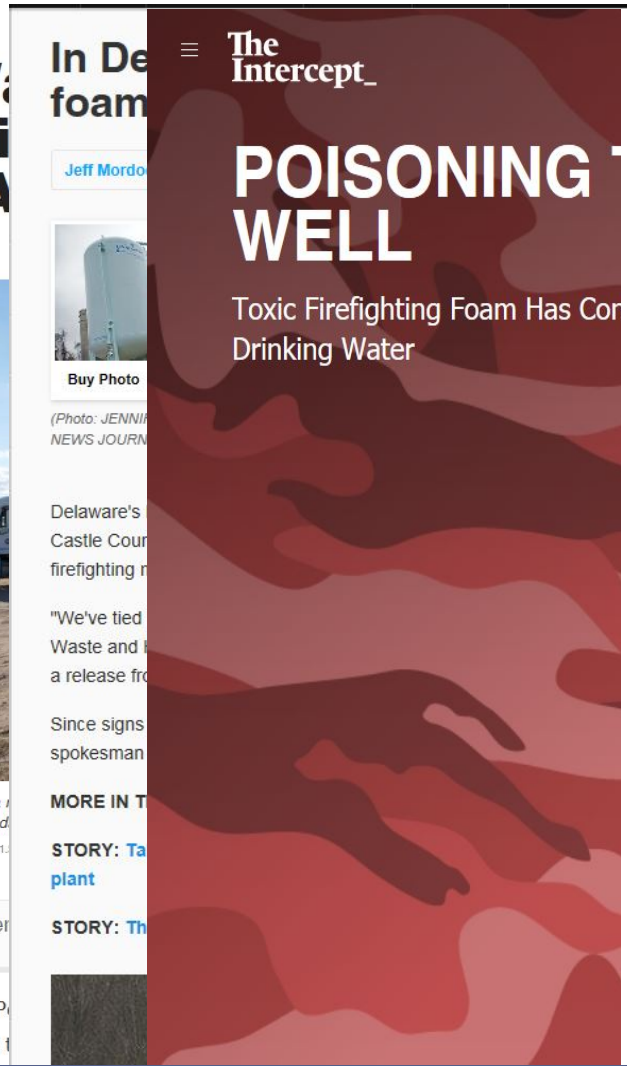
- **What is AFFF?**
  - Aqueous Film-Forming Foam

Perfluorinated Surfactants = PFCs

- **PFOS – 3M stopped production around 2002**
  - Are all other AFFF's going away?
- **PFOA – All other manufacturers**
  - EPA backed off these chemicals
  - EPA Voluntary Stewardship Program – thru 2015
  -

PFC Contamination Headlines





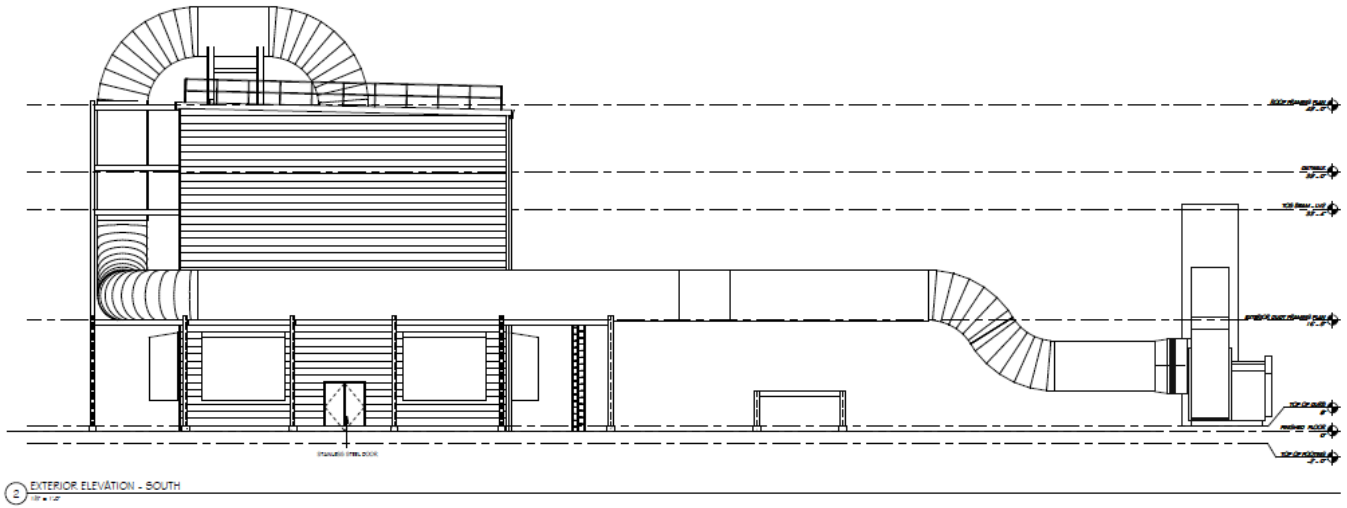
Current AFFF Industry

- Foam manufacturers working to reduce the amount of PFOA by using different chemical formulas (C6 vs C8 carbon chain).
- Int'l standard organizations are adding PFOA limits as part of approval process.
  - EU 25ppb PFOA
  - NavSea – considering limiting PFC's amounts in Mil Spec
- **New AFFFs do not have PFOA yet still utilize other PFC's in their formulation.**

ATR Current Research - ARFF

1. **Evaluate AFFF Alternatives – Flourine-free foams**
   - Limited labs large enough for required testing
   - None capable of handling chemical waste collection

ATR planning for a new fire test building to evaluate new firefighting agents.



ATR Current Research - ARFF

2. Foam Proportioning System Test Technologies

- 14 CFR Part 139 requires airports to discharge foam for annual certification.
- Create new process for testing foam without discharging onto the ground.
- Two current systems:
  - No-Foam System
  - Eco-Logic (E-One)

Airport Noise Research Funding FY16 – FY19

RPA N - Airport Noise [$ Mil]	FY16 $.75	FY17 $1.65	FY18 $2.1	FY19 $2.05
N1 National Noise Survey				
N1.1 - National Noise Survey				
N1.2 - NEPA Significance Definition				
N1.3 - Interior Sound Mitigation				
N1.4 - Mitigation Below 65db DNL				
N1.5 - National Noise Survey Phone Analysis				
N2 DNL & Metrics Evaluation				
N2.1 - Noise Metric Re-Evaluation Using Noise Survey Results				
N3 Sleep Disturbance				
N3.1 - National Survey to Quantify Impacts of Aviation Noise on Sleep Disturbance				
N4 Noise Mitigation				
N4.1 - Investigation of ASTM E966 Adjustment Factors				
N4.2 - Noise Level Reduction Review of Test Methods				
N4.3 - Noise Abatement Procedure Effectiveness				
Placeholder for 10-year framework results				
N5 Operations				
N5.1 - Noise Dispersion with Equivalent Space Operations (ELSO) PBN Procedures				
N5.2 - Steeper Noise Abatement Approach Operational Feasibility				

Large increase from FY16 to FY17 due to merging of noise-related research from Environmental

Airport Noise Research

Noise Annoyance Survey

- Year-long data collection, drafting final report.
- A public review and comment process will occur prior to making any policy determinations

- **Phone Analysis National Survey**
  - Using phone data collected, research WHY people are more or less annoyed by aircraft noise
  - 2,328 phone interviews
  - Develop analysis plan to determine what additional information can be identified regarding annoyance responses and people's experiences.
  - Same research team - 12 month effort

Airport Noise Research

Sleep Disturbance Survey

Objective: Conduct large scale sleep study to determine national relationship between sleep and aircraft noise.

- Follow-on from ASCENT grant
- CSRA/UPENN Contract

Phase 1 – Study Design – 12 months *(kicked off in December 2017)*
Phase 2 – Study Preparation – 6-12 months
Phase 3 – Data Collection – 24 months
Phase 4 – Data Analysis & Final Report – 6-12 months

Airport Noise Research

Noise Impact & Mitigation

1. *Investigation of ASTM E966 Adjustment Factors*
   - Identify adjustment factors for measurements of noise reduction in sound insulation programs and validate factors through modeling and field measurements.
     - Façade reflection using loudspeaker and flush-mounted microphone = 6bd (5db)
     - Façade reflection using loudspeaker and near-facade microphone = 3.5db (2db)

2. *Noise Level Reduction Review of Test Methods*
   - Follow up to ASTM E966, same team, 18mo effort began in Nov 2017
   - Evaluate the 2 measurement methods used in RSIPs and help Airports develop industry standards

Airport Noise Research

Noise Impact & Mitigation

3. *Noise Abatement Procedure Effectiveness*
   - MITRE effort began Sept 2017
   - Explore operational procedures with the potential to reduce community noise expose
   - Understand procedure usage and effectiveness
   - Develop guidance leading to more effective and frequently-used noise abatement procedures

4. *Steeper Noise Abatement Approach Operational Feasibility*
   - Evaluate feasibility of steeper approaches in terms of performance, terminal instrument procedures, and Flight Management System (FMS) dependencies
   - ID, evaluate and document operational considerations
   - Recommend a path forward for use in the NAS

Airport Noise Research FY 19/20

Sleep Disturbance Survey

Annoyance Study - Re-evaluation of DNL metric

- Data mine survey results to determine if there is more appropriate metric than DNL to correlate annoyance and aircraft sound level
  - Phone survey data analysis

Develop NLR Stands through SAE A-21

Airport Environmental Research Funding FY16 – FY19

RPA E - Airport Environmental Research [$ Mil]	FY16 $1.0	FY17 $.25	FY18 $.40	FY19 $.50
E1 Environmental Tools and Guidance				
E1.1 - 10-Year Framework for Environmental/Planning R&D				
E1.2 - Airport Air Screening Methods	**Phase 1**		**Phase 2**	
E1.3 - Review of Airport Standards, A/Cs, Orders, Design Criteria for Climate Adaption and Resiliency (Severe Weather Resiliency)				
E1.4 - Geospatial Data Library/Environmental Mapping Tool				
E1.5 - Sustainability Synthesis				

Airport Environmental Research

- Extends model of airport technology research programs on pavement and airport safety to improve performance of airports in reducing environmental impacts while responding to community needs for transportation services.
- Develop environmental solutions to help airports and surrounding communities.
- Collaborative effort among ARP, AEE and Tech Center
- Began with 5 projects with FY16 funds
- Each project has a technical lead from ARP and AEE
- Developed 10-Year research plan to guide efforts

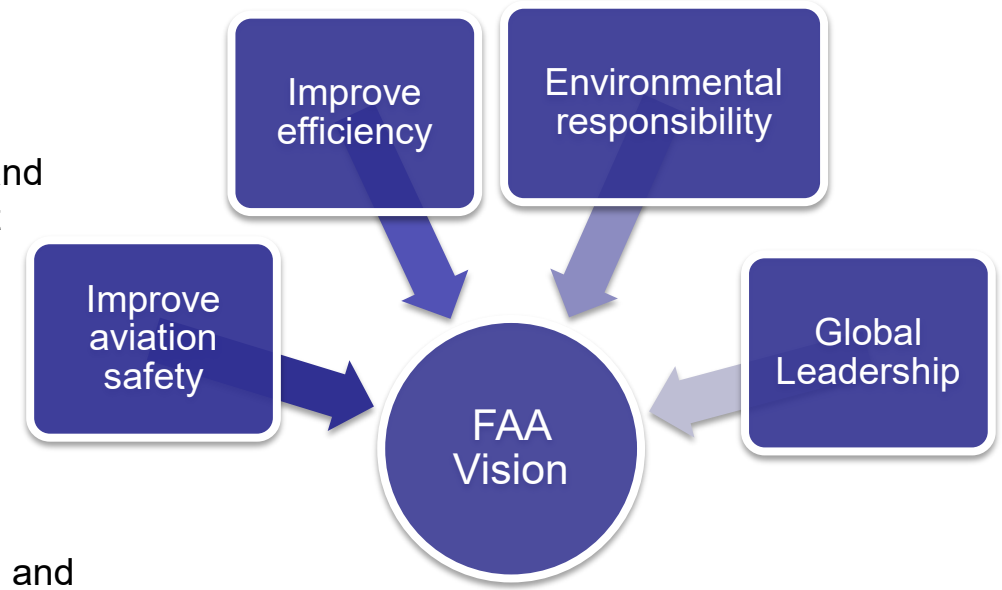
Airport Planning & Environmental Research Program – 10 Year Plan

- Established to support research efforts and development of guidance and tools for planning and environmental issues related to airport development and operation.
- High-level objectives
- Alignment of research projects under multiple focus areas
- Provides vision and justification for resources
- Inform APP policy-making decisions

Framework for Research Program

Introduction

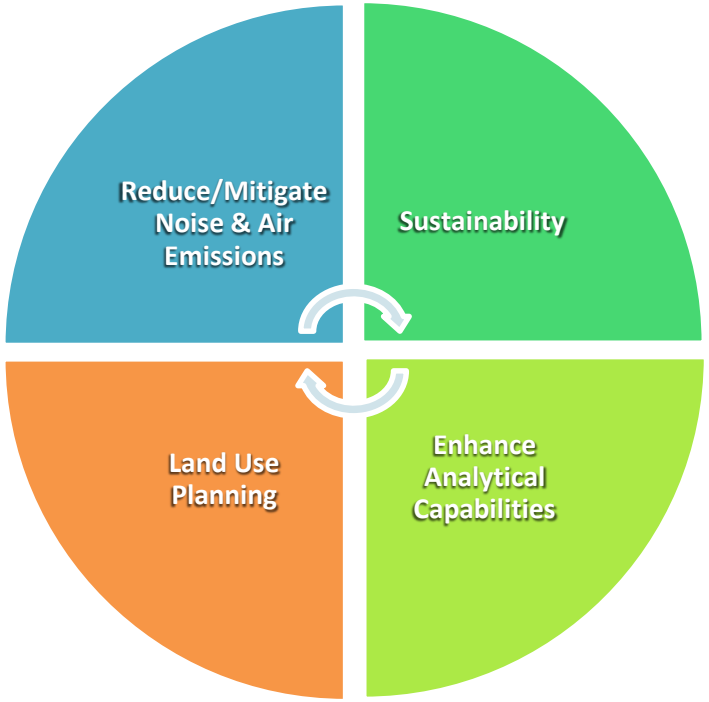
- ARP is committed to a research program that:
  - Informs a sustainable, smart growth strategy for US airports
  - Enhances incorporation of technology and data synthesis in the interest of efficient airport development
  - Prioritizes practical research with results that can be of direct use to the airport industry
- Purpose of the Environmental and Planning Research Program:
  - Ensure concepts and ideas for planning and environment are effectively integrated into the airport community through application of modern tools and processes
  - Improve the performance of airports in reducing their environmental impacts while responding to community needs for transportation services



Priority Topic Areas

Planning

Environmental



FY18 Airport Environmental Research Projects

1. *Geospatial Data Library*
   - Tool Development
2. *Airport Air Quality Screening Methods – Phase 2*
   - Validate current NEPA flow chart and operational screening methods
   - Develop construction methodology for attainment area projects
   - Updates to AQ handbook
3. *Sustainability Synthesis*

Questions?

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