Federal Aviation Administration

Airport Technology Research Overview

Presented to: REDAC Subcommittee on Environment and Energy

By: Lauren Vitagliano / Kent Duffy / Keith Bagot

Date: March 17, 2020

Airport Technology Research

19 Research Program Areas (RPAs)

- **Airport Safety R&D Section**
- **Airport Pavement R&D Section**

Research Sponsored by:

- **FAA Office of Airports, Safety and Standards**
  - Airport Engineering Division (AAS-100)
  - Airport Safety and Operations Division (AAS-300)
- **FAA Office of Airports, 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).

Overall ATR Budget

- **FY20 ATR Budget increased to $39.2M**

  ($6M earmarked for asphalt and concrete industry managed research)

  – 90% of budget is contract dollars
  – 48% on Pavement Research
  – 46% on Safety Research
  – 6% on Aircraft Noise / Environmental Research ($2M)

Noise and Environmental
Current Projects

Noise	Environmental
National Sleep Disturbance Survey	Sustainability Synthesis
Noise Level Reduction Test Methods	Future Climate Scenarios for Runway Length

FY20 Research

Continuation of:

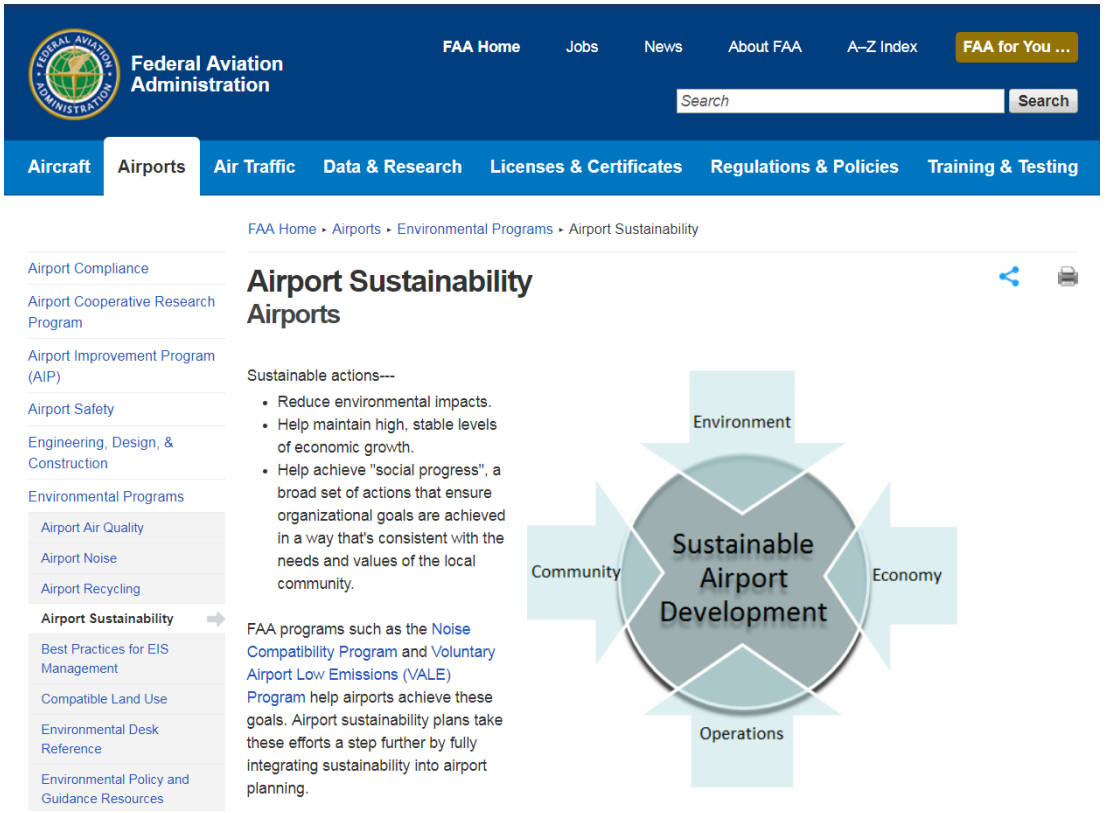
- **Aircraft Noise Annoyance Support**
- **National Sleep Disturbance**
- **NLR Test Method Standard Implementation**
- **Sustainability Synthesis**
- **Runway Length Considerations for Climate Scenarios**
- **AppMap Environmental Tool**

Airport Environmental Research
Sustainability Analysis

Sustainability Analysis

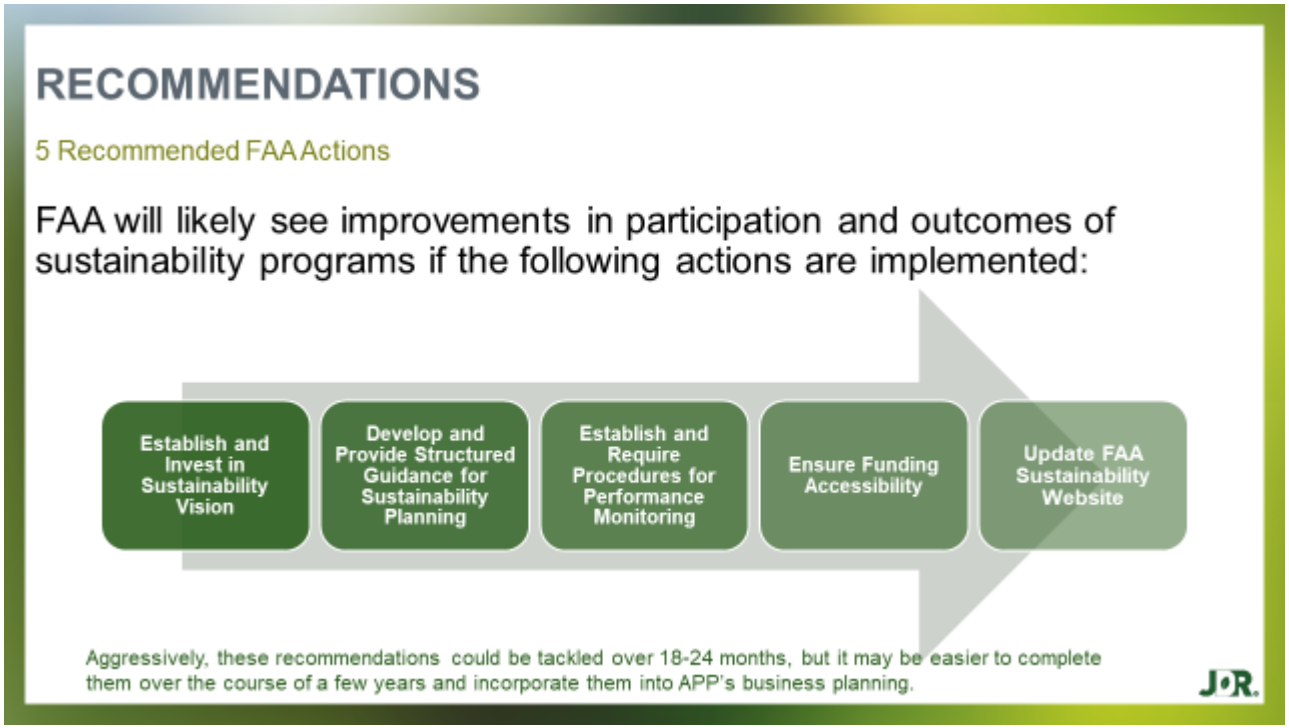
Background: In 2010 APP began Sustainability Master Plan Pilot Program, provided grants to airports; 47 grants awarded

Objective: Develop a synthesis of best practices and lessons learned from the Sustainability Master Plan Pilot Program.



Airport Environmental Research
Sustainability Analysis

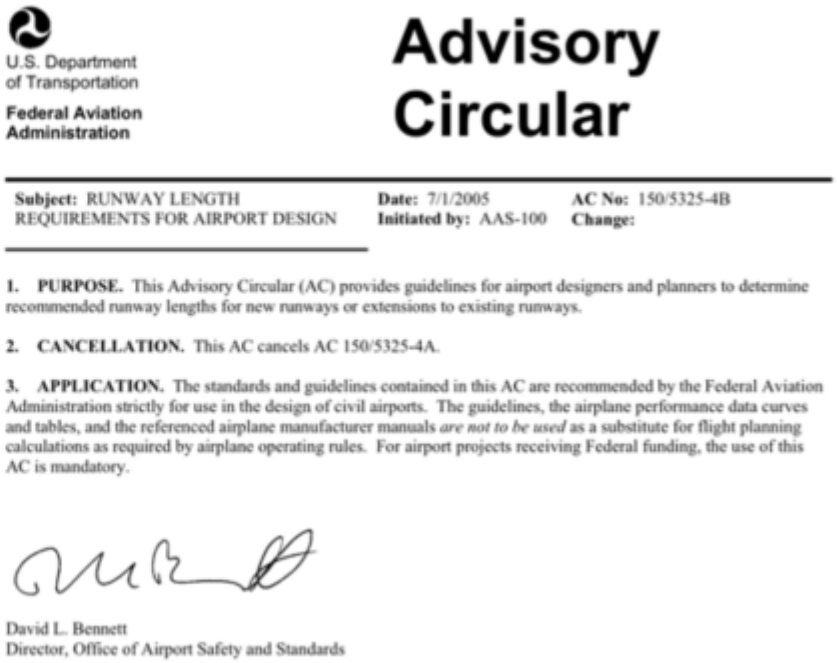
- **Draft Report submitted Nov 2019.**



- **ARP is planning next steps.**

Airport Environmental Research
Future Climate Scenarios for Runway Length

- FAA evaluates runway length needs for civil airports using Advisory Circular (AC 150/5325-4B), which contains the runway length requirements for airplanes for a range of weights, **runway conditions, temperatures**, and airport elevation
- Future environmental changes in precipitation patterns (wet or dry) and average high temperatures might **effect key inputs** that were used to evaluate runway length
- A thorough understanding of future climate trends and **their effect on aircraft performance** are needed with an update to the AC's methodology



U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: RUNWAY LENGTH REQUIREMENTS FOR AIRPORT DESIGN | **Date:** 7/1/2005 | **Initiated by:** AAS-100 | **AC No:** 150/5325-4B | **Change:**

1. PURPOSE. This Advisory Circular (AC) provides guidelines for airport designers and planners to determine recommended runway lengths for new runways or extensions to existing runways.

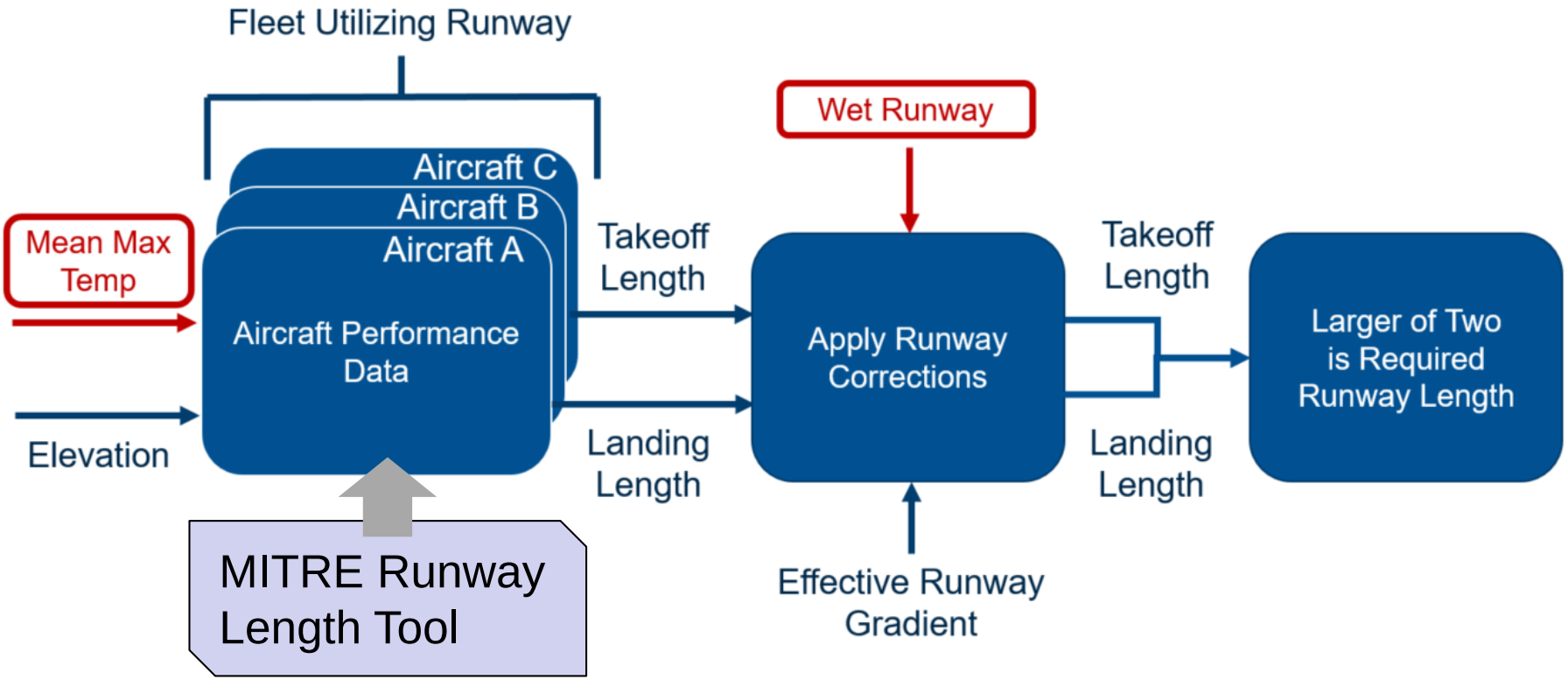
2. CANCELLATION. This AC cancels AC 150/5325-4A.

3. APPLICATION. The standards and guidelines contained in this AC are recommended by the Federal Aviation Administration strictly for use in the design of civil airports. The guidelines, the airplane performance data curves and tables, and the referenced airplane manufacturer manuals *are not to be used* as a substitute for flight planning calculations as required by airplane operating rules. For airport projects receiving Federal funding, the use of this AC is mandatory.

David L. Bennett
Director, Office of Airport Safety and Standards

Airport Environmental Research
Future Climate Scenarios for Runway Length

Advisory Circular Runway Length Analysis Procedure



Airport Environmental Research
Future Climate Scenarios for Runway Length

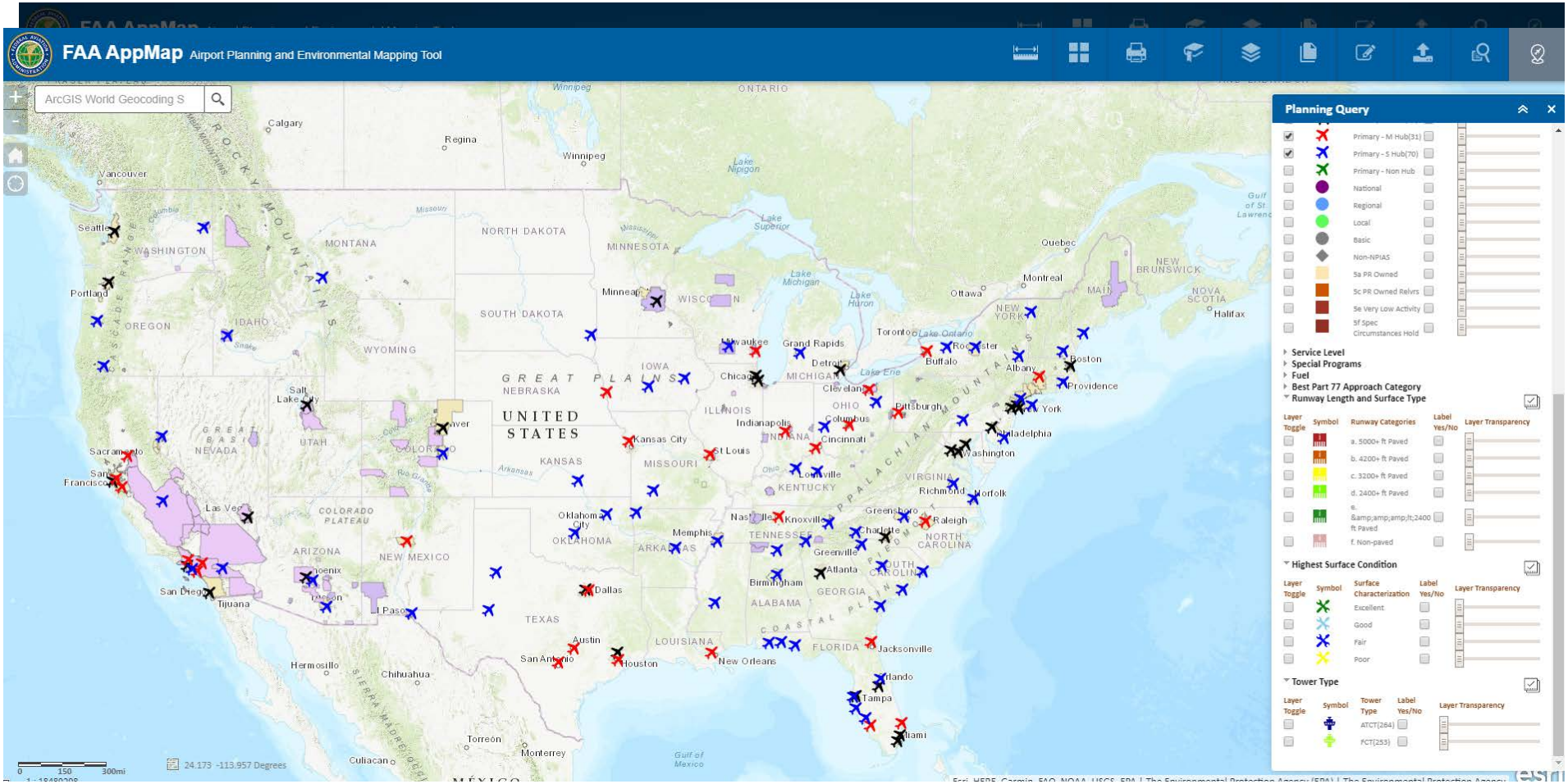
Climate Models

- Climate model has been identified to collect climate data **at current and future airport locations across the continental US through 2050**.
- The **percent of time runways would be dry or wet** and **mean daily temperature of the hottest month** will be extracted, as those are the criteria used in the aircraft performance data calculations to determine runway length
- This data will used to evaluate future runway lengths needs in the prototype Runway Length Tool, while also recognizing fleet mix trends over time

U.S. Climate Resilience Toolkit

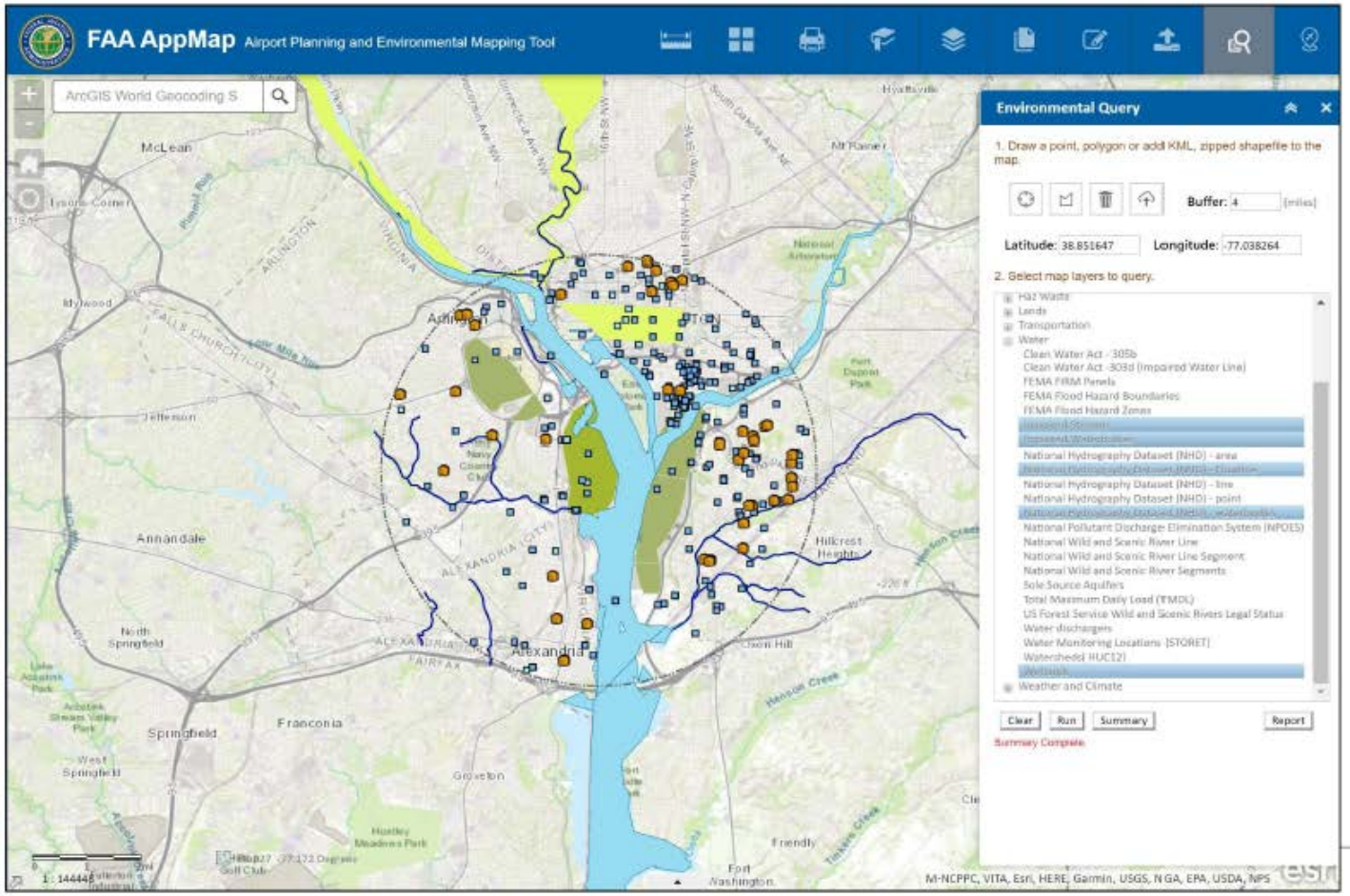
- 50 km resolution (on a county level)
- Statistical Downscaling of temperature and precipitation projections from the Coupled Model Intercomparison Project Phase 5 (CMIP5) using Localized Constructed Analogs (LOCA).

FAA AppMap http://appmap.faa.gov



FAA AppMap

ENVIRONMENTAL QUERY USE CASE - EXAMPLE MAP



AFFF Research – PFOS / PFOA

Federal Aviation Administration

Airport Safety Technology Research

Environmental Effects of AFFF

Brief History

Perfluorinated Surfactants

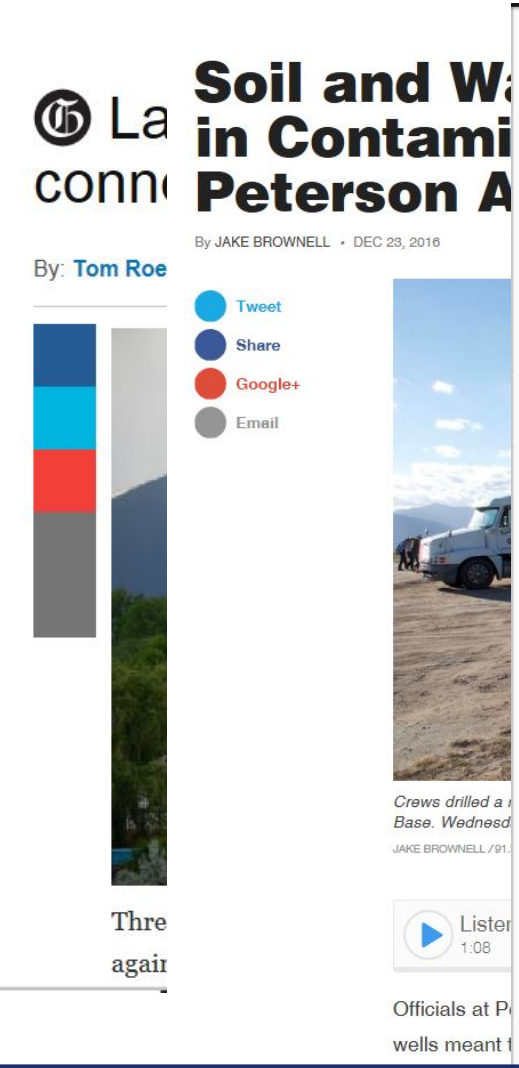
- **PFOS – 3M stopped production around 2002.**
- **PFOA – All other foam manufacturers.**
- **All long-chain (C8 or greater) production stopped by end of 2015.**

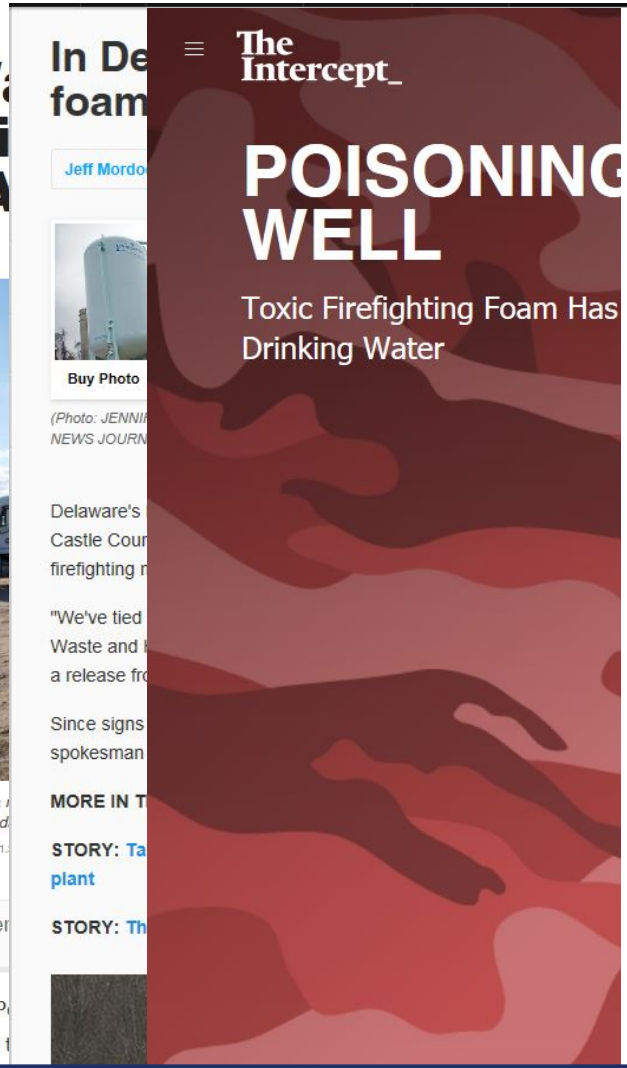
Environmental Effects of AFFF

Carbon Chains

- **Long-chain carbons – C8 and above, break down to PFOA**
- **Short-chain carbons – C6 and below, do not break down to PFOA**
- **NavSea (AFFF MilSpec owner) – considering limiting PFOA amounts in Mil Spec**
- **New C6 AFFFs do not have PFOA as an ingredient but may be evident as a “contaminant” of other chemicals in the process.**

PFC Contamination Headlines





FAA Reauthorization Act 2918

SEC. 332. PERFORMANCE STANDARDS FOR FIREFIGHTING FOAMS.

Not later than 3 years after the date of enactment of this Act, the Administrator, using the latest version of National Fire Protection Association 403,"Standard for Aircraft Rescue and Fire-Fighting Services at Airports, and in coordination with the Administrator of the Environmental Protection Agency, aircraft manufacturers and airports, shall not require the use of fluorinated chemicals to meet the performance standards referenced in chapter 6 of AC No: 150/5210–6D and acceptable under 139.319(l) of title 14, Code of Federal Regulations.

ARFF Fire Test Facility

- Preliminary design scoping document for new test facility 2014.
- Toured fire labs at NRL, NIST, ATF and CPSC - 2015.
- 100% Design and Bid Ready documents completed May 17, 2017.
- Construction contract awarded August 9, 2018.
- Notice to proceed October 31, 2018.
- Construction completed September, 2019.

ARFF Fire Test Facility

The instrumentation consists of:

- gas temperature thermocouples
- calorimeters
- pressure probe
- gas sampling probe
- smoke density meter
- heat flux sensors

- The hood calorimeter will be capable of accurately measuring the heat release rate of a 15 MW hydrocarbon pool fire.
- Building will have color and FLIR video camera array.

Input-based Foam Proportioning System Testing Technologies

- Test foam proportioning system without discharging foam onto the ground.
- Acceptable means under NFPA 412 and now Part 139 inspections (Cert Alert 19-01).
- Testing began June 2016.
- Testing completed 2018 with report published June 2019
- Three current systems:
  - No-Foam System
  - Eco-Logic (E-One)
  - Oshkosh Eco-EFP
- Fourth system currently being evaluated
  - Rosenbauer

Federal Aviation Administration

National Part 139 CertAlert

AdvisoryCautionary**Non-Directive**Advisory**Cautionary**Non-Directive**Advisory**Cautionary**Non-Directive**

Date: 10/29/2019 **No. 19-02**

To: **All Certificated Part 139 Airports and Aircraft Rescue and Firefighting (ARFF) Departments**

Subject: **Aqueous Film Forming Foam (AFFF) Testing at Certificated Part 139 Airports**

Point of Contact: Marc Tonnacliff, AAS-300, 202-267-8732
Email: marc.tonnacliff@faa.gov

1. **Purpose.** This CertAlert provides updated information and recommendations to airport operators about optional equipment for use in testing Aqueous Film Forming Foam (AFFF) systems on Aircraft Rescue and Firefighting vehicles. This guidance has been prepared in response to a directive in the FAA Reauthorization Act of 2018, described in further detail below, and it does not revise or replace any previously issued guidance other than that noted in the Cancellation paragraph below.

   This guidance is not legally binding in its own right, and the Agency will not rely on it as a separate basis for affirmative enforcement action or other administrative penalty. Furthermore, conformity with the guidance document (as distinct from existing statutes and regulations) is voluntary only, and nonconformity will not affect rights and obligations under existing statutes and regulations.

Federal Funding

Federal Aviation Administration

Memorandum

Date: JUN 10 2019

To: Office of Airports Regional Directors, AXX-600s; Airport Planning & Programming Managers, AXX-610s; Airports District Office Managers, XXX-ADOs.

From: Robin K. Hunt, Acting Director, Office of Airport Planning and Programming, APP-1

Subject: PGL 19-01: Aqueous Film Forming Foam (AFFF) Input-Based Testing Equipment

1. Purpose and Background

FAA 2018 Reauthorization

The FAA Reauthorization bill of October 2018, stated that the FAA Administrator, no later than October 2021, in coordination with the Administrator of the Environmental Protection Agency, aircraft manufacturers, and airport operators, shall not require the use of fluorinated chemicals in AFFF. This provision does not impact the current use of fluorinated foams.

Currently, the FAA has found that the fluorine-free foams are not as effective as fluorinated foams. Therefore, firefighting with fluorine-free foams requires a higher percentage of foam to water than fluorinated. The FAA continues to research fluorine-free AFFF as a high priority activity at the FAA Technical Center, with the focus on AFFF alternatives research testing and other ARFF technologies. One of the goals of these projects is to find alternative firefighting foams that are environmentally friendly, while providing the same level of safety currently offered by the AFFF that is in use today at airports.

Guidance to Airport Inspectors

FAA
Airports

Airport Certification Program – 14 CFR 139

Program Policy and Guidance Policy #108

Subject: Discharge of Aqueous Film Forming Foam (AFFF) at Certificated Part 139 Airports

Contact:
Anthony Butters, Acting Manager, Airport Safety and Operations Division
Marc Tonnacliff, ARFF Specialist, Airport Safety and Operations Division

Purpose: This program guidance letter documents the procedure the Office of Airports will follow during periodic Airport Safety Inspections to ensure adequate testing of AFFF proportioning systems.

Background: Title 14 Code of Federal Regulation (CFR) Part 139 requires airport operators to maintain their Aircraft Rescue and Firefighting (ARFF) vehicle and its fire suppression operating systems. Such systems, including the foam proportioning system and discharge functions, must be able to operate properly in an emergency situation. Order 5280.5D states "*At the discretion of the Airport Certification and Safety Inspector (ACSI), a discharge of water may be used in lieu of other agents during the timed response drill. However, a test of the agents not used in the response drill (except for Halon 1211 or Halatron) must be conducted for all vehicles used to meet the index requirements before the conclusion of the inspection to ensure the adequate capability. The ACSI may forgo testing dry chemical if the airport can document maintenance and testing of the system within the last 6 months.*"

The FAA allows tests conducted within 6 months of the airport's periodic airport certification safety inspection as proof to the integrity of the system. If such proof does not exist, the vehicle will be tested prior to the conclusion of the inspection. Airports need to maintain proper documentation of the testing and have it available during the periodic inspection.

Summary:

1. During the Aircraft Rescue and Firefighting (ARFF) portion of the periodic inspection, Airport Certification Safety Inspectors (ACSIs) will not require the discharge of AFFF during the timed response drill. The certificate holder will discharge water during the drill from all vehicles required

AFFF Replacement

Created Research Plan to outline R&D efforts

- Gap Analysis – Completed June 2019
- Literature Review – Completed July 2019
- Chemical Analysis – Starting December 2019
- Live-Fire Product Testing Begins – Starting January 2020

AFFF Replacement

Broad Agency Announcement (BAA)

- Posted December 5, 2019
- Looking for potential foam manufacturers and other industry partners to collaborate on research.

Proposed Research Timeline

- Calibration burns - December 2019.
- Baseline fire tests with current MilSpec approved product – January 2020.
- Followed by the 4 selected FFFs through June 2020.
- Products generated from BAA proposals will follow the initial 4 selected products (June 2020 – December 2020)
- Chemical analysis performed concurrently at Tyndall AFB.
- Tyndall AFB/FAA Interagency Agreement – long historical relationship of joint research together.
- Tyndall AFB has chemists and in-house laboratories to perform the chemical analysis and profiling.

Questions?

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