

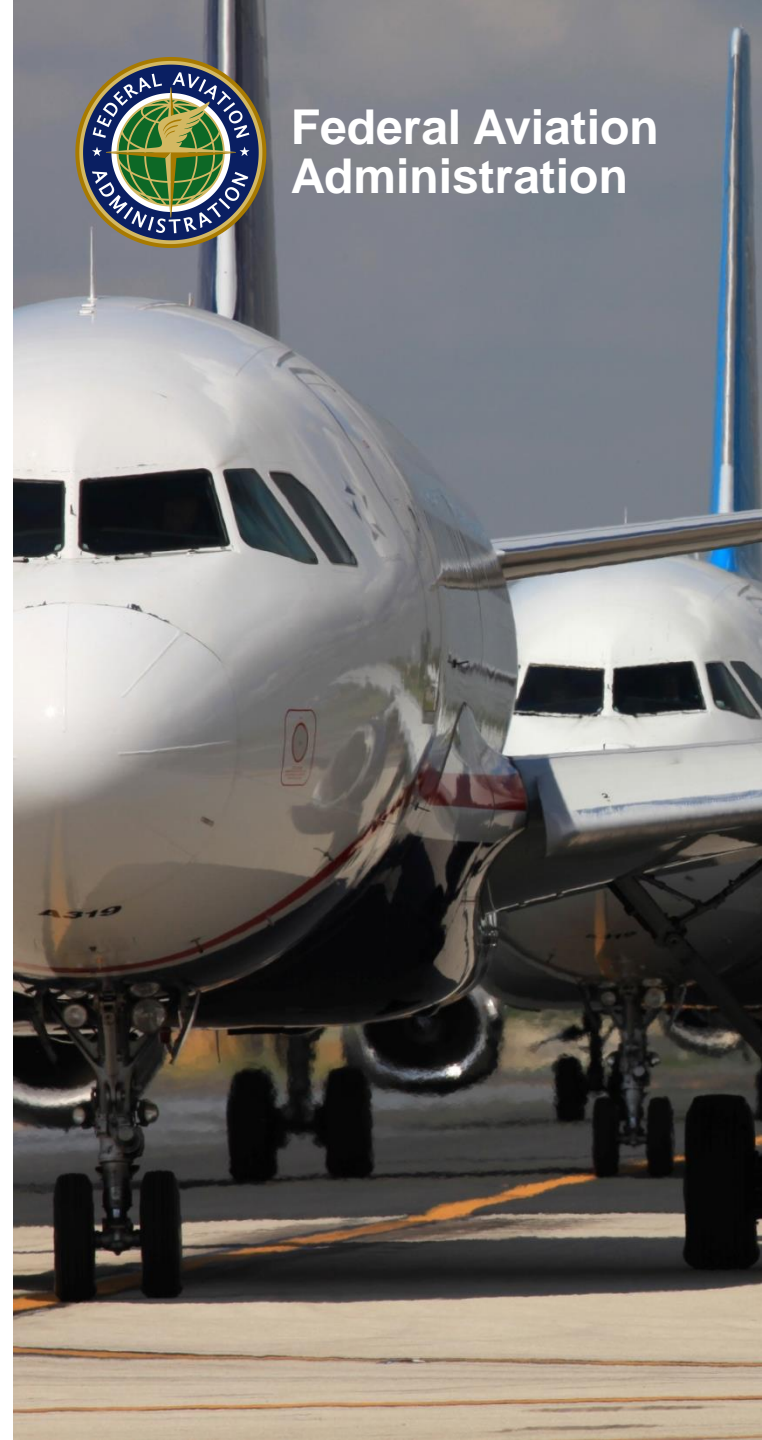
Alternative Jet Fuel ASTM Qualification

**Jetscreen Stakeholder Workshop
November 26, 2019**




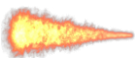
**Mark Rumizen
Senior Technical Specialist
Aircraft Certification**



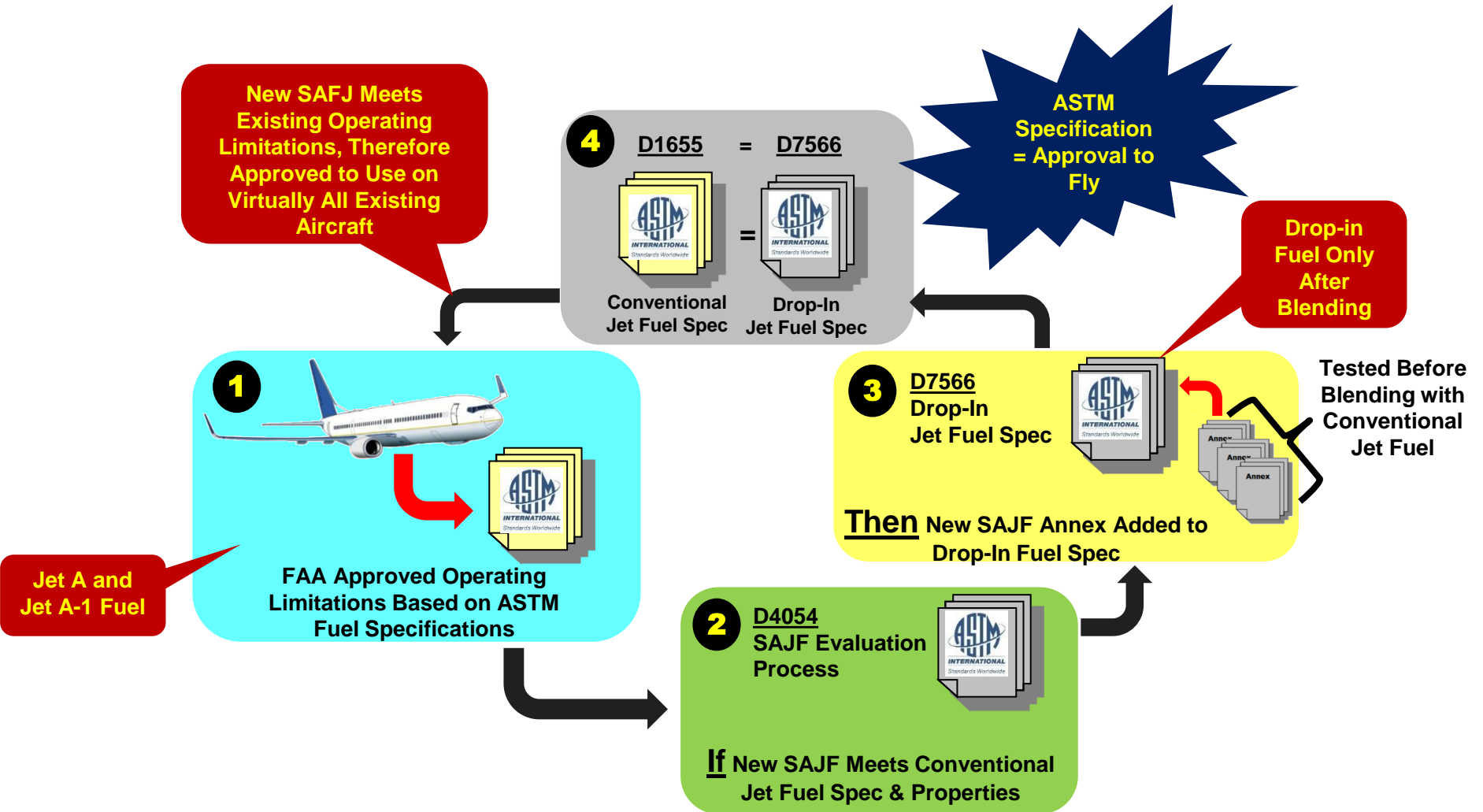
**Federal Aviation
Administration**



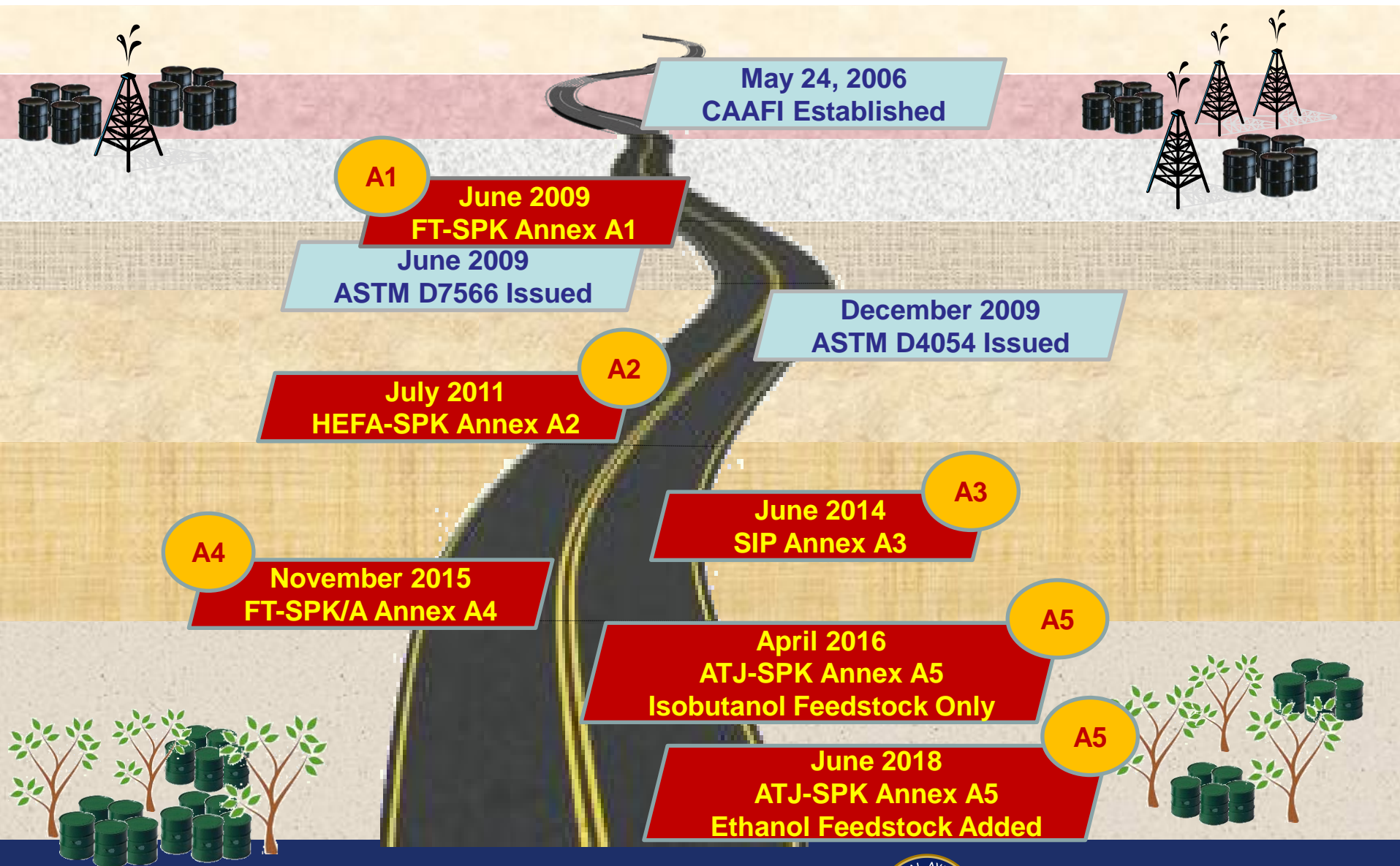
Presentation Overview

- **Qualification Process**
- **D4054 Process Improvement Initiatives**
 - D4054 Clearinghouse 
 - D4054 Fast Track Annex 
 - Alternative Jet Fuel Pre-Screening 
 - NJFCP Integration Into D4054 
- **Alternative Jet Fuel Status**

How does an AJF Get Qualified for Use?

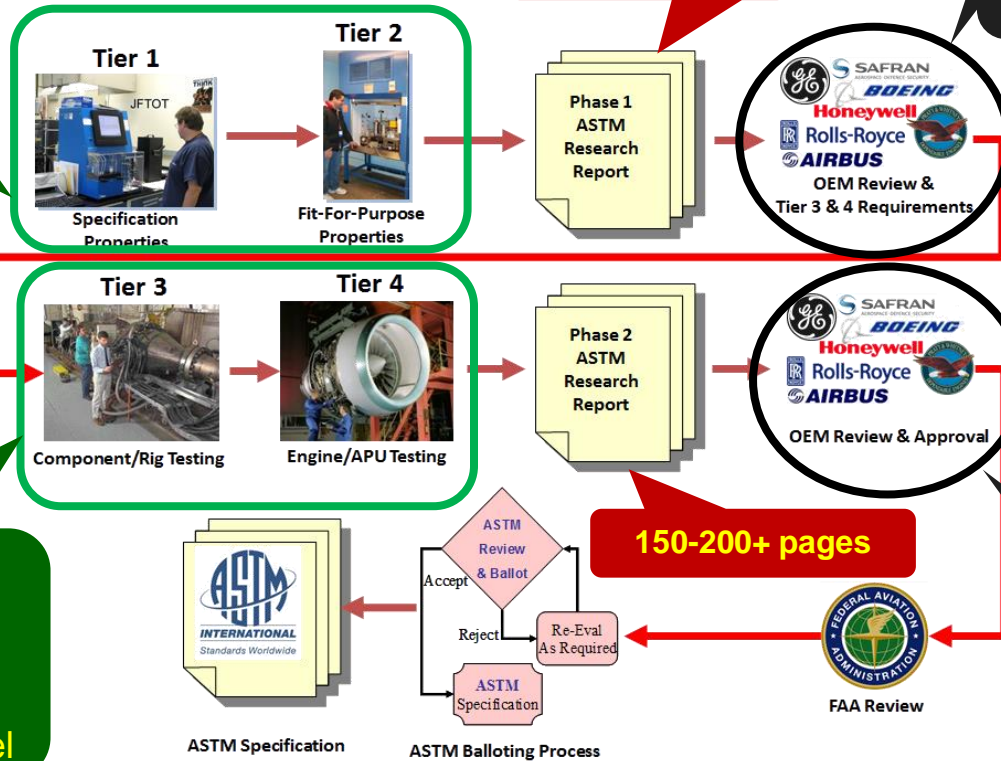


Over a Decade of Progress



D4054 Qualification Process

Fuel Property Testing
6 Months
~ \$50K (Testing Cost)
50 gals Neat Fuel



Preliminary Engineering Review
6 Months to 1 Year
~ \$350K (OEM Cost)

Engine/Aircraft Hardware Testing
2 – 3 Years
~ \$4M (Testing Cost)
30K – 120K gals Neat Fuel

Chief Engineer's Final Review
6 Months – 1 Year
~ \$1M (OEM Cost)

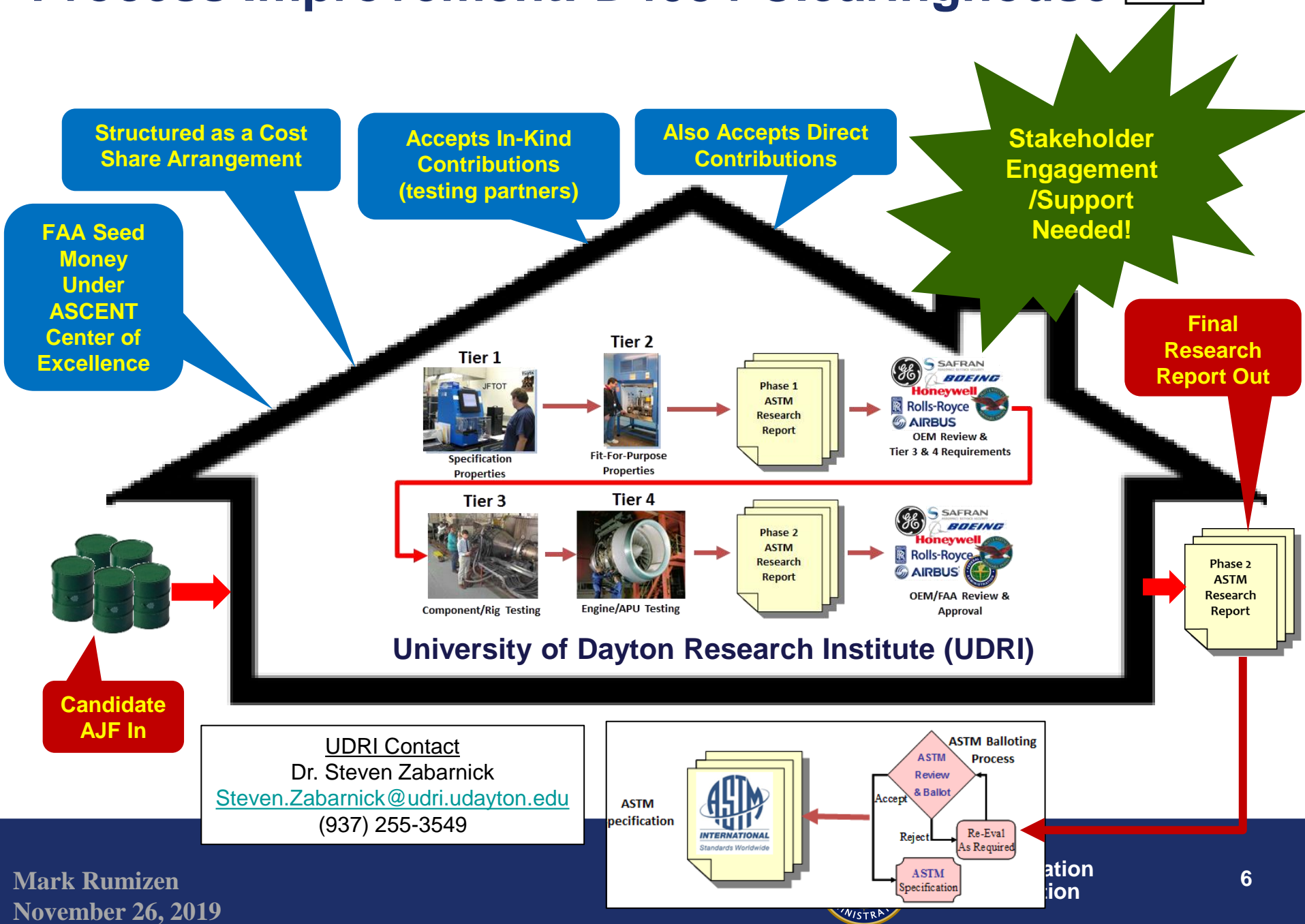
Notes:

- Assumes 50% blend ratio
- Does not include OEM or producer overhead/admin costs
- Time duration does not include inactive waiting periods

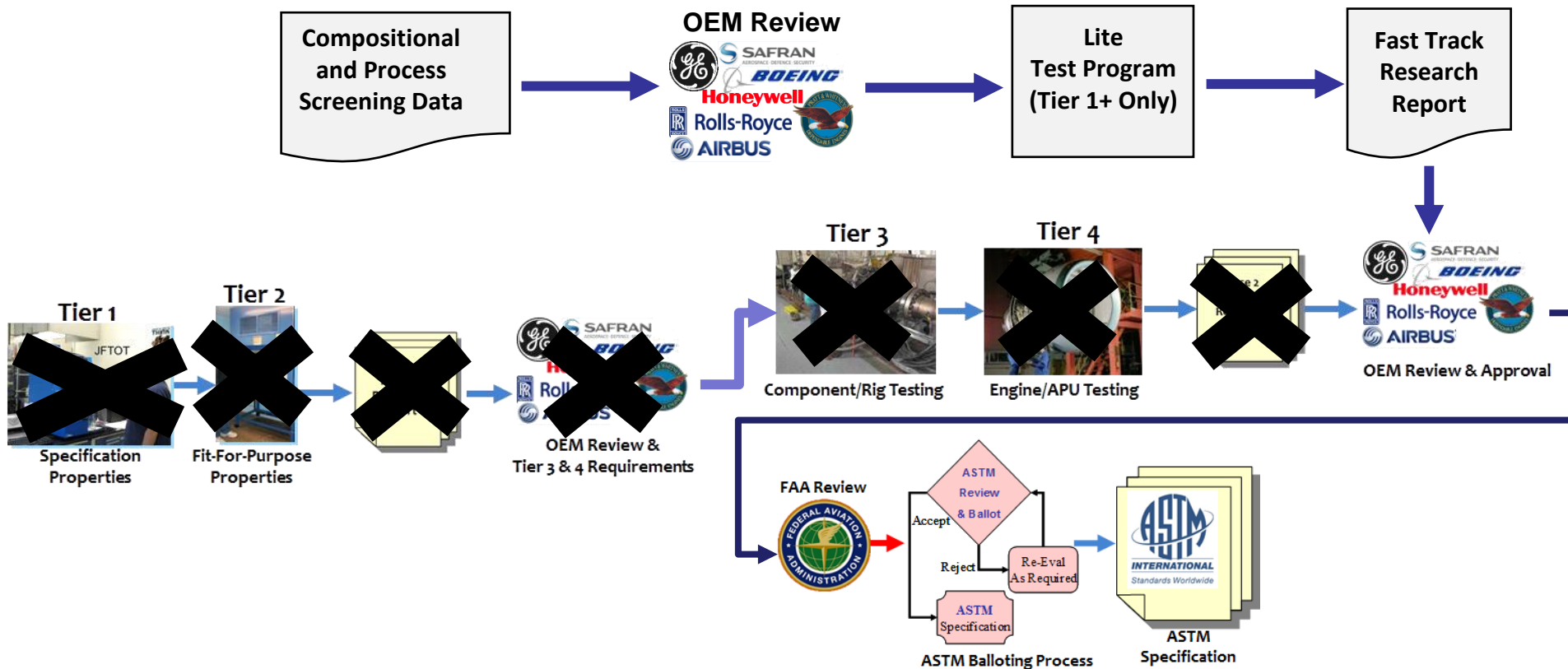


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Process Improvement: D4054 Clearinghouse



Process Improvement: D4054 Fast Track Annex



**For AJF's with Conventional Hydrocarbon Compositions
Limited to a 10% Blend Percentage**

Process Improvement: Alternative Jet Fuel Pre-Screening



Tier α

Property/Performance Predictions

- GCxGC,
- IR absorption, and/or
- NMR



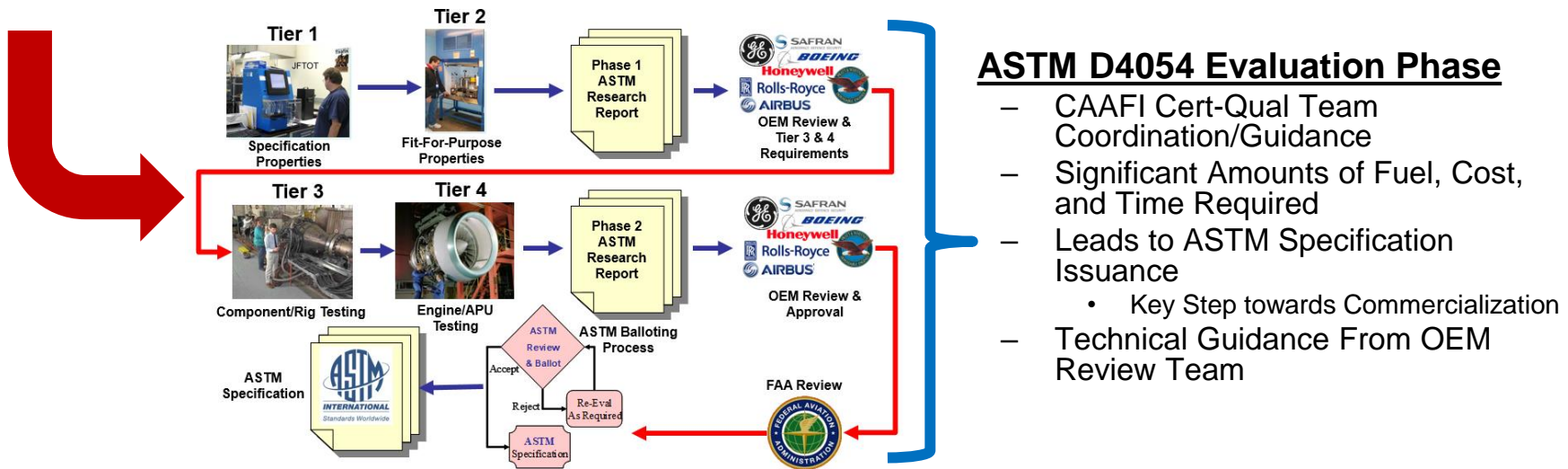
Tier β

Critical Properties

- DCN
- Density
- Distillation Curve
- Viscosity
- Surface Tension

Pre-Screening Phase

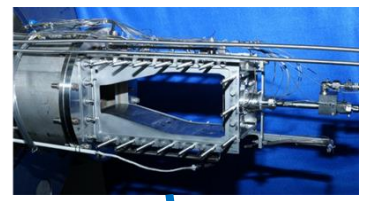
- CAAFI R&D Team Coordination/Guidance
- Very Low Fuel Volumes Required (less than ¼ gallon)
- Evolved from NJFCP Program
 - In Collaboration with EU JetScreen Program
- Optimize/Refine Conversion Process/Composition
 - Data Supports Combustor Operability/Fuel Property Predictions
- Technical Support Available from Univ. of Dayton
 - Josh Heyne



NJFCP Integration Into D4054

< 6 months
< \$300
< 300 gals neat fuel

Tier 2.5



- Tier 2.5 Tests
- Referee Rig
 - Shock Tube
 - Spray Rig

Tier 1


Specification Properties


Tier 2

Fit-For-Purpose Properties

Phase 1
ASTM
Research
Report


OEM Review &
Tier 3 & 4 Requirements

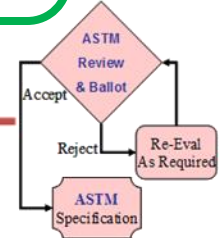
Tier 3

Component/Rig Testing

Tier 4

Engine/APU Testing

Phase 2
ASTM
Research
Report


OEM Review & Approval


ASTM Specification



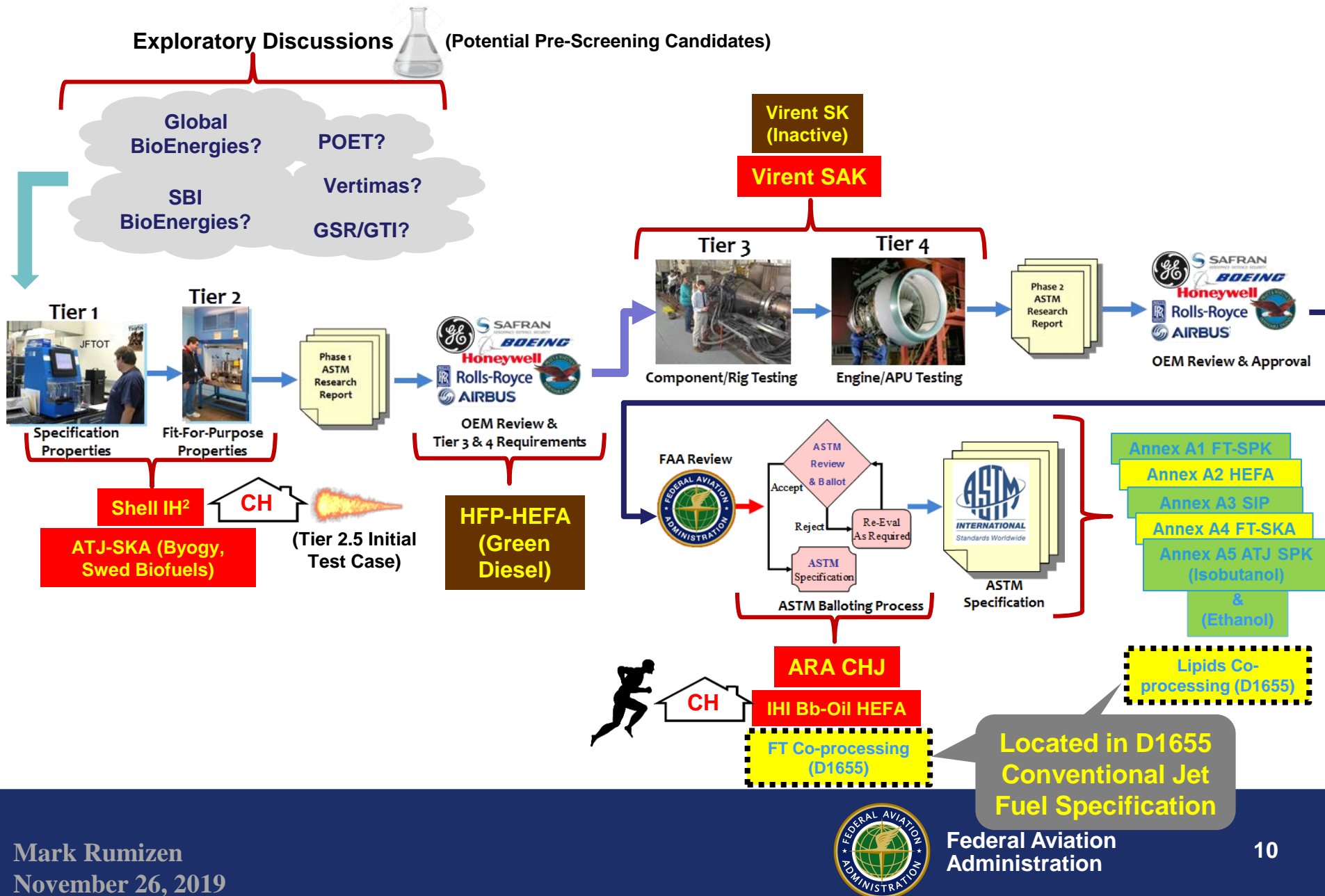
ASTM Balloting Process


FAA Review

~~2 – 3 Years
~ \$4M (Testing Cost)
30K – 120K gals Neat
Fuel~~



ASTM D4054 Alternative Jet Fuel Qualification Status



Thank You



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Questions?



**Federal Aviation
Administration**