

The National FAA Safety Team Presents

Topic of the Quarter
Second Quarter 2020
DEF Fuel Contamination Prevention

Presented to: <Audience>

By: <Presenter>

Date: < >

Produced by AFS-850
The FAA Safety Team (FAASTeam)



**Federal Aviation
Administration**



Welcome

- Exits
- Restrooms
- Emergency Evacuation
- Breaks
- Sponsor Acknowledgment
- Other information



Overview

- **What is the Problem?**
 - Background
 - The Tale of Two Chemicals
- **What Happened?**
 - Three Attention-Getting Events
 - How Could This Happen?
- **How do we Mitigate?**
 - One-Time
 - Ongoing
- **Where do We Find Help?**



What is the Problem?

- **Background**

- The Tale of Two Chemicals:

- Diesel Exhaust Fluid (DEF):

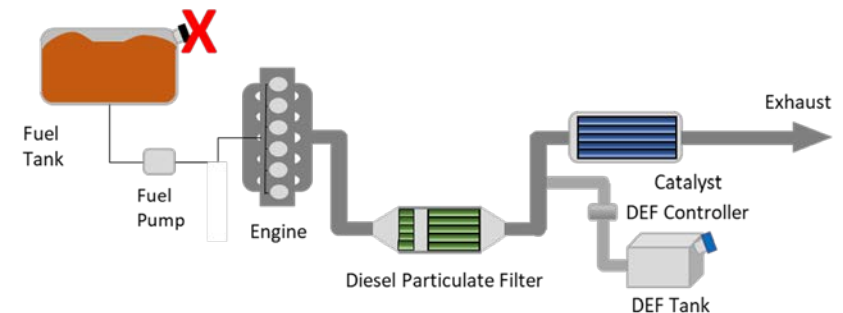
- Urea-based chemical

- » Clear liquid
 - » Ammonia odor



- Required on New Airport Diesel Vehicles as of 2014

- » EPA Emissions Mandates for Off-Road Vehicles (Tier 4 for engines >75 horsepower)
 - » All diesel powered vehicles and other equipped with Selective Catalytic Reduction (SCR) Systems
 - » DEF injected into **exhaust stream** of diesel engines



What is the Problem?

- **Background (Cont'd)**

- The Tale of Two Chemicals

- Fuel System Icing Inhibitor (FSII)

- DiEGME [diethylene glycol monomethyl ether]

- » Clear liquid

- » Alcohol Odor



- » Popular/Brand names: PRIST, DICE, Ice-5, Anti-Icing Fluid



What is the Problem?

- **Background (Cont'd)**

- The Tale of Two Chemicals

- How is FSII Mixed into Aviation Fuel?
 - *Injected into the fuel at the nozzle with aerosol cans*
 - *Injected into Fuel Hose from the fuel truck during refueling*
 - *Pre-Blended at Off-Airport Fuel Terminal*
 - » Shipped to Airport as Pre-Blended Fuel
 - FSII Inhibits Microbial Contamination in Fuel (*Side Benefit*)
 - Many Operators Request FSII Despite Not Requiring it For Icing Prevention
 - How are the containers Identified? (Next Slides)

This is Where We Have Seen DEF Contamination Events



DEF Containers



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FSII Containers



What is the Problem?

FSII and DEF Handling at Small Airports

DEF Has Become an Emerging Threat To Aviation

- DEF is becoming more prevalent at airports
 - Required on New Vehicles Starting in 2014
- DEF and FSII are both clear liquids
- DEF and FSII are both poured into reservoirs on airport refueling trucks



What Happened?

- **Three Events that Exposed the Problem**

1. Eppley Airfield (OMA) DEF Contamination Event.

- Seven Aircraft confirmed contaminated
- Six civilian aircraft and several military aircraft were fueled with contaminated equipment
- No accidents/incidents resulted, lots of maintenance required to correct



What Happened?

- **Three Events that Exposed the Problem**

1. Eppley Airfield (OMA) DEF Contamination Event
2. Miami-Opa Locka Executive Airport (OPF) DEF Contamination Event
 - Dassault Falcon 900 EX forced to return to OPF, #2 engine failure, then on approach another engine failure
 - Five Aircraft had been fueled with contaminated fuel
 - Nine other aircraft had been filled with contaminated equipment



What Happened?

- **Three Events that Exposed the Problem**

1. Eppley Airfield (OMA) DEF Contamination Event
2. Miami-Opa Locka Executive Airport (OPF) DEF Contamination Event
3. Punta Gorda (PGD) DEF Contamination Event
 - Two Citations from the same 135 were fueled at (PGD) with contaminated fuel
 - Both Citations flew to Naples (APF) and received more fuel.
 - Both *departed APF* to separate airports, aircraft one suffered an engine failure, diverted to a local airport and the other engine failed on approach. The aircraft landed without further incident
 - The other aircraft suffered one engine failure enroute, diverted and landed at a local airport without further incident



What Happened?

DEF Fuel System Contamination



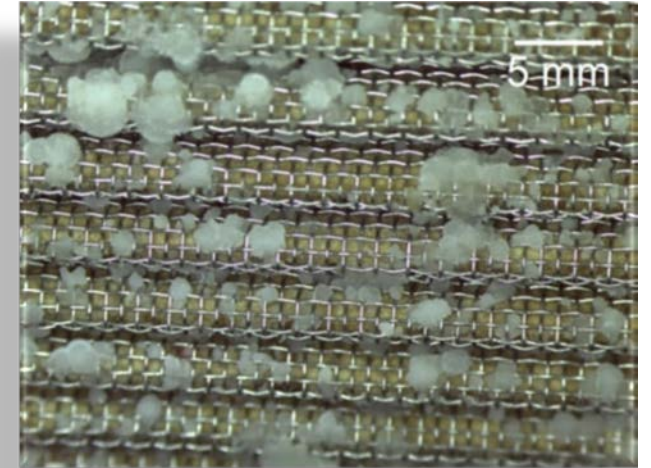
**DEF at Bottom of
Fuel Sample**

**DEF Deposits in Engine
Fuel System Screen**



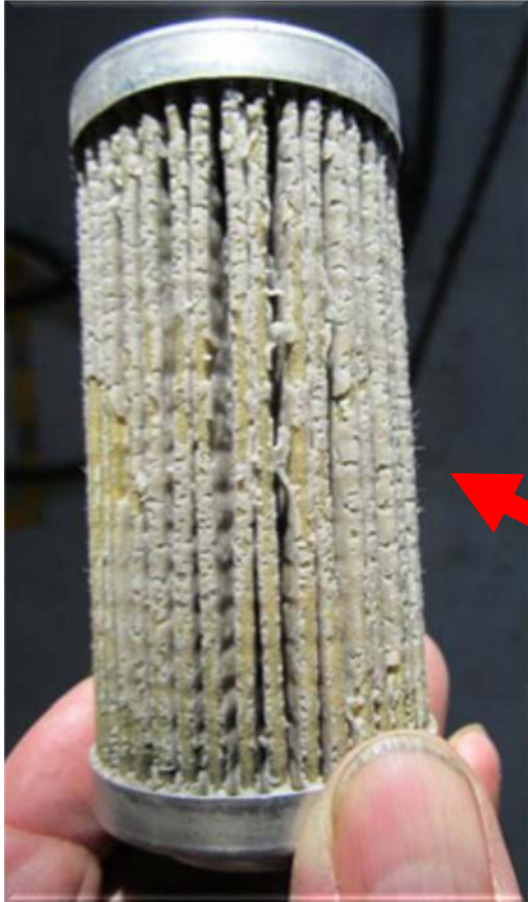
What Happened?

Filter Deposits



What Happened?

More Deposits

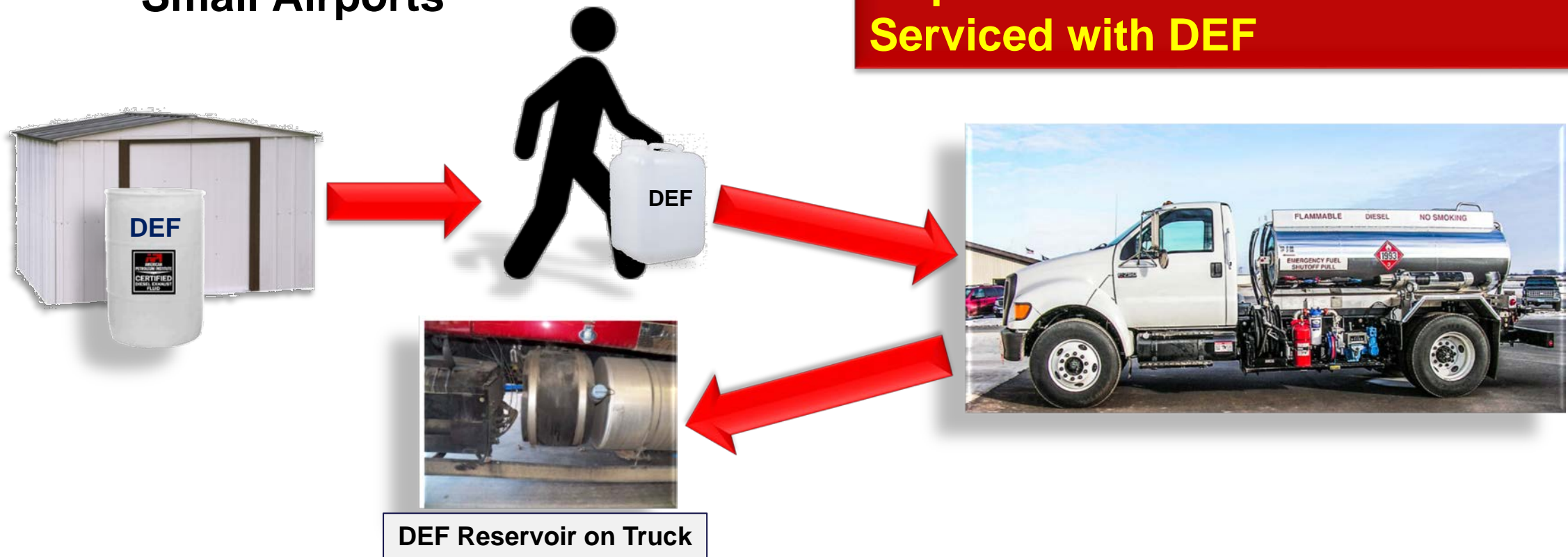


- “almost a flameout”
- Aux fuel tank deposits
- Left engine fuel filter



What Happened?

FSII and DEF Handling at Small Airports



What Happened?

FSII and DEF Handling at Small Airports

Airport Refueler Trucks Get Serviced with FSII



FSII Injection System and Reservoir on Truck



How do We Mitigate the Potential Problem?

- **One-Time**

- Ensure that all of the containers are separated, **never** to be cross-utilized
- Ensure that the products are **clearly labeled**, to include any **transfer containers**
- Give initial training to **anyone** that might dispense DEF or FSII
- Refer to the resources provided for further information



How do We Mitigate the Potential Problem?

- **Ongoing**

- Be diligent to keep the fluids stored *separately*
- Be diligent to keep the fluid containers, and all containers used for either fluid *clearly marked*
- Keep all personnel that comes in contact with either/both fluids *trained* to prevent contamination



Resources



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Working Group: How To Avoid DEF In Jet-A Fuel

Marc Cook June 11, 2019

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<https://www.avweb.com/news/working-group-how-to-avoid-def-in-jet-a/>



https://download.aopa.org/advocacy/2019/2019_06_11_Aircraft_DEF_Contamination_Working_Group_Report_FINAL.pdf



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RECOMMENDATIONS TO PREVENT JET FUEL CONTAMINATION RELEASED

June 11, 2019

By Alyssa J. Cobb

<http://aopa.org/news-and-media/all-news/2019/june/11/recommendations-to-prevent-jet-fuel-contamination-released>

FAA Publications

SAIB HQ-18-08R1, SAIB HQ-18-28, SAFO 18015



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Questions?

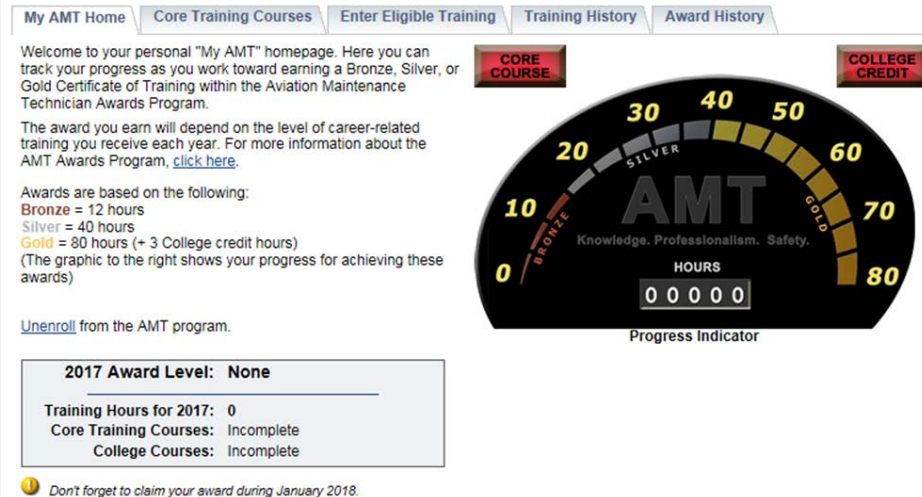


Training and Peace of Mind

- Technical Training
- Safety Related Training
- Document in My AMT



My AMT



Thank you for attending

- You are vital members of our GA safety community



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