

## **INTRODUCTION**

In response to two incidents of fuel contamination from Diesel Exhaust Fluid (DEF) at Florida airports resulting in jet engine flameouts while in flight, FAC formed a working group to identify how best to educate airport managers and fuel service providers regarding the risk of fuel contamination by DEF.

The FAC General Aviation Committee has taken the lead on the DEF initiative by engaging in discussions with Florida airport managers and other industry stakeholders to develop a statewide Best Management Practices Plan.

**This document highlights the importance of the DEF fuel contamination issue, industry and Federal agency response, and FAC's initiative to prevent future fuel contamination for the safety of Florida citizens, passengers, aircraft and airport operators.**

## **ABOUT DIESEL EXHAUST FLUID**

DEF is a solution of urea and deionized water used in diesel powered engines in order to reduce nitrous oxide (NOx) emissions through a process called Selective Catalytic Reduction (SCR). Unlike traditional fuel additives, DEF is not added to the diesel engines fuel system but is injected into the exhaust system. DEF is used on nearly all new diesel engines, including aircraft refueling vehicles and ground support equipment, produced today to meet federal emission standards.

DEF's colorless, odorless appearance creates the potential for it to be mistaken for Fuel System Ice Inhibitor (FSII or Prist®, Dice® or DiEGME) that could accidentally be placed in the FSII reservoir on an aircraft refueling vehicle and result in jet fuel contamination. An aircraft serviced with DEF contaminated fuel is likely to experience engine flameout due to clogged fuel filters or injectors sometime after takeoff and represents a serious safety hazard.

Between 2017 – 2019, there have been at least three instances of DEF fuel contamination affecting at least 15 aircraft that resulted in turbine flameouts at altitude, emergency landings and severe damage to engine components. In two of the instances, DEF was mistakenly placed in the FSII tank on refueling trucks. In the third instance a FSII tank became contaminated when it was rinsed with DEF while undergoing off-site maintenance.

## **INDUSTRY AND FEDERAL RESPONSE**

The aviation industry has embraced the need for increased safety training to prevent future fuel contamination.

The industry leader is the National Air Transportation Association. NATA initiated a DEF Contamination Working Group of air transportation providers, aircraft operators, FBO's, fuel service providers and the Federal Aviation Administration in 2019. This group examined the nature of DEF, its uses, and aviation contamination events. The working group developed DEF contamination mitigation strategies including short- and long-term recommendations for aircraft operators, FBO's, and fuel providers.

Recommended mitigations to reduce the risk and impact of DEF contamination of aviation fuel are centered on prevention, detection, and response. Florida airports, Florida FBO's and fuel providers are active participants in the implementation of mitigation measures. The cornerstone

of industry mitigation recommendations is comprehensive and reoccurring training, emphasizing the best practices to prevent fuel contamination.

NATA Safety 1<sup>st</sup> Program - On June 4, 2019, NATA issued a “Safety 1<sup>st</sup> Alert” addressing the critical issue of DEF fuel contamination. NATA has developed a training module for all U.S. airport sponsors, operators and fuel service providers providing operational best management practices, methods to prevent mis-fueling and fuel contamination, and other safety practices. NATA offers Safety 1<sup>st</sup> training to all of NATA members, which includes most airports and FBO’s that service turbine-powered aircraft. Currently, 124 aviation business across the state of FL utilize the NATA Safety 1<sup>st</sup> program.

The Federal Aviation Administration (FAA) is also aware of the DEF issue and has issued safety recommendations to airport sponsors, FBO’s and fuel service providers regarding industry training and best practices. FAA Bulletins and Alerts were sent to Operators beginning in September 2018, then in October 2018 and November 2018 alerting to the hazards of fuel contamination. Additional safety alerts were issued in June 2019.

FAA issued draft revisions to Advisory Circular 150/5230-4C - *Aircraft Fuel Storage, Handling, Training and Dispensing on Airports*, earlier this year for comments by the industry. This AC includes updates addressing new training requirements for DEF, and other safety recommendations. The Draft AC identifies mandatory supervisory and training programs at Part 139 airports (airports providing commercial passenger service) identification and marking of DEF and FSII, misfuelling prevention training and DEF contamination prevention. Employers are required to document supervisor and employee training to demonstrate continuity of training and successful completion by each employee.

## **FLORIDA AIRPORTS COUNCIL RESPONSE**

FAC’s BMP utilizes NATA’s Operational Best Practice (OBP) #36, “DEF Handling and Contamination” and expands upon how it is promoted and implemented at Florida airports. FAC’s BMP also respects the FAA’s safety guidance and the distinction between Airport Sponsor obligations and the responsibilities of the businesses under contract to provide aircraft fueling services.

### **Applicability**

In order to reduce the risk of jet fuel becoming contaminated with Diesel Exhaust Fluid (DEF), each Florida Fixed Based Operator (FBO), airport sponsor that operates its own FBO, or Special Aviation Service Provider (SASO) that services aircraft with jet fuel are encouraged to adopt NATA OBP #36 or incorporate its components into their Aircraft Misfuelling prevention training in accordance with Federal Aviation Administration Advisory Circular AC 150/5230-4C. Airport sponsors are encouraged to familiarize themselves with the standard operating procedures or operational best practices implemented by each FBO and/or SASO intended to prevent DEF contamination.

The FAC has partnered with NATA to bring Florida airports and fuel providers DEF fuel contamination training at no charge through a kickoff webinar tentatively scheduled for mid-February 2021 for training pertaining to DEF fuel contamination at no charge. FAC, NATA and FDOT will use their web pages, newsletters, social media and direct mail to promote this important initiative. Participants will receive a certificate illustrating they have successfully completed the

DEF training course. Operators will maintain records of the training of their staff and these records will be available for inspection.

### **Process**

1. Each Fixed Base Operator that provides fueling services is responsible to implement DEF handling and contamination prevention. Each FBO/fuel service provider will provide a copy of their BMP to the airport manager for record keeping purposes.
  - a. Airport managers will make the BMP available for review by Florida Department of Transportation during routine airport inspections.
2. Refer to ATTACHMENT 1 - [NATA Operational Best Practice, OBP #36 - DEF Handling and Contamination](#), when preparing their BMP to insure consistency with established industry standards. A copy is attached for your reference.

**Fuel service providers, FBO's and airport staff are encouraged to refer to the additional resources below:**

[FAA Special Airworthiness Information Bulletin](#)

[NTSB Safety Alert](#)

[NATA Resource Page](#)

[NATA DEF Operational Best Practices](#)

[NATA Misfueling Prevention Programs](#)

[FAA AC 150/5230-4B – Aircraft Fuel Storage, handling, Training and Dispensing on Airports](#) (New draft with DEF references found [here](#))

[Aircraft Diesel Exhaust Fluid Contamination Working Group Report & Recommendations](#)

[FAA SRM Report for Fuel Contamination with DEF Safety Issue](#)

**ATTACHMENT 1**

**NATA Operational Best Practice # 36 - Diesel Exhaust Fluid (DEF) Handling and Contamination Prevention**

<p><b>OPERATIONAL BEST PRACTICE -GROUND</b>  <b>Your Company Name Here:</b>  <b>Title: Diesel Exhaust Fluid (DEF) Handling and Contamination Prevention</b>  <b>No OBP- 36</b></p>	
<p><b>Effective Date: Sep. 13, 2018</b></p>	<p><b>Revision: August 31<sup>st</sup>, 2020</b></p>
<p><b>Purpose:</b></p>	<p>To reduce the risk of aircraft misfueling with Diesel Exhaust Fluid (DEF).</p>
<p><b>Policy Responsibility:</b></p>	<p>Chief Executive, General Manager, Environmental Health and Safety Director / Manager, Line Supervisor, Trainer/Training Coordinator (as applicable).</p>
<p><b>Policy:</b></p>	<p><b>Storage of Aviation Fuel Additives</b></p> <ol style="list-style-type: none"> <li>1. Diesel Exhaust Fluid (DEF) and other fluids, oils and chemicals shall be stored in a separate location from Fuel System Icing Inhibitor (FSII, Prist<sup>®</sup>, Dice<sup>®</sup> DiEGME) and other aviation fuel additives.</li> <li>2. DEF and FSII should be stored in original containers provided by the manufacturer. DEF and FSII should never be stored in unmarked containers.</li> <li>3. Locks for DEF and other fluids, oils and chemical storage areas shall be keyed differently than for areas containing FSII and other aviation fuel additives.</li> <li>4. Keys for locks shall be labelled and kept on separate key rings.</li> </ol> <p><b>Fluid Handling</b></p> <ol style="list-style-type: none"> <li>1. Only approved and trained personnel shall handle DEF or fill equipment DEF tanks. <ol style="list-style-type: none"> <li>a. All transfers of DEF shall be recorded in a log including: <ol style="list-style-type: none"> <li>i. Date</li> <li>ii. Time</li> <li>iii. Transfer to/from</li> <li>iv. Name of individual completing the transfer</li> </ol> </li> </ol> </li> <li>2. Only approved and trained personnel shall handle FSII or fill jet fuel refuelling equipment FSII tanks. <ol style="list-style-type: none"> <li>a. All transfers of FSII shall be recorded in a log including: <ol style="list-style-type: none"> <li>i. Date</li> </ol> </li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>ii. Time</li> <li>iii. Transfer to/from</li> <li>iv. Name of individual completing the transfer</li> </ul> <p>3. A specific location where DEF may be added to aircraft refueling vehicles or ground support equipment should be designated.</p>
<p><b>Procedure:</b></p>	<p><b>Procurement and Labelling</b></p> <ul style="list-style-type: none"> <li>a. DEF should be purchased in quantities that differ from FSII (ex. 2.5-gallon containers vs. 55-gallon drums).</li> <li>b. Original manufacturers labels for DEF and FSII storage containers shall be intact, clearly legible and leave no question as to what product is in the container.</li> <li>c. All equipment DEF tanks shall be labelled DEF ONLY. Labels shall be at least 3” high.</li> <li>d. Refillable FSII tanks on jet fuel refuelling equipment shall be labelled FSII ONLY (or DiEGME Only). Labels shall be at least 3” high. <ul style="list-style-type: none"> <li>• Where replaceable 5-gallon FSII tanks are used, the original manufacture’s label shall be intact and clearly legible.</li> </ul> </li> <li>e. Any equipment (containers, funnels, etc) used to transfer DEF or FSII shall be clearly labelled and “product dedicated” meaning: <ul style="list-style-type: none"> <li>• DEF transfer equipment shall only be used with DEF.</li> <li>• FSII transfer equipment shall only be used with FSII.</li> </ul> </li> </ul> <p><b>Staff Training</b></p> <ul style="list-style-type: none"> <li>1. Initial and recurrent training for all staff shall include: <ul style="list-style-type: none"> <li>a. The purposes of and differences between FSII and DEF.</li> <li>b. The different storage locations for FSII and DEF.</li> <li>c. The packaging and labelling differences between FSII and DEF.</li> <li>d. The dangers of aviation fuel contamination with DEF.</li> </ul> </li> <li>2. In addition to the above, initial and recurrent training for individuals handling DEF and or FSII shall include: <ul style="list-style-type: none"> <li>a. DEF fill points on all equipment requiring DEF.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"><li>b. FSII fill points for jet fuel mobile refuelers and other refuelling equipment as applicable.</li><li>c. The use of clearly labelled, dedicated equipment when transferring DEF or FSII.</li></ul> <ul style="list-style-type: none"><li>3. Recurrent training should occur every 12 calendar months.</li><li>4. Records for all training should be maintained for 36 months.</li></ul> <p><b>Auditing</b></p> <ul style="list-style-type: none"><li>1. Periodic internal audits of storage, labeling, training and recordkeeping should be conducted.</li></ul>
<b>PPE</b>	All staff shall follow the PPE recommendations found in the Safety Data Sheets (SDS) for FSII, DEF and other fluids and chemicals.