Welcome to the 23rd issue of the NATA Safety 1st eToolkit, our monthly online safety newsletter, supporting the NATA Safety 1st Management System (SMS) for Ground.

This monthly newsletter will highlight known and emerging trends, environmental and geographical matters, as well as advances in operational efficiency and safety. Flight and ground safety have been enhanced and many accidents prevented because of shared experiences.

The NATA Safety 1st Management System for Ground is underway and many of the tools discussed in this and other eToolkits will be provided as a part of the program.

FORWARD

The following article is a bare bones, non-technical article meant to inform the reader of the basics in regard to present concerns in the use of Anti-Icing Additive in fuel. It addresses concerns both in the use of pre-blended fuel and additizing fuel on the refueler truck.

Most aircraft do not require anti-icing additive. Those that do, require it to prevent any ice crystals that form in the fuel (in cold air at ground level or at altitude) from plugging the engine intake or fuel strainer.

A great deal of research was conducted by the USAF, C4E and Southwest Research Institute on fuel starvation problems occurring on aircraft operating on JP-8 fuel (which is very similar to Jet A fuel, except that it has 3 additives, including anti-icing additive). The anti-icing additive was shown to be a potential problem and the US Air Force has stopped using water absorbing filter elements to help reduce the risk of element failure. Based on this research, and other developments, water absorbing elements should no longer be used in pre-blended jet fuel, and their use is being phased out. But most importantly, while the operator of any fuel system should be diligent in removing all water from tank and filter sumps, this is especially important in systems using pre-blended fuel.

But it is equally dangerous - for aircraft requiring additive - to not get the pure and correct amount of additive they need. For this reason, operators using additive injectors must be very diligent in maintaining this equipment and keeping their operators well trained and supervised.

FSII in Jet Fuel - Special Handling Needed

By Jim Gammon - Gammon Technical Products

In this article, we address concerns both in the use of pre-treated (pre-blended) jet fuel and the proper, safe use of additive injection systems as well as the handling of fuel with additive either pre-blended or additized on your refueler truck. We make additive injectors, but ours is not the only brand available. This article is not a sales article. We mention our injectors only when needed and do not fault others.

There is some disagreement over whether pre-treated fuel is better or worse than injecting additive at or near the skin of the aircraft. We will not get into this issue on either side, that decision is up to you. But we will say:

1) The advantage of pre-blended fuel is you don't have to worry about the injector maintenance or operation

2) The advantage of injecting additive selectively on the refueler itself is that you don’t have to worry as much about system maintenance.

A toss up? People disagree both ways.
What is the all the talk about regarding additive?

The subject here is anti-icing fuel additive, known of as "Prist", DiEGME (DiEthylene Glycol Monomethyl Ether), and FSII (Fuel System Icing Inhibitor) We used a different chemical (EGME) until the 1990's when we changed due to personnel safety issues. This additive was actually in use with the US Navy for decades, so it isn't really "new". Anti-icing additive is not needed by most aircraft.

The additive dissolves into jet fuel, but only just barely. It prefers water. This is important. When water does appear, we WANT the additive to migrate to the water and mix with it in a concentration sufficient to keep the droplet from freezing. This is to protect aircraft that do not have heated fuel intakes from having fuel flow problems due to ice crystals when flying at high altitudes or in cold climates. For the most part, only small aircraft need the additive (helicopters, small jets), but also many military aircraft. Additive is put in at 1000 to 1500 ppm (parts per million). For reference, 1000 ppm is 1/10 of 1 percent.

Potential Problems

The problems with pre-blended (pre-treated) fuel are:

1. If you don't keep your tank, filter and low point sumps drained (daily at least), condensed water can remove additive, and you can build up pockets of additive/water mix that can become mostly additive over time. This mix is corrosive and can't be easily removed with filters.

2. If you are using water absorbing (monitor) type elements, remember that they are made to remove water by turning water into a gel and trapping it in the element. But if the "mix" gets up to more than about 25% additive, the water absorbing elements can't remove water reliably. For this reason water absorbing filters should not be used with pre-treated fuel. When "mix" gets into this type of element, over time it can break down the element, creating a goop called "Appl(e) Jelly".

Note: pre-blended fuel is NOT a problem with specially made filter separator elements, just monitor type elements. Use a filter separator if you are pumping additized fuel, even if you are only seeing additive when defueling aircraft.

Safe and Approved Filters for Pre-blended Fuel

The industry went to the monitor type elements because they were an improvement, as a final filter, over filter separators. Filter separators do a wonderful job in fuel handling because they remove water very efficiently. They concentrate it into the vessel sump for draining. But they can fail due to a chemical contamination, called 'surfactant' (a detergent or soap type contamination), or if the water sensor in the vessel sump failings to shut down the system when the filter separator vessel is sump full of water. Don't be fooled, be sure your people are doing the QC checks!

Filter separators are not perfect, that is why the industry came up with monitors! Neither approach is perfect and both require careful housekeeping. A filter separator without a properly working water sensor in the sump is worthless if water suddenly is present in quantity. Water can fill the small sump and overwhelm the filter separator. There are many, many examples of this happening. Be SURE these sensors are tested regularly.

You can safely use filter separators in pre-blended fuel if you use the correct, special elements. There are special elements available that meet API-1581 tests for fuel with FSII, but you must specify FSII grade elements (Type M or M100). Regular elements DO not meet the standard.

IMPORTANT, even if you do have a filter separator vessel, you may not have filter separator elements. Many were refitted with water absorbing elements.

NOTE! If you have a water detector probe on your filter separator, it is not going to detect a mix of additive and water unless it has our new optional HyprCon control. I am sorry if this appears to be a sales pitch, but we are the only manufacturer who has accomplished this. No older controls have the sensitivity to detect mixes of additive and water, even our older models. This new control is more than 15 times as sensitive as anything that came before it.

"Appl-Jelly"

A lot has been said about Appl Jelly. This is confusing, because there are two materials that can be called by the name. Unfortunately, it has become popular to call both contaminants Appl Jelly, even though one is not jelly-like at all. One is a thin liquid that is made up of additive and water, plus a small amount of fuel. This can be found anywhere additive treated fuel is found. It occurs when liquid water is left to lie for periods of time in pre-blended fuel systems, or in wing tanks of aircraft with additive in the fuel. It is chemically aggressive and can attack almost anything over time: epoxy, steel, aluminum, bladders, seals, etc. In addition, if you find it, your fuel has lost some additive and may not have the correct amount of additive left in it.

Pre-blended fuel is usually treated with enough additive to lose a bit in handling and still provide protection to the aircraft. EVEN if you inject on the refueler, don't forget that this material still occurs in the aircraft fuel tank. It is important...
to sump aircraft tanks for this reason, and you can still get this in your system if you defuel an aircraft with additive in the fuel!

But for us, the real Appl Jelly is a material that is a thick, viscous goop. This stuff is much worse in aircraft! Appl Jelly goop has water and additive in it, but also has water absorbing media in it. It is formed in the element. Filter separators do not generate this thick stuff.

**Does additive "fall out" of pre-treated fuel?**

No, regardless of what you may have heard. But it may appear to fall out of the fuel in some cases, either because it was not blended properly or due to temperature change and wet fuel. Proper blending requires two things, that the additive is virtually (less than 1/2%) free of water prior to injection, and that the mixing is done proportionally. If anyone tells you that they safely mix additive in by pouring a bucket into the tank, tell them they are very, very wrong. The chemistry is too complex to explain here, but trust me on this please, such methods are dangerous. We know of people who have had to replace fuel tanks due to this, and aircraft that have flamed out in flight. Such lousy additive mixing can result in dropping out of additive, but it is not the fault of the additive. It is due to ignorant practice.

Water exists in all fuel at tiny concentrations, just like humidity in air. No filter will remove it. If this "humidity" in pre-treated fuel (or treated fuel in an aircraft wing) is at or near 100%, and then the temperature goes down a few degrees at night, some water condenses out of the fuel, just like fog forming in chilled night air. This tiny amount of water (about 1 ppm per degree F in temperature drop) instantly absorbs a tiny amount of additive. The resulting droplet will not dissolve back into the fuel and will settle to the sump. This is one of the reasons why we drain sumps on tanks, filters and aircraft fuel tanks! But whenever you drain water from a system with pre-blended fuel in it, you are removing a little bit of additive.

Draining sumps frequently ensures you are removing as much water and as little additive as possible. This is because the longer you leave water in the system; the more additive it will draw from the fuel.

**Additive Injection Concerns**

It is important also that additive injection on-board the truck be done correctly. It is not just a matter of keeping the additive tank full and remembering to turn the injector on and off (although even these simple things tend to get overlooked).

**Important Handling Concerns!**

Be absolutely sure to have a desiccant type dryer on the additive tank vent. Make sure it is checked and maintained. It should be blue in color. Pink is failed. This need for a desiccant dryer also applies to the storage drum, especially if you are using additive from 55-gallon drums.

Why? Because the additive draws water right out of the air (humidity) and as stated above, the additive will not dissolve into the fuel if there is more than 1/2% of water in the additive prior to injection. If this happens, not only are you injecting an additive that provides no protection for the aircraft, but also the additive will quickly settle to the tank bottom and attack the tank or bladder.

NEVER locate a working 55-gallon drum outdoors standing up. Rainwater can get in through the connections.

Note: In large facilities such as refineries and terminals, pure nitrogen is used in place of a dryer to keep humid air and rain out of the tank.

NEVER inject additive upstream of the filter vessel. Always inject as close to the aircraft as possible. If possible, just before the hose reel, but at a minimum, just before the tee that leads to two hose reels.

**Personal Safety**

Anti-Icing Additive, DiEGME, is a very reactive material when concentrated. Be sure to have and follow the MSDS sheet for safe handling. Neoprene gloves are a necessity. Do not use just any rubber hose or a pump that is not neoprene sealed. Do not use aluminum in contact with pure additive. Some people will tell you that viton, buna or nitrile rubber is "just like neoprene, but better" - But only two rubber compound types have shown resistance to DiEGME, neoprene and butyl, butyl is quite rare these days. We recommend neoprene, but test soak a glove before you trust it completely.

**Calibrating Additive Injectors**

Making sure that the additive injector is putting in the correct amount of additive is a concern. Some people use a refractometer to measure additive injection. This is surely the most accurate method, but you must either pump into a larger empty tank (due to blending down with the fuel already in the tank) or slowly bleed a sample from the flowing stream. This is because most injectors inject additive in little squirts. Don't take a sample from an overwing nozzle feeding into a 2-gallon bucket, chances are you'll get too much or too little.
On some injectors, calibration using a jar to measure the additive output may not be good enough. To be sure, keep track of how much additize fuel you sell and how much additive you consume. It should come out to about 1 gallon per thousand gallons. These injectors are best "suction calibrated", not by directing the outlet flow of additive into a jar. Either use a special "suction calibrator" or park the truck, mark the reservoir level or stick the tank, additize fuel under actually flow and pressure conditions, and then (without moving the truck) see how much additive you must pour into the reservoir to bring the level back up to the mark. This will tell you how much additive you actually injected into the flowing fuel. It is not as precise a test as you may prefer, but it is simple.

Making the math simple: 1,000 ppm is 1 quart of additive per 250 gallons of fuel. You can do the math with ounces. 1 cup is 8 oz, 1 quart is 32 ounces, 1 gallon is 128 ounces. So if you pump 250 gallons of fuel, that is 32,000 ounces. If you need 26 ounces to refill the reservoir to the mark, then (26/32,000 = .0008125% = 812 ppm) you injected at 812 ppm, not the 1000 ppm minimum you should have. Your injector needs to be adjusted to put in more additive. Check at low and high flow rates to be sure.

With some injectors, you CAN calibrate into a jar, so this is simpler. In that case, we usually use a graduated cylinder and measure in milliliters of additive. 1 gallon is 3,785 liters (3,785 milliliters). So if in 250 gallons (946.250 liters = 946,250 ml) of fuel you get a jar with 950 ml of additive, then (950/946,250 = .1%) you have 1004 ppm.

On advanced additive injectors (no, not just GTP's top of the line models!), you actually have an additive meter and electronics to monitor the injection, and some even display, monitor, record and adjust the additive level automatically. But this doesn't mean you don't have to check these units, you need to make sure the additive meter is accurate. So contact your manufacturer to determine how to periodically check this meter's accuracy. In our case, we have a mode included in the electronics to make this easy, right into a graduated cylinder.

But I want to make four final important points in regard to any fuel operation.

1) It is very important that EVERYONE, whether they have pre-blended fuel or not, checks the sumps in all systems very frequently. Water promotes microorganism growth, it corrodes metals, it can freeze causing problems, and it won't burn. And yes, if you have pre-blended fuel it will remove some additive if it is left to sit in the sump. But the PRIMARY reason we sump is to help catch anything in the system that doesn't belong there. There are many stories including rainwater, other fuels, lavatory "blue fluid", liquid fertilizer, bits of burst filter elements, rubber lining from hose, etc, etc.

2) Even if you do not have pre-blended fuel, you can still have the additive in your fuel when you defuel an aircraft.

3) Test your water controls regularly. Be 100% sure they work.

4) Testing and sampling is meant to find little problems before they become big ones.

Our reputation is for examples in the form of true stories:

1. A storage tank had 18" of water in the bottom. No, they didn't sump it, ever. They thought they had no water because a tank level gauge read zero inches of water. Then one day the tank level got low and the floating suction reached the water. Their refueler truck shut down with almost 100% water. This is WAY to close to the aircraft for comfort. So don't trust electronics. Sump the tanks and the filter drains.

2. A customer called and asked for a quote on an additive system. He didn't call back until about 6 months later and ordered it. He told a story of how his fiberglass storage tank had failed and he had to replace it as well as his aluminum meter, and re-epoxy his filter vessel. It seems someone told him "You don't need an injector, just pour the additive in and it mixes with the fuel by itself." Very bad advice. Fortunately, no aircraft crashed.

3. An operator forgot to put additive into an aircraft until after fueling. So he got a can of additive and sprayed it into the tanks afterward. The aircraft lost power in flight, but landed safely. A few months later, they had to replace the fuel bladders due to attack from the additive.

Incident Roundup

Type UNK: A fuel truck bumped a plane on Monday in a low-speed incident that resulted in no injuries, a Federal Aviation Administration spokeswoman said.

An air carrier was carrying 36 passengers and three crew-members when it was hit at around 6:40 a.m., spokeswoman said. The plane, which was on its way to Raleigh, N.C., was just starting to back out from an airport ramp, spokeswoman said.

The flight was cancelled and authorities were examining the plane, spokeswoman said. Minor damages to the aircraft would likely be found, she said.
Incident Roundup, continued…

C-172: Fuel truck (3K) backed into prop spinner while positioning to fuel another aircraft. Lineman performing “K” turn with truck, and misjudged distance to parked aircraft.

Florida: 12 Aircraft - Numerous Aircraft Types (C-172 to G-IV): Wind damage to aircraft and hangars as a result of unexpected severe thunderstorm. Winds up to 70mph.

Fuel and Hazardous Materials Safety Workshop

June 19-20, 2006 in Dallas, Texas

AAAE, NATA and Air BP Aviation Services are pleased to present a new seminar that specifically addresses 14 CFR Part 139.321 certification requirements and hazardous materials. This two-day workshop is designed for airport operations personnel, ARFF, FBO and airline personnel who are responsible for the safe fueling of aircraft and handling of hazardous materials.

The first day of this course is designed to define and explain the criteria for quarterly inspections. The second day will provide attendees with the skills and information needed to safely handle hazardous materials incidents.

Tentative topics (subject to change) include:

► FAR Part 139 Fire Training Safety
► Handling Fuel Spills
► Overview of Fuel Truck and Fuel Farm
► NFPA 407 – Standard for Aircraft Fuel Servicing
► Proper Labeling of Hazardous Materials
► Material Safety Data Sheets
► Proper Hazmat Storage
► Protecting Yourself When Handling Hazmat

Register today for the Fuel and Hazardous Materials Safety Workshop at the Hilton Garden Inn DFW Airport South. Hotel rates are $119 for single/double occupancy. Reservations must be made by June 2, 2006, in order to guarantee this rate. The phone numbers is (972) 313-2800 and identify yourself as part of the AAAE group.

Register online today at [http://www.aaae.org/meetings](http://www.aaae.org/meetings).

For further program information, call Jennifer Klass, C.M., AAAE, at (703) 824-0504 ext 225 or e-mail: jennifer.klass@aaae.org.

For further registration information, call Catherine Pawlowicz, AAAE, at (703) 824-0500 ext 132 or e-mail: catherine.pawlowicz@aaae.org.
Velcon Filters, Inc.

Service Bulletin

May 30, 2006

Vol. 5 Number 1

VELCON FILTERS, INC. RECOMMENDS DISCONTINUING
THE USE OF WATER ABSORBING CARTRIDGES
WITH PRE-MIXED FUEL CONTAINING ANTI-ICING ADDITIVES

Background on Use of DiEGME with Water Absorbing Cartridges

Since 1997, Velcon Filters, Inc. has recommended that operators who use pre-mixed fuel with anti-icing additives (DiEGME, FIZZY®, Print®) prior to filtration should use caution when using water absorbing cartridges (also known as monitors). Velcon has issued a number of service bulletins and articles in its newsletter “The Clarifier” addressing the performance and operation of water absorbing cartridges when anti-icing additive is present in the fuel. The following recommendations have been consistently provided:

1. Drain vessel daily
2. Changeout at 15 psid
3. Inject anti-icing additives after filtration whenever possible

In 2001 Velcon added the following caution statement to all of Velcon’s water absorbing cartridge and vessel data sheets and installation instructions.

******CAUTION******
In fuels containing anti-icing additive (DiEGME, FSI, Print®), stagnant water bottoms can absorb large amounts of the antiicing additive. This water/FSI solution can disarm water absorbing elements allowing water to pass downstream. Daily draining of the monitor vessel and of water bottoms upstream of the elements is IMPERATIVE. Also, changeout @ 15 psid.

In November of 2003 Velcon issued a service bulletin that recommended that service life for all water absorbing cartridges should be one (1) year. Velcon also advised all operators to continue to follow the previously published Velcon guidelines of May, 2003.

In a Clarifier article published in March, 2000, Velcon addressed the issue of using coalescers in pre-mixed fuel. This article confirmed that Velcon had not encountered any operational problems with the coalescers, provided operators regularly drain storage tanks and filter/separators sumps daily. In the article Velcon also emphasized that it is extremely important to use desiccant dryers on anti-icing drums to ensure that water is removed from the air entering the drums.

VELCON FILTERS, INC. POSITION

During the Coordinating Research Council (CRC) meeting in May of 2006 it became clear to Velcon that although very clear guidelines exist for the safe operation of pre-mixed fuel, it has proven difficult for operators to ensure that the water absorbing cartridges are being operated correctly.

Following the CRC meeting and for the reasons set forth above, Velcon Filters, Inc. has concluded that effective immediately, the use of water absorbing cartridges with commercial fuels (Jet A and Jet A1) containing anti-icing additives should be discontinued. Velcon believes this decision is also supported by the fact that the current IP specification 1583 does not address the issue of fuels containing anti-icing additives.

If you currently use pre-mixed fuel prior to filtration and require assistance from Velcon Filters, Inc. please contact us at vsales@velcon.com or visit our web site at www.velcon.com to locate your nearest Velcon Filters’ distributor.
CONGRATULATIONS to our NATA Safety 1st Participants:

America's Top-Rated FBO's in AIN 2006 Survey

The annual AIN FBO Survey lists top-rated facilities according to the survey responses from pilots, dispatchers and users of FBO facilities. The categories that users were asked to rate remain the same: line service; passenger amenities; pilot amenities and facilities.

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Online Training… Free

**Safety and Health Management Systems for Small Businesses**

*A FREE training tool from NC State University developed with a Susan Howard Grant*

Now, any business of any size can invest in safety. This FREE classroom-quality, self-instructional training program on Safety and Health Management Systems (SHMS) for Small Businesses can help you implement an SHMS that is the following:

► Easy to develop
► Cost effective
► Can normally be done in-house
► Reflects your company’s way of doing business
► Based on specific needs for your company

Small businesses oftentimes do not have an adequate work force or financial resources to implement an effective SHMS. This course, funded by an OSHA-sponsored Susan Harwood grant and developed by NC State University, is designed to assist small- and medium-sized businesses in developing and implementing an effective safety and health management system. Get started today managing the risks of doing business.

Begin your **FREE online training** and learn how to establish your own individualized Safety and Health Management System (SHMS).

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NEW FIRST-AID GUIDE FROM OSHA… Free

OSHA has come out with a new guide to assist companies in setting up a workplace first-aid program.

The guide, *Best Practices Guide: Fundamentals of a Workplace First-Aid Program*, identifies four essential elements for first-aid programs to be effective and successful. The four elements include:

1. Management leadership and employee involvement
2. Worksite analysis
3. Hazard prevention and control
4. Safety and health training

The First-Aid publication also provides guidance on the primary components of a first-aid program in the workplace and includes best practices for planning and conducting safe and effective first-aid training.

Check it out: [Click here](#) to download your own copy.
CONTINUING EDUCATION

General Education Offerings

Fuel and Hazardous Materials Safety Workshop
(Sponsored by AAAE, NATA and Air BP Aviation Services) – Last Chance to Sign-up!

June 19 & 20 in Dallas, Texas
Additional Details and Registration Online:
http://www.aaae.org/meetings

Line Service Supervisor Training Seminar

September 13 & 14
Seminar: Air Services Museum / Hotel: Academy Hotel
Additional Details & Registration Online:
http://www.nata.aero/events/index.jsp

November 29 & 30
Hotel & Seminar: Marriott Riverwalk

If you think education is expensive, try ignorance!
- Derek Bok

2006 Schedules: Aviation Safety and Security Offerings

Embry-Riddle Aeronautical University's Center for Aerospace Safety/Security Education (CASE)
Website: http://www.avsafl.org/case/programs_events.html

Southern California Safety Institute
Website: http://www.scsi-inc.com/

The GW Aviation Institute
Aviation Safety and Security Certificate Program
Website: http://www2.gwu.edu/~aviation/safetyandsecurity/ss_courses.html

Transportation Safety Institute
Website:
http://www.tsi.dot.gov/divisions/Aviation/aviation.htm

University of Southern California
Aviation Safety and Security Program
Website: http://viterbi.usc.edu/aviation/

The NATA Safety 1st eToolkit is brought to you by NATA Safety 1st SMS and SH&E. SH&E is the leading expert in safety and operational integrity evaluations and safety management consulting. SH&E has developed a proprietary evaluation methodology, called Safety Architecture, which is unique within the industry as it focuses on systemic surveillance and process evaluation. This is a systems and controls look at how an operator manages those technical functions that support aviation operations.

If you think education is expensive, try ignorance!
- Derek Bok

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Yes, we want to sign up for the NATA SMS for Ground! We understand the following will be included in the price of our participation in the SMS:

- SMS Guide
- SMS Webcast Tutorials
- SMS Consultation by Telephone or email
- SMS Secure, Online Event Reporting Form
- SMS Monthly Online Newsletter
- SMS Root Cause Analysis

Contact Information (please print legibly)

CEO/Owner __________________________________________ Email __________________________________________
Safety Coordinator _______________________________________ Email __________________________________________
Company __________________________________________
Street Address __________________________________________
City __________________________ State ___________ Zip ____________
Phone __________________________ Fax __________________________ Email __________________________________________

Pricing

The prices below reflect the total number of employees at your facility. This number should include all your FBO locations. Please note that we will correspond with one Safety Coordinator per company and will require additional company information once established in the program. Please check appropriate box below.

☐ $600 for NATA Safety 1st participants / NATA Members with 0-50 employees
☐ $1,200 for NATA Safety 1st participants / NATA Members with 51-150 employees
☐ $1,800 for NATA Safety 1st participants / NATA Members with more than 150 employees

Payment

☐ Check enclosed (Please make payable to Aviation Training Institute, LLC.)
☐ Please charge my ☐ MasterCard ☐ Visa ☐ American Express

Credit card number ___________________________ Expiration ___________________________
Signature _______________________________________ Name on card ___________________________

Fax to (703) 845-8176 or mail to NATA Safety 1st® SMS, 4226 King Street, Alexandria, VA 22302

Agreement

I understand as CEO/Manager of this facility, Safety is our #1 priority. As such, the authority and responsibility to implement this program is placed with me. I will provide the resources necessary to ensure the safety of our customers, their equipment, our employees and the environment in our daily operations.

Signed this date ___________________________, CEO/Owner Signature ___________________________