

July/August 2021

FAA **BRIEFING** *Safety*

EMBRACING THE ENVIRONMENT



**Federal Aviation
Administration**

8 The Shocking
Potential of
Electric Aircraft

12 Get the
Lead Out!

14 Cutting Through All
the Noise



U.S. Department
of Transportation

Federal Aviation Administration

ISSN: 1057-9648
FAA Safety Briefing
July/August 2021
Volume 60/Number 4

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Published six times a year, *FAA Safety Briefing*, formerly *FAA Aviation News*, promotes aviation safety by discussing current technical, regulatory, and procedural aspects affecting the safe operation and maintenance of aircraft. Although based on current FAA policy and rule interpretations, all material is advisory or informational in nature and should not be construed to have regulatory effect. Certain details of accidents described herein may have been altered to protect the privacy of those involved.

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The Office of Management and Budget has approved the use of public funds for printing *FAA Safety Briefing*.

ABOUT THIS ISSUE ...



The July/August 2021 issue of *FAA Safety Briefing* focuses on how the FAA seeks to advance aviation in an environmentally-responsible and energy-efficient manner by considering noise, emissions, and other environmental issues. Articles also explore ways we can “fly green” through new technology and by following environmentally-sustainable practices.

Contact Information

The magazine is available on the internet at:
www.faa.gov/news/safety_briefing

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Subscription Information

The Superintendent of Documents, U.S. Government Publishing Office sells *FAA Safety Briefing* on subscription and mails up to four renewal notices.

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and send to Superintendent of Documents, U.S. Government
Publishing Office, Washington, DC 20402-9371.

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FAA BRIEFING Safety

The FAA Safety Policy Voice of Non-commercial General Aviation



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A CLIMATE FOR CHANGE

It's a common human characteristic to avoid choices that require us to change. We tend to put our activities on autopilot and turn our attention to other things, often not noticing the changing circumstances that would compel us to change course. It may sound like I'm setting the stage for another essay on VFR-into-IMC accidents but the topic this time is the increasingly urgent need to address the causes of climate change.

No matter where you live, you've probably experienced some impact of climate change. You might have found yourself close to the unprecedented wildfires making headlines last summer. If you live in Texas, you might have shivered through the worst freeze in memory. I could go on, but you get the idea.

Sustaining Our Future

Because of its reliance on fossil fuels, the transportation sector, including aviation, has played a role in bringing us to the present challenge. But that also means that the transportation sector can — and must — play a role in finding and implementing solutions. To that end, earlier this year, President Biden announced a new target for the United States to reduce

greenhouse gas pollution by 50-52% of 2005 levels by 2030. This target calls for cutting carbon pollution from the transportation sector in a number of ways, to include working toward very low carbon, new-generation renewable fuels for aviation.

On that subject, you have probably heard about the long and continuing work to find a replacement for the 100LL fuel that powers much of the existing GA fleet. We'll provide an update on this work, known officially as the Piston Aviation Fuels Initiative (PAFI). But we will also take a look at exciting new technologies like electric aircraft. It's likely to be awhile before you can board a commercial airliner with electric propulsion. Happily, though, the size and diversity of the GA sector enables it to serve as both a seedbed and a testbed for all kinds of innovative ideas and technologies that eventually find their way into larger applications.

Beyond their benefit in carbon reduction, technologies like some electric aircraft can contribute to the environment through noise reduction. Technology has lowered the source noise of aircraft over the years. In Washington DC, where Reagan National Airport is conveniently close to the city, I can remember a time when the noise of departing (or arriving) aircraft forced every outdoor conversation into a stop-and-start staccato rhythm. It's a lot better now but noise concerns are also among the biggest threats to the viability of our nation's airports. We need to

do better. You might not have ready access to a whisper-quiet electric GA airplane, but we'll review some of the ways you can lessen the noise for airport neighbors.

We can't consider aviation and the environment without mentioning wildlife. Right from the start, pilots learn that there are rules against flying too low over certain parks and wildlife areas. But you may be more familiar with the risk of wildlife encounters of a different nature. Even with airport fencing, deer and other animals can create collision hazards for pilots operating at GA airports. Aerial collisions between our metal birds and our feathered friends are not uncommon either. To refresh your knowledge, this issue of *FAA Safety Briefing* will review risk mitigation measures and reporting protocols for wildlife encounters.

Respecting Mother Nature

Those who fly, whether as passengers or pilots, are privileged to see our planet with no boundaries. We see its beauty, and we can also see the damage we do to the environment. Now more than ever, the FAA seeks to advance aviation in an environmentally responsible and energy efficient manner. You have a role to play too, and you will find plenty of information in this issue on specific steps you can use to make your own aerial activities environmentally friendly.

LEARN MORE

FAA Environmental Policy and Guidance
[bit.ly/FAAEnvironPolicy](https://www.faa.gov/air_traffic/safety/FAAEnvironPolicy)

White House Fact Sheet on US Commitments
[bit.ly/WHCleanEnergy](https://www.whitehouse.gov/fact-sheet/US-CleanEnergy) (PDF)



AVIATION NEWS ROUNDUP

New Course for Preflight Self-Briefings for Student and VFR Pilots

The new course provides guidance on how to conduct a safe and regulatory compliant preflight self-briefing using automated weather resources. The objective is to ensure that the pilot understands aviation weather basics and learns to apply meteorological and aeronautical information in a systematic manner to plan a safe flight.

The course includes scenarios, real-life examples, videos, reference

materials, and practice exercises for pilots to conduct on their own or with their CFI. The FAA encourages pilots to leverage automated resources and develop weather and aeronautical interpretation skills in order to assess flight safety risks. Go to bit.ly/ALC-683 to take the course.

Sharing Aircraft Operating Expenses AC Updated

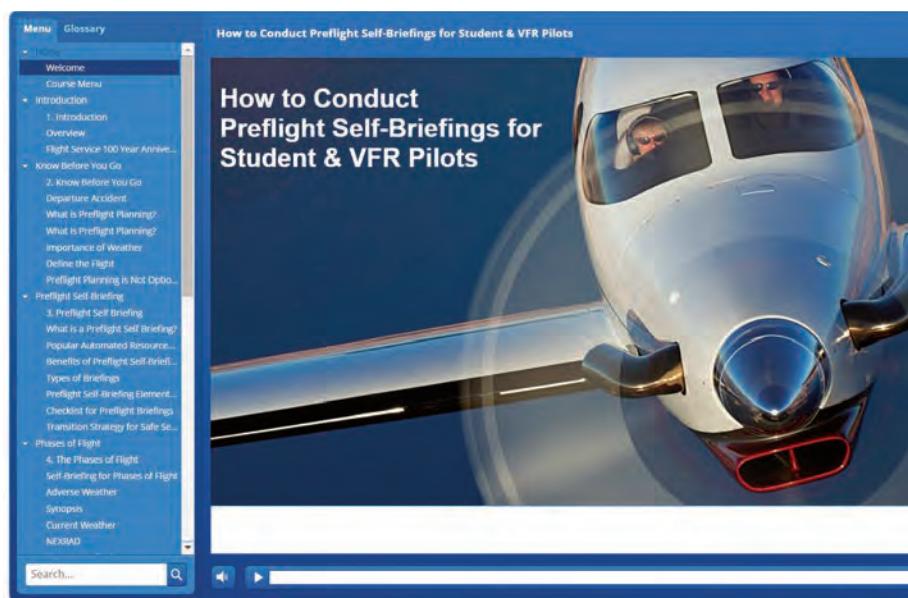
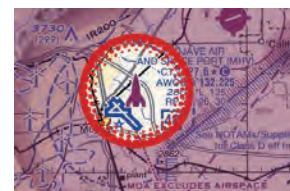
Advisory Circular (AC) 61-142, *Sharing Aircraft Operating Expenses in Accordance with 14 CFR § 61.113 (c)*,

was updated in 2020. This AC provides guidance on how a pilot may share flight expenses with passengers in a manner consistent with Title 14 of the Code of Federal Regulations (14 CFR). It responds to Section 515 of the FAA Reauthorization Act of 2018 that sets forth the FAA's longstanding position with regard to the regulation governing expense-sharing flights and the manner in which those flights relate to operations that require a 14 CFR part 119 Operating Certificate. Go to bit.ly/AC61-142 to download the AC.

Space Launch Activity Areas Added to Navigation Charts

Adding space launch activity areas to the navigation charts used by pilots who fly visually responds to the recent and expected continued growth of commercial space operations. All 12 FAA-licensed spaceports, and other federal and private launch and reentry sites, are represented on the charts by a rocket symbol. These areas are in Alaska, California, Colorado, Florida, New Mexico, Oklahoma, Texas, and Virginia.

Pilots can download the free charts and reference the FAA Aeronautical



SAFETY ENHANCEMENT TOPICS

Please visit bit.ly/GAFactSheets for more information on these and other topics.



JULY

Stabilized Approach —
Maintaining a stabilized approach and landing is a great way to avoid a loss of control situation.



AUGUST

Use of Weather Information —
A review of best practices on obtaining and using weather information for your flight.



Chart User's Guide at [bit.ly/FAAChartGuide](https://www.faa.gov/air_traffic/flight_info/charting/chart_guide) for more information. In addition, the FAA encourages pilots to check the NOTAM database for any Temporary Flight Restrictions (TFRs) issued to divert air traffic from where space operations are scheduled.

In 2020, the FAA licensed 41 commercial space launches and reentries, the most in the agency's history. For 2021, that number could reach 50 or more. Pilots also need to be aware of NASA, military, and other government launches that the FAA does not license.

Aviation Safety Reporting for UAS

The FAA has extended the Aviation Safety Reporting Program (ASRP) to UAS operators, including the protections offered through NASA's Aviation Safety Reporting System (ASRS).

ASRS has a reporting form tailored to the UAS community. This will ensure that the safety data that is collected will result in actionable information for the entire aviation community. ASRS captures confidential reports, analyzes the resulting aviation safety data, and disseminates vital information to the aviation community. This system is completely confidential, voluntary, and non-punitive. Anyone can use this reporting system, including bystanders. Go to asrs.arc.nasa.gov to learn more or to use the system.



Changes to EAA AirVenture NOTAM

The 32-page notice to airmen (NOTAM) booklet is an absolute must if you're flying an aircraft to EAA AirVenture in Oshkosh, Wisc. this July. It outlines all arrival/departure procedures, radio frequencies, Wittman Regional Airport details, and much more. AirVenture is scheduled to run from July 26 to July 31, 2021.

Although many of the procedures are similar to prior years, there are updates in nearly every area to enhance safety, efficiency, and convenience for the thousands of airplanes expected at The World's Greatest Aviation Celebration.

The EAA AirVenture NOTAM is required reading and should be part of a pilot's pre-flight preparation. Go to [bit.ly/OSHNOTAM](https://www.eaa.org/aviation-safety/oshkosh-notam) for the latest information.

New Online Airman Registry Coming Soon

The Civil Aviation Registry Electronic Services (CARES) is a reimagined and modernized service solution that will enhance the registration services provided by the FAA. Expected to launch in October 2021, CARES will provide web-based services for registration of all U.S. aircraft, and certification of all U.S. airmen, including unmanned aircraft systems (UAS) and will replace current Civil Aviation Registry processes. The new system will maximize the use of automation, optimize business processes, support risk-based decision making, and increase efficiency and effectiveness.

CARES will allow for direct user entry and automated processing of most FAA Civil Aviation Registry Division (Registry) services, with real-time access to authorized information. This transformation is expected to impact approximately 3 million industry stakeholders. The CARES initiative is in response to the FAA Reauthorization Act of 2018,

which directs the FAA to digitize Registry information, processes, operations, and functions through electronic or remote means. For more information, go to [faa.gov/go/CARES](https://www.faa.gov/go/CARES).

FAA Completes New Pilot Records Database Rule

A new rule from the FAA will enable the sharing of pilot records among employers in an electronic database maintained by the agency. The final rule for the Pilot Records Database requires air carriers and certain other operators to report pilots' employment history, training, and qualifications to the database. The rule also requires air carriers and certain operators to review records contained in the database when considering pilots for employment.

The database will include the following information:

- FAA pilot certificate information, such as certificates and ratings;
- FAA summaries of unsatisfactory pilot applications for new certificates or ratings;
- FAA records of accidents, incidents, and enforcement actions;
- Records from employers on pilot training, qualification, and proficiency;
- Pilot drug and alcohol records;
- Employers' final disciplinary action records;
- Pilot records concerning separation of employment; and
- Verification of pilot motor vehicle driving record.

The FAA will publish an advisory circular to accompany the final rule and will offer additional resources to support industry adoption and use of the database. The rule has been thoroughly debated and incorporates feedback from all aviation stakeholders. See the FAA's press release here: [bit.ly/3uMaepZ](https://www.faa.gov/press/2021/07/20210727-pilots).

WHEN YOU'RE DIAGNOSED WITH COVID-19

The past year has been challenging for aerospace medicine. We have worked closely with our international counterparts, fellow federal agencies such as the Centers for Disease Control (CDC), and FAA co-workers to keep the National Airspace System open for business, albeit at a reduced level. Deep cleaning, fixed crews for air traffic controllers, quarantine and isolation protocols, etc., became part of our daily routine. The FAA extended the validity for many time-sensitive qualifications, including medical certificates, several times to accommodate widespread logistical challenges while ensuring public safety. The availability of AMEs (aviation medical examiners) and specialty evaluations has improved significantly, removing the need to extend medical certificates. The last of the medical certificate extensions expired on April 30, 2021.

OUR GOAL REMAINS TO CERTIFY AS MANY AIRMEN AS SAFETY PERMITS.

On March 26, 2021, we provided AMEs with guidance on applicants with a history of COVID-19. In most cases, the AME will be able to issue a medical certificate if you are otherwise qualified. If you had more than mild disease or have persistent symptoms, please discuss your health with your personal physician prior to returning to flying. We recommend this for all pilots. If you maintain a FAA medical certificate, have that conversation with your AME as well. Anyone with a medical should have the documentation from your illness available for your AME to review, regardless of the

severity. The AME can guide you on what is necessary. In some cases, the AME might not need any documentation. For others, the AME might want to see the positive test report or doctor's note requiring isolation for presumptive COVID-19. We defer this to the judgement of the AME. If you were hospitalized, we need the hospital records including admission and discharge notes, testing, and a status report from the treating physician. We also need a status report for anyone with persistent symptoms. You do not need to report a quarantine due to a possible exposure.

Post-COVID conditions (the CDC term, known also as long COVID, long-haul COVID, and chronic COVID) are an area of active research and a concern for flight safety. Defined as new, recurring, or ongoing symptoms more than four weeks after the initial infection with COVID-19, they are not rare. Post-COVID conditions are more likely if you are older, have underlying health conditions, and had more severe disease. Previously asymptomatic healthy and younger individuals have developed post-COVID conditions though. Manifestations include dysfunction of the cardiovascular, respiratory, renal (kidney), or neurological systems. You should report mental health symptoms ("brain fog," depression, anxiety) or other symptoms such as fatigue, shortness of breath, cough, chest pain, headache, fever, loss of smell or taste, dizziness when standing, joint or muscle pains, or chest pain to your AME.



Remember that all certificated pilots (including student, sport, recreational, private, commercial, and airline transport) must comply with 14 CFR section 61.53. It states that if you have a disqualifying condition, medication, or treatment, you may not fly until it is resolved. Section 61.53 applies whether you use a FAA medical certificate, BasicMed, a driver's license, or fly balloons or gliders.

Unfortunately, while the vast majority of airmen can be issued a certificate by their AME right away, we have denied a medical certificate for a small number of airman after a COVID infection. Some airmen had other conditions or medications unacceptable for flying. However, the vast majority of these individuals and others who only had COVID-19 simply failed to provide the information we requested. Our goal remains to certify as many airmen as safety permits. Please help us to do so.

Dr. Susan Northrup received a bachelor's degree in chemistry and a medical degree from The Ohio State University, as well as a master's degree in public health from the University of Texas. She is double board certified by the American Board of Preventive Medicine in Aerospace Medicine and Occupational Medicine. She is a retired U.S. Air Force colonel and a former regional medical director for Delta Air Lines. She is also an active private pilot.



GUIDANCE ON COVID-19

Guidance for COVID-19 prevention and treatment has evolved throughout the pandemic, often rapidly. In May, the FDA (Food and Drug Administration) and the advisory committee on immunization practices (ACIP) expanded the Pfizer vaccine as an EUA (emergency use authorization) for those 12 and older. The CDC (Centers for Disease Control) eased many restrictions for those who are fully vaccinated. In addition, individuals can now receive the COVID vaccines at the same time as other vaccines. Additional changes are likely. Pfizer is seeking full approval for its vaccine (as opposed to the current EUA (see the May/June 2021 issue bit.ly/CIMayJun21)) for adults (18 and over). Vaccine manufacturers are conducting vaccine trials for children under 12.

COVID-19 occurred as early as November 2019 in China and appeared in the United States in January 2020. As of this writing, there have been over 33 million cases and over 600 thousand deaths in this country alone. Most of the deaths have been in individuals at increased risk. High risk criteria include a body mass index of 35 or greater (bit.ly/BMITables), chronic kidney disease, diabetes mellitus, immunocompromising condition or treatment, age of 65 or greater, age of 55 or greater and cardiovascular disease, hypertension, or a chronic respiratory disease. Different criteria exist for those under 17.

Prevention to control the spread of COVID (and other diseases spread via respiration) includes minimizing contact with the virus and getting vaccinated. The risk of spread is dependent upon the level of exposure, limited by the now familiar practices of social distancing, sanitation, mask

wear, and frequent handwashing. The historically low rates of influenza this season demonstrate the benefit of these practices.

COVID-19 VACCINES ARE SAFE AND EFFECTIVE, BUT OTHER PREVENTIVE MEASURES AUGMENT THE PROTECTION.

Evidence shows that the vaccines effectively reduce susceptibility to infection and serious disease as well as the risk of transmission. The vaccine is nearly 100% effective in preventing serious disease and death. However, some will decline vaccination and others cannot receive the vaccines. Therefore, some individuals will remain susceptible. Mutations naturally occur in virus replication, leading to variants. **The best way to reduce the number of new variants is to reduce the number of infections.** Although the CDC recently revised its recommendations for fully vaccinated individuals, keep up the good habits acquired during the past year. Frequent handwashing, not touching your face, and staying home when ill are always good practices. Note that while the current vaccines also work against the variants, vaccine experts are reviewing the need to revise the vaccines and the need for a booster.

While the risk of vaccine complications is very low, the Johnson and Johnson vaccine recently came under scrutiny. Some, primarily women, developed blood clots after vaccination. The individuals were between 18 and 60; many had other risk factors for a blood clot. While the risk of a blood clot complication from the vaccine is

real, it is much less dangerous than having COVID-19. In fact, the risk of death if you contract COVID-19 is 1,000 times greater. Consider also that oral contraceptives, commonly used, pose a greater risk of a clot complication than the vaccine. After reviewing the data, the FDA determined that the vaccine remains safe.

Others have been concerned about vaccine safety in general due to a lack of understanding the Vaccine Adverse Event Reporting System (VAERS). VAERS is simply a warning system for potential adverse effects from a vaccine and documents an association, not causality. After analyzing these reports, vaccine experts determined that the COVID vaccines are safe.

Unfortunately, treatment for COVID-19 remains challenging. This is a “novel” coronavirus, and there is much we still don’t know. The current options are limited unless you meet very specific criteria for a clinical trial. You and your physician should discuss what is appropriate for you should treatment be necessary.

The take home message is that vaccines are safe and effective, but other preventive measures augment the protection. As a reminder, the FAA allows airmen to use the Pfizer, Moderna, and Johnson and Johnson EUA COVID vaccines, but mandates a minimum 48-hour grounding after any of these (note: 14 CFR section 61.53 still applies).

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Federal Aviation
Administration



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SHOCKING POTENTIAL

GA Can Light the Path for Electric Aviation

By James Williams

Most of us don't invest much time in learning about things that don't directly impact our lives or hold a significant interest to us. This can present a problem when new technology makes familiar spaces feel strange. You hear terms that don't fit into anything you know. The good news is that you don't need an advanced degree to become familiar with — even comfortable with — the concepts and the language of a new technology. Electric aircraft offer a great example. Let me introduce you to the basics of this fast-developing arena.

Ctrl-Alt-Del

Electric and combustion propulsion systems do the same thing: they transform potential energy into the kinetic energy needed to fly. Now let's talk terms. The watt is a unit of power that signifies a selected amount of energy transfer over a specific amount of time. One watt equals one joule of energy transferred per second. In most uses, we talk about kilowatts (kW) which is 1,000 watts. In transportation, power, (particularly engine power), is usually expressed in horsepower (hp). Since both are derived units, they can be easily converted ($1 \text{ hp} = 0.7457 \text{ kW}$). You can apply either unit to any engine. A 100 hp engine would roughly equate to a 75 kW engine regardless of power source.

The next unit to consider is the kilowatt hour (kWh), which you know as the major component of your electric bill. One kWh is the energy of one kW (flowing) for an hour. The kWh is the unit of measure for an electric vehicle's "fuel tank," making it the counterpart of the gallon or liter for an internal combustion engine (ICE). A 10 kWh battery could supply 1 kW for 10 hours or 10 kW for one hour assuming the motor and systems attached to it could draw that amount of power. This hypothetical system also doesn't account for transformation losses in the system, but we'll talk about efficiency later.

Reactions of Another Kind

Electrification trades one chemical reaction for another. Like most tradeoffs, there are pros and cons. On the positive side, baseline efficiency is better than ICE. Electric motors are generally 75-95% efficient. With ICE engines usually in the 30-40% range, airplane engines aren't exactly on the leading edge of efficiency. So, electric motors could possibly triple the per unit efficiency of "fuel," with no direct emissions. Electric motors are also lighter and mechanically simpler with fewer moving parts. Slam, dunk. Electric is the way to go, right?

Not so fast. All methods of transportation use chemistry to transform potential energy into kinetic energy. This points toward the primary challenge of electrification, specific energy.

We discussed specific energy in detail in a previous article (see [Learn More](#) for link), but here's the recap. Batteries store far less energy per unit of either volume or mass than fossil fuels. Avgas (100LL) has a specific energy of about 12 kWh per kilogram (KG). The best batteries currently available (in terms of specific energy) are lithium ion (Li-ion) batteries with a specific energy around 0.25 kWh/KG. Even assuming 100% motor efficiency, the battery would manage only 0.25 kWh/KG while an ICE with 25% efficiency would net 3 kWh/KG — about 12 times more energy. In energy intensive operations like aviation, that matters.

The Darker Side of Green

Another challenge to electrification is the use of certain resources. Most of the cobalt needed for batteries comes from the Democratic Republic of the Congo, where conflict and regulatory structure raise ethical and environment issues. Lithium (Li), a key component of a Li-ion battery, must be processed from compounds. Hard rock mining has been the dominant source for Li but processes now enable extraction from salt brine deposits primarily in South America. Researchers are working on methods to extract Li from seawater (where it occurs naturally at 0.1 parts per million), but right now Li ore mining involves the kind of environmental impacts associated with open pit and mountain top removal mining. Brine extraction has less impact but can consume massive amounts of water — a problem in very arid regions.

Does that mean that Li-ion batteries are bad? Not exactly. All forms of energy have negative externalities. Thinking of batteries as a “zero impact” solution to environmental concerns is incorrect, but batteries clearly have a role to play in our energy future. How that evolves will depend on how technology advances.

Charged Up

While electric motors are simpler and less maintenance intensive than their ICE counterparts, batteries are far more expensive and complicated. The actual chargers for most electric vehicles (EVs) are built into the vehicle, enabling installation of “chargers” in homes and public places without compatibility issues. Regardless of where the actual charger resides, there are different levels of charging. How this will be applied to aircraft remains to be seen, but the EV world offers a few choices. Level 1 alternating current (AC) charging (120V/up to 16 amps (A)) is a standard household electrical outlet. Level 2 AC charging is 240V (usually about 50A) and is typically similar to an electric clothes dryer. The higher the voltage and amperage of the circuit, the more electricity it can



In this photo, we see the difference between Level 1 and Level 2 automotive Electric Vehicle Supply Equipment (EVSE), commonly referred to as chargers, and the different outlets they use.

provide to the vehicle. A typical Level 1 charger can only supply less than 2 kW, while a Level 2 charger typically provides around 7-11 kW. Using basic math, a 20 kWh battery would take about 10 hours to charge on Level 1 but only 2-3 hours on Level 2. Losses in charging make it a tad more complicated, though: Level 2 is close to 90% efficient while Level 1 is less than 84%.

For aviation, Level 1 might seem too slow, but its low cost and ready availability are advantages. Some hangars already have electricity, so adding a 120V outlet isn't a big deal. For an airplane that spends most of its time in the hangar, extra charging speed probably isn't worth the cost. Even a large spec 92 kWh battery would be charged in about three days from empty off of a standard outlet. You could fly, roll your airplane back in the hangar, plug it in, and go home. When you return a few days later, your airplane is “refueled” for less than \$20 of electricity. But what about those times when you don't have time?



While both Level 1 and 2 use the same J-1772 connector, note the difference in cord gauge of the Level 2 connection on top. The 240V 32A EVSE requires a much heavier cord.

AC/DC

If time is an issue, you might need DC Fast Charging. Often called Level 3 charging, DC Fast Charging is a very different technology. The electrical grid provides power in alternating current (AC), but batteries store it in direct current (DC). AC works very well for most applications. To store that energy in a battery, though, you need an inverter to transform it into DC. DC Fast Charging eliminates that step by going directly into the battery and at a much higher voltage and amperages. DC Fast Charging can provide over 300 kW of charge if your vehicle can accept that much. While still not quite as fast as a visit from the fuel truck, it's getting much closer.

The downside is that it creates a lot of heat and requires heavy gauge cables. It's also hard on the battery to be charged that rapidly. So using DC Fast Charging a lot could potentially reduce battery performance and life faster over time than less aggressive charging. It's also important to remember that regardless of the level, charging varies with conditions and state of charge (SOC). This is why you often see charging times listed at 5-80% rather than 0-100%. Charging will slow dramatically above 80% in most applications. Level 1 and 2 will be less impacted by virtue of their lower base charging rate.



The eFlyer 2 prototype takes flight to continue its certification program.

The Sky Ahead

So does an electric future lie ahead? Will we see electric aircraft become a factor in GA?

I believe the answer is yes, but it's not going to be a quick revolution or even possibly a complete one.

Because electrification — at least for now — is harder for bigger and more powerful aircraft, we are likely to see GA lead the way. The initial training market looks to be the most ripe for conversion. Electric aircraft now available or soon to be available can cover most required tasks. They can benefit from significantly reduced fuel costs and the reduced noise signature from switching. The picture for general purpose GA use is a little more challenging but could become a reality in the coming years. This is especially true if you operate from a hot or high airport. Since the electric motor doesn't depend on atmospheric oxygen, density altitude won't compromise EV motor performance in the same way it affects ICE.

It's an exciting time to be in aviation, and it will be fun to watch the electric airplane fleet develop. ➤

James Williams is *FAA Safety Briefing's* associate editor and photo editor. He is also a pilot and ground instructor.

LEARN MORE

"Ride the Lightning, Aviation's Electric Future?"
FAA Safety Briefing — Nov/Dec 2018
bit.ly/RideLightning



A 350 kW DC Fast Charger. Note the heavy cord and CCS connector.



U.S. Department of Transportation
Federal Aviation Administration
ADS-B Performance Monitor

Public ADS-B Performance Report

ICAO: A5BEC0 (51337300)

Tail Number: N47

Last Flight Id: N47

Period: 03-23-2018 13:11:20 to 03-23-2018 13:59:29

Operation Analysis Overview

Airborne 1090	<input checked="" type="checkbox"/>
Surface 1090	<input type="checkbox"/>
Surface RWY/Taxi 1090	<input type="checkbox"/>
Airborne UAT	<input type="checkbox"/>
Surface UAT	<input type="checkbox"/>
Surface RWY/Taxi UAT	<input type="checkbox"/>



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SEE AND BE SEEN

Get the Lead OUT!

Looking at the Future of Avgas

By Paul Cianciolo

There's nothing better than the smell of avgas in the morning! Well, maybe the "sound of freedom" as a fighter jet soars by overhead may be better. Nevertheless, sampling aviation gas — avgas for short — is a ritual every general aviation pilot does during preflight. Part of the rationale is making sure you have the right grade of fuel, the one with the blue tinge. The other part is making sure there is no water in the tanks. Even though you may love that fuel smell, inhaling toxic lead particles is not the best decision for your health.

'TEL' Me More

Yes, lead. It's the same lead you have to read about when you buy an old house or rent an apartment. Eating paint chips in today's world may be a safer bet. (*Please don't eat paint chips.*) Burning leaded fuel in piston-engine aircraft is one of the last remnants of 20th century flight. Pumped at 3,000 airports across the country, avgas is the only remaining lead-containing transportation fuel.

The FAA shares the Environmental Protection Agency's (EPA) concerns about lead emissions from small aircraft. More than 167,000 piston-engine aircraft operating in the United States rely on avgas. Lead is a toxic substance that can be inhaled or absorbed in the bloodstream, and emissions from avgas have become the largest contributor to the relatively low levels of lead emissions produced in this country.

There's a reason for the lead in avgas though. The additive used, tetraethyl lead (TEL) prevents damaging engine knock, or detonation, that can result in a sudden engine

failure. The TEL byproducts after combustion also provide some benefits to exhaust valves by preventing them from recessing into the cylinder head and burning.

Searching for Alternates

Leaded gasoline for cars and trucks was fully phased out in 1996 with the passage of the Clean Air Act. At that time, piston-engine airplanes and helicopters were only responsible for around 5% of all emissions in the country. The advances in automobile engines created a new market for unleaded fuel, but there were no alternative fuels for piston engines.

The market for avgas is small, with jet fuel, which does not require lead, accounting for approximately 86% of aviation's fuel needs. However, piston-engine aircraft are the staple of GA flying. Two-thirds of GA flying occurs for business purposes, which includes carrying millions of passengers



annually, serving as the primary training ground for most commercial airline pilots, and aircraft used for firefighting, law enforcement, and search and rescue, among others. New aircraft just aren't bought and sold like new vehicles, and no one wants to see an older piston engine aircraft lose value simply because it's incompatible with a new avgas.

Given the drawbacks of lead, in 2013 the FAA and EPA launched a research and development program to find an alternative unleaded fuel for piston aircraft. To help "get the lead out," the FAA is supporting the research of alternate fuels at its William J. Hughes Technical Center in Atlantic City. Through the Piston Aviation Fuels Initiative (PAFI), the FAA is working with aircraft and engine manufacturers, fuel producers, the EPA, and industry associations to overcome technical and logistical challenges to developing and deploying a new, unleaded fuel.

Knock, Knock!

The focus of the PAFI is qualification and authorization of an acceptable unleaded fuel and the safe transition to a more environmentally-friendly aviation fuel, which includes four key elements.

1. Fleet-wide Authorization Qualification Test Program
2. New Alternative Fuel Proposals and Certification
3. Establishment of FAA Safety Standards
4. Safe Deployment and Transition to a New Fuel

Testing, which has been ongoing since late 2014, was recently delayed due to the COVID-19 public health emergency. The FAA, fuel suppliers, and aerospace manufacturers continue to develop high octane, unleaded fuel formulations. The FAA requires the fuel producers to complete pre-screening tests prior to a candidate fuel formulation entering into more extensive testing through the PAFI. These tests include completion of a 150 hour engine endurance test on a turbocharged engine, an engine detonation screening test, and material compatibility tests using the PAFI test protocols or other procedures coordinated with the FAA.



Development and pre-screening testing is taking place at both private and public testing facilities across the country. The FAA's William J. Hughes Technical Center is providing engine-testing services with individual fuel companies. The FAA also continues to support other fuel applicants who have decided to pursue engine and airframe approvals that would allow the use of their fuel formulations through traditional certification processes.

In the big scheme of things, avgas for our GA aircraft is a very small portion of our country's fuel needs. This last remnant of the high-octane needs for our "arsenal of democracy" 75 years ago is still fueling our need to fly. It's time to get the lead out for good.

Prop Wash

In the short-term, lead exposure at airports can be reduced by increasing the distance between run-up areas and public areas. If existing run-up areas typically cause propeller wash to be directed off airport property or into areas where the public can be exposed, an airport operator should consider shifting either the location or orientation of run-up activities to locations where the emissions can be better contained to non-public areas of the airport. In cases where it is not immediately feasible to reduce lead emissions, minimize the public's outdoor air exposure to lead emissions by either shifting fences to increase the distance between run-up areas and public observation areas and/or posting signs to discourage loitering by the public in those areas where there may be potential and unnecessary exposure to lead from piston engine aircraft emissions.

With valuable input from industry, the FAA is taking important steps in advancing general aviation forward to a cleaner future. So next time you smell avgas in the morning, know that change is in the air. ➤

Paul Cianciolo is an associate editor and the social media lead for *FAA Safety Briefing*. He is a U.S. Air Force veteran, and an auxiliary airman with Civil Air Patrol.

LEARN MORE

faa.gov/about/initiatives/avgas



Cutting Through All THE NOISE

How the FAA is Working to Reduce the Impact of Aircraft Noise

By Tom Hoffmann

Growing up in a neighborhood just over a mile north of JFK Airport's Runway 22R/L, I know a thing or two about aircraft noise. We're talking about the mid-1970s too, when 707s, 727s, and DC-9s freely roamed the skies well before the quieter Stage 3 noise requirements were in place. Ah yes, then there was the Concorde. It felt like time stopped for a minute or so as the sleek supersonic airliner passed a mere few hundred feet above my garage on approach. The vibrations from its engines rattled dishes in my mother's cupboard and good luck if you were at a pivotal point in any TV show. Of course, as a wide-eyed aviation buff, I relished the extra loud engine noise and would always bolt to the backyard to watch the Concorde's iconic "droop-snoot" in action. However, I'm fairly sure my neighbors did not share my same enthusiasm for these routine aerial encounters. I can't say that I blame them.

For Flying Out Loud!

Fast forward several decades, and my, how things have changed. I no longer live a half dozen golf swings from a major international airport, but I'm keenly aware of

the tremendous strides the FAA has made in terms of reducing and mitigating aircraft noise. Still, the current situation with regard to noise is a dichotomy of sorts. On one hand, the number of people exposed to significant aviation noise in the United States has declined 90% from roughly 7 million in the 1970s, to just over 400,000 today. This also occurred as total enplanements increased by nearly a factor of five, from 200 million in 1975 to more than 850 million today.

Despite this favorable shift over time, a recent noise survey revealed a somewhat curious discovery. Data from the FAA's Neighborhood Environmental Study (NES), which was released this past January, indicated a substantially higher percentage of people were "highly annoyed" over the entire range of aircraft noise levels, including those at lower levels (below DNL 65 dBA). So how does that happen with so many fewer people exposed to aviation noise? It's the same question FAA experts are currently tackling in their bid to rethink the way noise is addressed, including figuring out ways to better understand how people perceive and respond to different types of noise. "This is a nuanced story," explains

Dr. James Hileman, the FAA's Chief Scientific and Technical Advisor for Environment and Energy during a recent webinar on the NES results. "The noise experience today is very different than it was in decades past."

Indeed it is. What may help explain this growing distaste for aircraft noise are changes in a range of factors including survey methodology, how aircraft operate, population distribution, how people live and work, and societal response to noise. The NES is the first major update the federal government has undertaken to assess annoyance from aircraft noise since a 1992 reassessment of survey data collected in the 1970s was conducted. The NES attempted to capture some of these nuances and provide more recent quantitative data, which the FAA could use going forward. But before we get into those details, a brief background on sound metrics and the agency's noise efforts might provide helpful context.

Background Noise

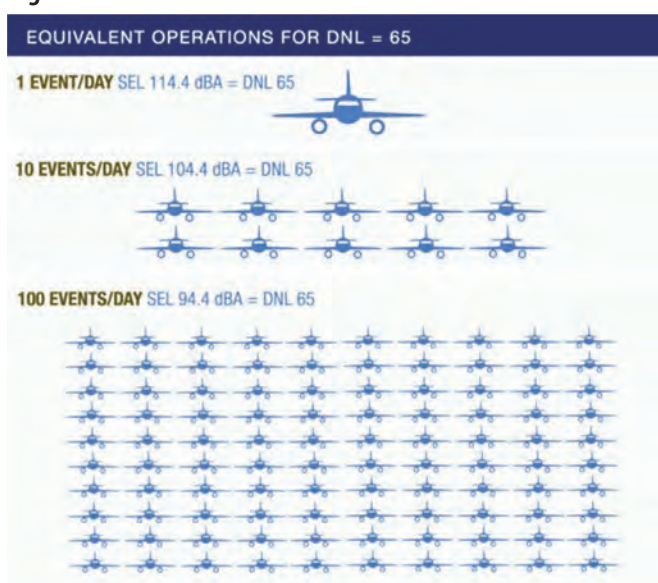
Simply stated, noise is unwanted sound. As we mentioned, there is a great deal of subjectivity involved with that assessment, but also a physical, more objective component as well. For example, we use decibels to measure sound intensity on a logarithmic scale. (*Fun fact: a decibel is actually 1/10 of a bel (B), a unit originally used to quantify telegraph signal loss and named after Alexander Graham Bell*). But to account for the way people respond to sound, we use the A-weighted scale (dBA). This accounts for both intensity and how the human ear responds to sound, focusing on frequencies that would affect us most (e.g., a crying baby vs. the low rumble of thunder).

Because people are exposed to sounds that vary in length and loudness, the FAA must use metrics that take these factors into account. The FAA's aviation noise webpage (www.faa.gov/go/aviationnoise) goes into great detail on these metrics, but we'll focus on one in particular here that helps measure noise exposure in a uniform manner — the day-night average sound level (DNL).

DNL is a metric that reflects a person's cumulative exposure to sound over a 24-hour period and is the standard metric used for all FAA noise studies. It takes into account both the noise from a particular aircraft, as well as the total number of aircraft operations over a single day (see Figure 1). For example, the DNL value for a single very loud event (like my Concorde experience) could equal that of several hundred aircraft that are less noisy, like near a busy general aviation airport. It also accounts for the complex set of variables that could cause noise to vary, like aircraft weight and configuration, weather, and time of year. To account for increased noise sensitivity at night, DNL is weighted to assess a 10 dBA "penalty" for operations between 10:00 pm and 7:00 am.

The FAA began using a DNL of 65 dBA as a threshold for significant noise exposure in response to the 1976 Aviation Noise Abatement Policy. Together with federal

Figure 1



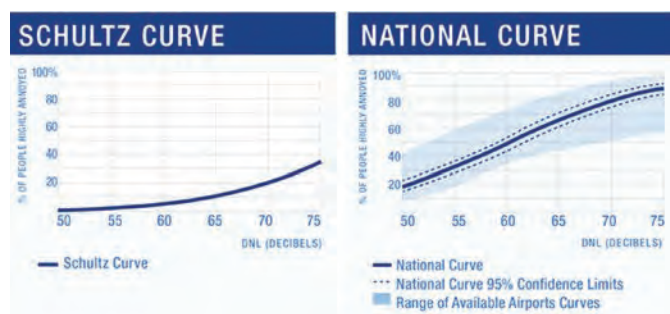
land-use guidelines, this helped the FAA to significantly reduce the number of people living in areas exposed to aviation noise as was pointed out earlier. The agency also established eligibility for noise mitigation funding, like sound insulation for schools or homes.

Peace of Your Mind

To get to the meat of the matter on noise, the FAA also had to find a way to represent the effect of noise exposure on people. Researchers use the term "annoyance" to capture the varied adverse reactions people have to different levels of noise exposure. With the help of social surveys, this relationship can be measured with what's known as a dose-response curve. If that term sounds like it belongs in a medical textbook, you're correct. It's a term also used within the medical field to measure the relationship of an exposure and a reaction. In fact, the FDA used dose-response curves to help pinpoint optimal dosing amounts for COVID-19 vaccines. In the FAA's case, the dose is aircraft noise and the response is a measure of how it annoys people. Current FAA noise policies, including the DNL 65 dBA threshold, are driven by a dose-response curve developed in the 1970s, known as the Schultz Curve. Although the Schultz Curve was reviewed and revalidated in 1992, its underlying survey data is 40 years old.

That brings us to the FAA's most recent effort to better understand the impact of aircraft noise exposure, the NES. By measuring responses to a modern fleet using updated data collection and analysis tools, the FAA was able to depict a more contemporary picture of the response to aircraft noise exposure. The NES involved surveying more than 10,000 residents living near 20 representative airports. A range of airport types were selected for the study including larger commercial airports as well as medium-sized

Figure 2



A comparison of the older Schultz Dose-Response Curve and the new national curve derived from the Neighborhood Environmental Study. In both cases, you can see how when noise levels increase, so do annoyance levels.

airports with a healthy mix of general aviation and rotorcraft operations like Des Moines International and Savannah/Hilton Head International.

As the right side of Figure 2 indicates, the new national curve reflects a much higher level of annoyance and a substantial change in the way people perceive aircraft noise. To help better understand and address these changes, the FAA issued a Federal Register Notice in January (86 FR 2722) to make the public aware of the NES results and to solicit feedback on where the FAA could further direct resources. The agency is now reviewing the more than 4,100 responses received during the comment period with the hope that this feedback will help shed light on the shift in increased annoyance levels and inform future steps.

“We will look at these results alongside outputs from other noise research programs to inform future actions,” said Don Scata, Noise Division Manager with the FAA’s Office of Environment and Energy. This includes ongoing research to study the impact to cardiovascular health and sleep disturbance. While these other programs may take some time to complete, the FAA is committed to keeping the public and stakeholders updated with any progress. Scata adds that the NES results are “an important element of a broader portfolio of research and community engagement to investigate and mitigate the impacts of aircraft noise.”

To view the FAA’s Federal Register Notice on Aircraft Noise Policy and submitted comments, go to [bit.ly/FAAFRN](https://www.faa.gov/aircraft-noise-policy).

In the meantime, the FAA remains actively engaged with other government and industry stakeholders to explore ways to reduce noise exposure, including how certain emerging technologies could play a role. The FAA is currently working with NASA and the ASCENT ([ascent.aero](https://www.ascent.aero)) Center of Excellence on studying noise from electric-powered aircraft, advanced air mobility vehicles,

and the X-59 Quiet SuperSonic Technology (QueSST) aircraft, a kinder and quieter Concorde if you will. There’s also the FAA’s ongoing work with the Continuous Lower Energy, Emissions, and Noise (CLEEN) program that is helping to accelerate the development of noise-friendly aircraft and engine technologies ([bit.ly/FAACLEEN](https://www.faa.gov/cleen)). It’s worth noting that the single most influential factor in reducing aircraft noise exposure has been the transition to quieter aircraft over the years through stringent noise standards.

On a more local level, the FAA has taken a host of actions in recent years to meaningfully engage communities with regard to noise. This includes hiring community engagement officers in each region and working with airport authorities to address community noise concerns. The FAA also created the Fly Neighborly noise abatement training program ([bit.ly/FlyNeighborly](https://www.faa.gov/fly-neighborly)) that teaches helicopter pilots about noise abatement procedures and noise-minimizing flight techniques. (Be sure to read this issue’s Angle of Attack for more on ways GA pilots can “fly friendly.”) Additionally, the agency continuously reviews air traffic procedures across the country to find ways to reduce aircraft noise while maintaining safety. For example, we’re already seeing noise (and fuel) benefits from the use of idle thrust approaches and narrower flight paths with performance-based navigation procedures for both commercial and general aviation operations.

Let’s Go Someplace More Quiet

With these ongoing efforts, coupled with a new comprehensive noise survey, the FAA is demonstrating its longstanding commitment to the environment and remains well poised to gain a keener understanding of the impact of aircraft noise exposure on the public. We encourage you to stay tuned as the FAA turns a new page on its efforts to adopt quieter, cleaner, and more efficient air transportation. ▶

Not sure who to contact with an aviation noise concern? Want to learn more about ways the FAA engages with communities? Visit [faa.gov/noise](https://www.faa.gov/noise).

Tom Hoffmann is the managing editor of *FAA Safety Briefing*. He is a commercial pilot and holds an A&P certificate.

LEARN MORE

FAA Aviation Noise Policy Webpage
[faa.gov/noise](https://www.faa.gov/noise)

FAA Neighborhood Environmental Survey Public Webinar
youtu.be/Mku13gLOxGc

“Of White Lies and Unintended Consequences: Real Estate, GA, and the Inevitable Conflict,” *FAA Safety Briefing* — May/June 2013, p. 10
[bit.ly/MayJun13](https://www.faa.gov/safety-briefing/may-june-2013) (PDF)

Sound Judgement for Using Drones

Diana Robinson

Bzzzzzzzz. You might think you hear a bothered bunch of busy bees if you are in hearing range of a drone's departure from *terra firma*. Nearly all small unmanned aircraft systems (sUAS) fall below the decibel level that can be harmful to human hearing; however, drone sounds can be a nuisance. They can also hinder an operation's objective: noise makes surveillance obvious and isn't a welcome wedding party guest even when participants really want drone photography.

Using drones for wildlife observation is another example. As scientists and naturalists are quick to note, animals are not particularly fond of bees or other stinging insects. A drone that quickly approaches a herd can cause a stampede. Drones have also been known to draw the attention of birds of prey, creating dangers to both bird and drone. Gustavo Lozada, a technology manager for the Nature Conservancy in Colorado, acknowledges that drones are an important tool in wildlife research and protection. Drones can track elephants in Africa, and they have helped eliminate activities like poaching, illegal fishing, and wildlife trafficking. Scientists can observe vulnerable species by tracking migration routes and patterns.

Recognizing the nuisance of drone noise, though, drone researchers are working with manufacturers to help reduce the buzzing noise they create. In the meantime, you need to use sound judgement (pun intended) when planning your mission, keeping risks and rewards of your decisions in mind while flying your drone.

Whether using drones near animals or humans, common sense is always in order. Lozada has formulated a method for slowly introducing the drone near animals by keeping a safe distance until they get used to the noise. The aim is to not scare the animals or disrupt their natural behaviors. The World Wildlife Fund and University of Exeter recommends drone pilots adopt a precautionary principle, since little is known about animals' sensitivity to drones. Their recent report, "Drones for Conservation," shares best practices for operating around

endangered species and sensitive habitats (space-science. wwf.de/drones).

They encourage you to think about your launch and recovery sites and to select a location that is away from animals.

When flying your drone near people, always aim to be courteous, respectful, and responsible. Let others know in advance about your drone operation. Be mindful of their privacy. Letting people know what to expect eliminates the startle factor, and that could help unleash curiosity and even inspire interest in flying drones.

We know to follow FAA rules when flying our unmanned aircraft, but it's also important to plan carefully. Check local, state, and national laws. Select the correct drone for the job. Pay attention to who and what are below the planned operation. In short, small steps go a long way toward assuring mission success.

To learn more about drones helping with conservation efforts, go to bit.ly/2Q9MLRr.

Diana Robinson is a project specialist in the Operational Programs Branch of the FAA's UAS Integration Office.



A picture taken from a drone as elephants are moved outside Serengeti National Park.

Nathan Hahn/Biodiversity and Wildlife Solutions.

LEARN MORE

Read the article, "Birds Attacking Drones: How to Fly Away!" cptrz.com/birds-attacking-drones-how-to-fly-away

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SPLAT!

The Story of Snarge

Accidental “Meetings” Between Aircraft and Wildlife

By James Williams

Snarge: (*snärj*) n. It’s the word used for what remains of a bird after it strikes an aircraft. It’s not pretty ... and neither are the results of most bird collisions with aircraft, which seem to be increasingly common. Anecdotes abound. On a recent road trip with an old friend who happens to be a regional jet captain, talk turned to hangar flying. “I seem to be having a lot of bird strikes lately,” he said. In the wake of US Airways Flight 1549’s miraculous landing in the Hudson River more than a decade ago, public attention focused sharply on one of aviation’s most chronic problems: wildlife strikes. As my friend reported, “One strike on landing was so bad we had to take the aircraft out of service and ferry it back to the manufacturer, unpressurized. The birds did enough damage to the pressure vessel that we didn’t want to risk it.”

That was a wise decision. A 2019 accident in Florida proved that point. On approach to Naples Airport, a Piper *Twin Comanche* entered an unannounced turning decent and crashed, killing the sole pilot on board. As far as air traffic controllers could tell, the flight was completely

routine, right up until the pilot deviated from his flight path. The National Transportation Safety Board determined that the cause of the accident was a loss of control due to a bird strike with a black vulture, based on the remains found inside the wreckage of the aircraft.

A Growing Concern

Just how big is the problem?

Although serious events are rare, wildlife strikes can happen nearly every day. Air traffic controllers handled over 87,000 pre-COVID flights per day (commercial passenger, general aviation, air taxi, air cargo, military) during which there were 17,358 strikes documented in 2019. That equates to about 48 strikes per day, or one strike for every 1,812 flights. The important statistic to remember though is that there were only 739 strikes recorded in 2019 with any level of damage, meaning there were only two damaging strikes per 43,500 flights.

Over the past 20 years, the problem of wildlife strikes has only gotten worse. According to the U. S. Department of Agriculture, 13 of the 14 largest bird species have

shown significant population increases. These include Canada geese, white and brown pelicans, sandhill cranes, wild turkeys, and bald eagles. Populations of many other hazardous species, such as turkey vultures, snow geese, red-tailed hawks, ospreys, great blue herons, double-crested cormorants, and white-tailed deer have also increased dramatically. Adding to the challenge is the fact that most of these species have adapted to living in urban environments, including airports.

Wildlife strikes are one of the most pressing concerns we face at U.S. airports.

Experts put the total losses of wildlife strikes at \$196 million per year in direct damage and associated costs, and over 110,000 hours of aircraft downtime. In an industry that runs on razor thin margins at virtually every level, these losses could be crippling. Financial losses pale in comparison with the loss of life that occurs in some wildlife strikes. While birds make up 94% of those strikes, they aren't the only problem. Between 1990 and 2019, there were 1,211 reported deer strikes in the U.S.

"Although strike reporting has increased significantly during the last two decades, there are reporting gaps from certain airports and airlines that need to be filled,"

says the FAA's National Wildlife Biologist John Weller. "Larger, part 139 airports, and those with well-established wildlife hazard management programs, have reporting rates about four times higher than other part 139 airports."

"Furthermore," Weller says, "GA airports that are part of the National Plan of Integrated Airport Systems (NPIAS) comprise only 15% of the overall strikes reported into the database, yet have accounted for 64% of reported civil aircraft destroyed or damaged beyond repair due to wildlife strikes from 1990 to 2020."

"Despite reporting gaps, both the quality and quantity of strike reports being submitted have steadily increased," says Weller, "but we can still do better." Weller points out that species identification is only provided in about 60% of all reported strikes and that the estimated and/or actual cost of the strike event is typically not provided. According to Weller, both are "critical pieces to understanding a complicated puzzle."

With this in mind, Weller, and his FAA Wildlife Biologist colleague Amy Anderson, have laid out steps to improve the reporting process. "We've worked hard to make reporting a strike as easy as possible. We've got a website, and we have now made it possible for you to report wildlife strikes directly from your smartphone at wildlife.faa.gov. We are always striving to get the word out



to pilots as much as possible.”

What Can I Do?

Anecdotes are not enough to get a handle on the true magnitude of the issue. As Weller observes, the biggest challenge for airport wildlife managers today remains the need for good strike data as well as mitigating hazardous wildlife (and their attractants) off airport properties.

To improve that data, the FAA has worked to make reporting wildlife strikes much easier. Simply navigate to: wildlife.faa.gov and click “report a strike.” As noted earlier,

you can even do it from your smartphone.

The form also includes instructions for safely collecting remains whenever possible. Though admittedly distasteful, the remains are critical to helping airport wildlife managers create better mitigation strategies. These strategies differ according to species. For instance, the methods used to drive off a hawk are different from those that would be effective against a starling. As outlined on the website, the remains — generally feathers

— should be sent to the Smithsonian, which provides identification services free of charge to U.S. registered aircraft owners and operators. If feathers are not available, even a swab of the

biological material (a.k.a., snarge) can help experts determine the species through DNA.

If we all pitch in and help improve the data, we can create safer skies through better mitigations. ►

[This article originally appeared in our Nov/Dec 2011 issue but has been extensively updated with current information and statistics.]

FAA Wildlife Strike Database

The FAA Wildlife Strike Database contains records of reported wildlife strikes since 1990. Strike reporting is voluntary. Therefore, this database only represents the information we have received from airlines, airports, pilots, and other sources.

Search the Database

Report a Strike

Update a Strike Report

For additional information, please visit the FAA Wildlife Hazard Mitigation Program site.

http://www.faa.gov/airports/airport_safety/wildlife/

LEARN MORE

FAA Wildlife Strike Database (search, update, or report strike here)
wildlife.faa.gov/home

FAA Wildlife Hazard Mitigation
faa.gov/airports/airport_safety/wildlife

FAA's The Air Up There Podcast: Flora, Fauna, and Flight
faa.gov/podcasts

FAA Wildlife Hazard Mitigation Video
youtu.be/Y4zIHRjNa4E

Smithsonian Institute's Feather ID Lab
bit.ly/FeatherIDLab

Guidebook for Addressing Aircraft/Wildlife Hazards at GA Airports
nap.edu/22949



Propane “noise cannons” are a common tactic to encourage birds and other wildlife not to gather on the airport.



CHANGING THE LIGHT BULBS

LED Technology Is The New Beacon in Aviation Safety

By Jennifer Caron

“If you want a quick and easy way to save money, change your lightbulbs to LEDs.” I received these words of wisdom from countless adults when I was looking for ways to make ends meet in my first apartment. Back then, light emitting diodes (LEDs) “lit up” the consumer marketplace as the longer lasting, more energy-efficient, eco-friendly alternative to traditional incandescent bulbs. The initial investment was quite steep, but with 80% less energy usage than Edison bulbs, the long-term, in-pocket savings offset the upfront cost.

With all that benefit buzz, I decided to give the lightbulb switch a try. What sounded good in theory was harder in practice, as I wandered up and down the lighting aisle of my local hardware store, desperately trying to figure out *what the watt* is an LED lumen, and will this oddity replace my existing 60 watt bulbs? Who knew that changing the light bulbs could be so complicated! Skeptical, I reluctantly purchased a box of 60 watt *equivalent* LEDs, and although it took me a while to “warm up” to the light, I haven’t looked back. I don’t have to change them, they don’t burn a hole in my wallet, and I’m doing my part to protect the environment.

Navigating Change

“Change can be hard, even when the benefits are obvious,” says Donald Lampkins, FAA Visual Guidance Lighting Systems Technical Lead. Lampkins and his team are leading the effort to convert incandescent lamps used in airport approach lighting systems to LEDs. While the switch may seem like a natural next step in cost and energy savings, Lampkins’ team has had to invest considerable effort in ensuring buy-in from pilots and technicians in the field. “As is the case with any new technology,” he continues, “you have to be prepared for hesitation or even skepticism.”

In 2007, the Energy Independence and Security Act mandated improved light bulb efficiency. As a result, LED-based lighting began to replace traditional incandescent lights at U.S. airports. Apart from the mandate, four influential factors promoted the switch to LEDs: lamp life, lamp cost, reliability, and maintenance costs. LED technology greatly outperforms traditional light systems using a fraction of the power, with an expected life of 50,000 hours versus 2,000 hours for incandescent lamps. They’re non-hazardous, recyclable, digital, and very precise in how they produce constant, uninterrupted light. Despite their higher upfront price,

the return on investment is realized in substantial savings. This is especially attractive to airports across the country.

“LEDs are replaced less often and cost less to maintain. Airfields no longer have to close their runways incrementally each night just to change out lamps for maintenance,” says Matthew Harmon, Aviation Safety Inspector in the FAA’s Flight Operations Group. “At a busy airfield that’s a really big deal,” he explains.

But at the end of the day, the switch to LEDs has proven to be safe and effective. They’ve been researched continuously for over a decade by both the FAA and industry and they are the same, if not better than the familiar incandescents. “The research bears that out, and the aviation community overall is pleased with LED lighting,” says Harmon.

Flipping the Switch

Across the board, both large and small airports are transitioning to LEDs, to the point where LED-based lighting has largely replaced incandescent technology on runways and taxiways, with approach lighting systems (ALS) soon to follow. Since ALS plays a safety-critical role in ground-based navigation, particularly at night and in reduced-visibility conditions, any transition has to be safe or safer than the system in use today.

Early on, prior to installation, some of the common concerns about LEDs were related to brightness, glare, and depth perception. Anecdotal pilot reports suggested that LEDs were perceived as brighter than incandescents at the same intensity, and tests confirmed this was true.

Prior to introducing the technology into the National Airspace System (NAS), the FAA conducted extensive photometric testing to determine how LED lights affect a pilot’s visibility and perception. LEDs have different visual, infrared, and thermal characteristics from incandescents, due to the dissimilar ways in which they generate light. The saturated color of LEDs makes them appear brighter than their less saturated, incandescent counterparts.

To resolve the issue, the FAA revised and re-defined the dimming curves for LED runway lighting, effectively lowering the light intensity. After making these changes, pilots are now beaming over the improved clarity, resolution, and better ability to distinguish colors on the airfield.



The FAA requires airports to convert to LED lights on a single runway or taxiway at the same time to avoid any visual perception differences to pilots.

The U.S. Department of Transportation’s Volpe Aviation Weather Research Center compared incandescent lamps to LEDs in a wide variety of real-world weather and challenging visibility conditions. “Testing and analysis has



convincingly shown that in all weather conditions, the pilot will see and recognize LED lights before incandescents,” says Steve McArthur, FAA Visual Guidance Lighting Systems Manager. Check out this video to see the side-by-side comparison on approach (the video contains no audio): bit.ly/PAPIApproaches.

There’s LED lighting options for aircraft too that have some good benefits. More on that in a future article.

Oh Say Can You See

In 2015, the FAA assembled a Significant Safety Issues (SSI) team and Safety Risk Management Panel (SRMP) to study the integration of LED lighting into the aviation system. “There were some initial safety concerns identified with LEDs that we’ve since mitigated; namely, compatibility with night vision goggles (NVGs), and loss of sight issues with high intensity runway edge lights,” says Robert Bassey, electronics engineer in the FAA’s Office of Airports. Legacy NVGs were built to detect the infrared (IR) emission of incandescents. That presents a problem with LEDs, given their limited IR. The FAA found that some pilots using NVGs were unable to acquire red-colored, LED obstruction lights. The agency adopted performance specifications in 2020 to add IR emitters to red LED obstruction lights. “Pilots need to know these lights are now compatible with NVGs,” says Bassey, “and the red obstruction lights are being built to those standards.” Work is ongoing to upgrade the circuitry that powers airport light fixtures so they’ll support LED voltage, with plans to introduce new standards specific to LEDs.



LEDs are compatible with night vision goggles.

When LED conversion was initially considered, the FAA had a restriction on the use of LED high intensity runway edge lights (HIRL). After rigorous testing, the SSI team and SRMP concluded that LEDs meet the standards set for lighting performance in both approach and runway lighting systems. As a result, the restriction on LED HIRL was lifted in 2019.

Some pilots also reported an inability to recognize the shape of the runway closure marker, based on LED intensity and the size of the runway closure marker. “We issued a technical report, and we’re doing some validation testing that would ultimately allow us to modify those parameters to make LED runway closure markers more easily recognizable by pilots — that’s coming down the pike,” says Bassey.

Pilots who use Enhanced Flight Vision Systems (EFVS) can continue to use their devices safely, and in the same manner, but the requirement to have an electronic means to see approach lights if you can’t see them with your naked

eye, will not change (Title 14 Code of Federal Regulations (14 CFR) section 91.176 (a) and (b)). EFVS users have asked to know, prior to departure, if an airfield has LED lighting. “There are plans to change the Terminal Procedures Publication (TPP) to identify LED lighting on airfields, with emphasis on HIRLs, and any LED approach lighting systems as they change over,” says Harmon.



There are plans to change the Terminal Procedures Publication to identify LED lighting on airfields.

Cleared for Approach

It is estimated that by 2024, LEDs will start to replace incandescent lamps in ALS across the United States. “The conversion is happening at a rapid pace not only because of the obvious benefits, but also because several manufacturers have stopped making incandescents suitable for airport lighting systems,” says Lampkins. Outside of ALS testing sites, there are currently no LED ALS in use at any U.S. airport. The FAA has determined the most economical approach to replace incandescent lamps is to use the existing ALS infrastructure of 950 Medium Intensity Approach Lighting Systems (MALSRs). As commercial LED lamps are unable to meet the intensity requirements of the current MALSR design, the FAA has validated the requirements for a special LED lamp.

Since 2016, Lampkins and his team have installed LED Precision Approach Path Indicator (PAPI) systems at 52 airports throughout the U.S., such as Flagstaff, Ariz.; Vero Beach, Fla.; Rochester, N.Y.; Harlingen, Texas; Atlanta, Ga.; Newport News, Va.; and Tri-Cities, Tenn., to name a few.

In 2018, they installed LEDs in the MALSR at Juneau International airport in Alaska (KJNU) to collect operations data during low visibility and/or degraded weather conditions. The team received glowing feedback from pilots stating that LEDs are brighter, and easier to distinguish and see.

ALS environmental testing and flight evaluation is ongoing at Savannah/Hilton Head International airport (KSAV), with initial positive feedback from pilots and airport management. Plans are in place to install LEDs at three additional airport test sites: Memphis (KMEM), Columbus (KCMH), and McCarran (KLAS).

“We’ve looked at these lights as a replacement for incandescents for over a decade, and we haven’t found any safety case not to install them,” says Lampkins. “With a much longer life and a more consistent, even light, LEDs are the new beacon of safety on approach.” ▶

Jennifer Caron is *FAA Safety Briefing*’s copy editor and quality assurance lead. She is a certified technical writer-editor in the FAA’s Flight Standards Service.

The 2021 National GA Award Honorees

Every year for more than 50 years, the General Aviation Awards program and the FAA have recognized aviation professionals for their contributions to GA in the fields of flight instruction, aviation maintenance/avionics, and safety.

The FAA and the General Aviation Awards Committee plan to present individual plaques to the 2021 recipients at EAA AirVenture in Oshkosh, Wis., and will provide them with an all-expenses-paid trip to this event. Names of the honorees will be added to the permanent plaque in the lobby of the EAA AirVenture Museum.

Nominations and applications for the 2022 General Aviation Awards will be accepted starting July 1, 2021. If you know of a flight instructor, AMT, or FAAS Team Rep whom you think is deserving of an award at the local, regional, or national level, we encourage you to nominate them. If you are an aviation professional with a distinguished career in one of these categories, we encourage you to apply. For more information about nominating or applying, please go to GeneralAviationAwards.com/Nominations.

2021 National Flight Instructor of the Year

Ronald Jay "Ron" Timmermans of Orlando, Fla. is the 2021



National Flight Instructor of the Year. Ron earned his bachelor's degree in architecture from Iowa State University in 1972, and was a professional architect and project manager for 40-plus years before devoting himself to aviation. He has been an independent flight instructor since 1998. These days, he

owns and manages AileRon T, LLC, and flies a Beechcraft Bonanza co-owned with his wife.

Ron has logged more than 4,000 hours of dual instruction given, with nearly 1,300 of those hours in the past five years. He instructs at locations throughout Florida, where he serves as a mentor and advocate for emerging and young pilots and CFIs.

Certificates and ratings Ron holds include ATP-AMEL, Commercial-ASEL, CFI-IA, MEI-IA, AGI-Instrument, and Remote Pilot. He is a National Association of Flight Instructors (NAFI) Master CFI and Master Ground Instructor, a Gold Seal Instructor, and an American Bonanza Society (ABS) Master Aviator. Ron is particularly well-known in the Beech community for his active involvement in the Beech-

craft Pilot Proficiency Program (BPPP) and Bonanza/Baron Pilot Training (BPT) program.

Ron began providing training to Beechcraft pilots in 1998 and developed BPT training curricula approved for FAA WINGS credit. He instructed in BPT events throughout the United States and has also been active in the BPT Companion Training Course for those pilots' significant others.

His involvement in the Beech community includes publishing 50 articles in the ABS Magazine and serving on the ABS Board of Directors. He is a frequent consultant to owners and buyers of Beechcraft airplanes, and regularly conducts Beechcraft transition training.

Ron has served as a FAAS Team Lead Representative for both the North Texas and Orlando FSDOs. A big supporter of the FAA WINGS program, Ron has presented at 30 WINGS safety seminars. He served on the WINGS Industry Advisory Committee and helped found the WINGS Industry Network in 2020. He also serves on the FAA's WINGS Usability Working Group.

Ron's outreach activities include presenting NAFI MentorLIVE webinars for flight instructors, and hosting broadcasts for Florida Aviation Network events to a national audience. He is a regular presenter at ABS national conventions, EAA AirVenture, Sun 'n Fun, AOPA Regional Fly-Ins, and numerous other aviation events. (RonTimmermans@att.net)

2021 Aviation Technician of the Year

Michael Colin Dunkley of Coshocton, Ohio is the 2021 Aviation Technician of the Year.



Growing up in Rhodesia (now Zimbabwe), Mike was always curious about how things worked. He sometimes upset his parents when he took toys apart to see how they worked and couldn't reassemble them. He eventually learned to reassemble as well as fix them

when they broke. The closest he got to aviation was building plastic model airplanes.

Mike learned machining, sheet metal work, and similar trades at a technical high school, and then applied to Air Rhodesia (now Air Zimbabwe) to pursue a career in aviation maintenance. He started with the airline at 16, and went on to become a line and heavy maintenance technician and then a supervisor and inspector. After 15 years, he moved to general aviation when he joined Mission Aviation Fellowship (MAF), which provides aviation services to over 1,000 Christian and humanitarian agencies, as well as thousands of isolated missionaries and indigenous villagers in remote areas of Africa, Asia, and South

America. Mike's first MAF job was liaison for turbine field operations. Two years later, he worked for a humanitarian organization bringing relief to civil-war-torn Mozambique, maintaining a fleet of up to 11 aircraft ranging from single- and twin-engine Cessnas to a King Air 200. Mike later moved to the Democratic Republic of Congo as a director of maintenance for a large program operating Cessna 185s, 206s, 210s, and *Caravans*.

In 1995, Mike returned to the U.S. and continued with faith-based aviation organizations, first with Moody Aviation, and then with MMS Aviation in Coshocton, Ohio where he serves as a supervisor and instructor. After four decades of learning, performing, and supervising aviation maintenance, Mike now focuses on passing his knowledge and experience to missionary aircraft mechanic trainees.

During his career, Mike has trained on a wide variety of aircraft and engines, including everything from the Boeing 707, 727, and 737, to a Piper PA46 *Malibu/Mirage*.

Paul Gillenwater, FAAS Team Program Manager for the Columbus, Ohio FSDO notes that "Mike Dunkley represents an organization and, in fact, an entire sector of aviation that often goes unnoticed and unseen, but to those lives that are affected by their selfless dedication, it couldn't be more impactful." (mike.dunkley@mmsaviation.org)

2021 National FAA Safety Team Representative of the Year

Adam Timothy Magee of Swisher, Iowa, is the 2021



National FAA Safety Team (FAAS Team) Representative of the Year. Adam holds bachelor's and master's degrees in accounting from the University of Missouri. A Certified Public Accountant, Adam's day job is with a bank but after banking hours, he doffs his suit and tie in favor of a

white silk scarf and becomes a safety superhero for lighter-than-air (LTA) aviation, a.k.a. hot air ballooning.

Adam's mother is a LTA instructor pilot, so he was "hangar flying" with LTA pilots by age five. Later he cofounded The Balloon Training Academy, a non-profit organization for LTA training and education. As president of the Academy, Adam built the organization from the ground up. It is now a Training Provider and Industry Member of the FAAS Team. Adam's pro-bono activities earned him 2019 District and Regional CFI-of-the-year awards. He received the Balloon Federation of America (BFA) Directors Award, and also the Bill Murto-roff Spirit of Ballooning Award for youth aviation education.

Adam is a commercial LTA pilot rated for hot air balloons, which confers CFI privileges, and is a Designated

Pilot Examiner (DPE) for Private and Commercial LTA. He is also an appointed FAAS Team Representative, WINGSPro, and DronePro with the Des Moines FSDO.

Working with the National Association of Flight Instructors (NAFI), Adam spearheaded the NAFI Elite Balloon Instructor program that recognizes instructors raising the bar on hot air balloon education and training. In October 2020, Adam became a NAFI director and treasurer.

Having achieved BFA's Level 8 (highest level) Distinguished Aeronaut achievement award, Adam has served as a Safety Officer, Weather Officer, and Event Director of hot air balloon festivals and events. A valued LTA Event Official, he is among the few Americans in the international hot air balloon competition jury pool.

Adam has authored training articles for BFA's *BALLOONING Journal* and the *FAA Safety Briefing* magazine. He has created hot-air-balloon-specific content for FAASafety.gov, added numerous WINGS courses, and reached almost 1,000 balloon pilots during the past six months via the National FAA LTA Outreach Series.

Adam has helped shift the ballooning community safety culture. Thanks to his efforts, there is now more LTA content available and more LTA participants in the FAAS Team than ever before. (adam@theballoontrainingacademy.com)



HOW CAN I HELP? — SMALL STEPS CAN MAKE A BIG DIFFERENCE

You probably know the story about Everybody, Somebody, Anybody, and Nobody. Everybody was asked to do an important job. Everybody was sure Somebody would do it. Anybody could have done it, but Nobody did. Somebody got angry, because it was Everybody's job. Everybody thought Anybody could do it but Nobody realized that Everybody wouldn't. Everybody blamed Somebody when Nobody did what Anybody could have done.

That story seems especially relevant to this issue's "Embracing the Environment" theme. When there is a large-scale task at hand, individuals often see it in all-or-nothing terms: I can't do it *all* on my own, so there is *nothing* I can do. Not so. While it's true that Nobody can do everything, Everybody can do something. In a time when there are many challenges to general aviation, and many growing concerns about how transportation and aviation affect the global environment, it's increasingly important for each of us to do as much as we can to mitigate damage from our own individual activities.

Ditch the Dumping

It always bugged me to throw fuel on the ramp after sumping the fuel tanks. That made me one of the earliest adapters of the GATS jar fuel tester,

whose screen allows you to safely pour sampled fuel (minus the water) back into the tank. It may cost more than the traditional fuel testers, but the very modest cost of an environmentally-friendly fuel sampler is far less than the cost to the environment — not to mention the cost to your budget if you incur an EPA fine for fuel dumping.

Another option is to use the fuel collection receptacles that are fast becoming a standard feature on ramps all over the country. If you can't safely return sampled fuel to the tank, step to the nearest fuel collection container and pour it in. If your airport lacks such containers, speak to the FBO or airport management about installing them ASAP.

"SHH"ow Consideration

When I first started flying in northern Virginia, my home airport was surrounded by open fields. No longer. Several housing developments now occupy that once-empty space, and other open areas are gradually filling in. Nowadays, many of the airports that GA pilots call home are surrounded by other people's actual homes. We pilots can huff and puff all we want to about how the airport was here first, and how "those people knew" that buying property near an airport would mean tolerating a certain amount of noise.

Our huffing and puffing is pointless if "those people" complain to elected officials who would happily see the airport closed and consigned to "other economic uses."

It is incumbent upon all of us to do as much as we can do to reduce the noise impact on our neighbors. If there are residential developments near your airport, it's a good bet that airport management has, so to speak, "heard" from them and worked out a noise mitigation plan that could include non-standard traffic patterns, designation of a calm wind runway that reduces traffic over more congested areas, and other such measures. Learn what noise mitigation measures exist at the airports you use and follow them as closely as you can.

Another way to fly friendly is to avoid prolonged maneuvering over any given area. That silo may be perfect for practicing turns around a point, but the folks in the farmhouse next to it may not consider their neighborhood to be as "uncongested" as it appears to you. That also applies to operating near environmentally-sensitive areas that are marked on sectional charts.

Doing your part to keep the planet green, clean, and quiet is more than a good idea. It's the right thing to do.

Susan K. Parson (susan.parson@faa.gov) is editor of *FAA Safety Briefing* and a Special Assistant in the FAA's Flight Standards Service. She is a general aviation pilot and flight instructor.

LEARN MORE

For more suggestions on flying friendly, check out the "Environmental Issues" section of the Aviator's Model Code of Conduct, available free of charge from www.secureav.com



SEND IN THE DRONES! — SCOPING AND COPING WITH ADVERSE ENVIRONMENTAL IMPACTS

It's been over a year since much of the population has been working virtually, and we are all ready for a much deserved vacation. But looking back at the summer of 2018, *Karenia Brevis*, better known as the Red Tide, was the culprit that struck the Florida coastline, inlets, and waterways with a harmful toxin-producing algae bloom bringing respiratory irritation to humans, and fatality to fish, sea turtles, manatees, birds, and dolphins. The environmental and economic impact to the more than 150 mile stretch of coastal communities was devastating.

Florida was recently in the news again as roughly 215 million gallons of polluted water was discharged into Tampa Bay from an inactive Piney

Point phosphate plant's retention pond, built into a gypsum stack. A gypsum dewatering stack is a defined geographic area associated with a phosphoric acid manufacturing plant in which gypsum is disposed of or stored outside a fully enclosed building, container, or tank.

The emergency release of this polluted water took pressure off the compromised stack to avoid an accidental spill of even more of its contents. Had the breached retention pond burst, a 20-foot wall of water could have flooded over 300 homes.

Drones proved their mettle during both these events.

The main goal of environmental protection and conservation is to protect and preserve wildlife and the ecosystems they inhabit. Whether you are evaluating coastal erosion, or identifying endangered species, drones allow professionals to fly remotely and out of harm's way. In these events, drones helped local governmental authorities safely and remotely collect, review, and analyze data to determine what actions to take to reduce or eliminate both serious situations.

Photos taken by drones during the Red Tide event identified the most vulnerable areas and allowed researchers/government to track the path of the blooms, as well as deceased sea creatures. This data helped with preparation of clean-up activities for delicate estuaries and tourist destination areas. Drones could quickly identify where clean-up crews should go first, helping to reduce health risks to residents. The use of drones further reduced operational costs and the time it would have taken for employees to go into areas using more traditional methods.

A Tampa area videography company was contracted by Manatee County government to provide drone footage of the retention pond breach. With the assistance of part 107 certified remote pilots, officials were able to monitor the situation by observing the 24-hour live drone video sent to the Emergency Operations Center. The live feed was active on Zoom and the county's YouTube page for 30 straight hours.

Florida's Department of Environmental Protection made a temporary repair to the concentrated leak, and they will continue to monitor it until a permanent solution is found. Drones with thermal cameras were also used to evaluate conditions and scan for nutrient levels in and around the area.

The biggest lesson learned during both of these events is the value of using drones in collaboration with state agencies, local governments, and industry to reduce negative impacts on the economy and environment.

Diana Robinson is a project specialist in the Operational Programs Branch of the FAA's UAS Integration Office.

Photo by Melissa Matisko



Twenty-four hour drone video footage was monitored at the Piney Point site from an SUV.

Photo by Melissa Matisko



Beach cleanup during red tide by Manatee County property management crews.



THE ORGANIC MECHANIC — 5 STEPS TO A GREENER MRO

When it comes to aircraft maintenance, repair, and overhaul (MRO), “eco-friendly” and “organic” are typically not the first words that spring to mind. Yet with a commitment across the aviation industry to protect public health and the environment, going green is not only good for the earth, it’s also good for your employees’ job safety and health, it safeguards your shop against liability, and adds more “green” to your bottom line. There are small steps you can take now to prevent, eliminate, and manage waste in your day-to-day maintenance operations.

Step 1: Develop a Waste Management System

Servicing aircraft leads to predictable types of waste, such as fluids and spent chemicals. Some are hazardous to human health (solvents, heavy metals) and some are not. Yet both types pose a risk to you and the environment if they’re not handled properly. Know the risks and the difference between the two.

Waste-Opedia 101:



Per the U.S. Environmental Protection Agency (EPA), hazardous waste is any waste that is Toxic, Reactive,

Ignitable, or Corrosive (TRIC). The most common hazardous shop waste comes from cleaning products, such as certain halogenated solvents, xylene, toluene, methyl ethyl ketone, or methanol. These products are also hazardous air pollutants, or HAPs, which pose an acute toxic reaction when inhaled by humans/animals. You’ll find a list at bit.ly/WASTEID. A quick way to know the risk of any hazardous material is to take a look

at the diamond-shaped risk label on its Material Safety Data Sheet.

Next, inventory your shop waste, and:

- ⚠ **Collect It:** Use approved, labeled, and dated containers; do not mix hazardous and non-hazardous waste.
- ⚠ **Store It:** Indoors, closed lids, keep records, inspect regularly.
- ⚠ **Dispose of It:** Use a licensed waste company or recycler.

Consult the EPA, and state and local agencies for permits and amounts you can either generate or store. For resources and environmental regulations in your state, visit bit.ly/EnvironByState.

Step 2: Substitute Environmentally-Friendly Alternatives



Swap out solvents, soaps, de-icing fluid, synthetic detergents, and VOCs (volatile organic compounds) for non-toxic, water-based cleaning alternatives, non-caustic rust removal substitutes, and terpene (plant-based) products.

Adopt environmentally-responsible methods for aircraft and ground vehicle care, especially cleaning, degreasing, painting, de-icing, corrosion control, and fueling. Dry strip instead of wet. Clean in a sloped area to manage run-off.

Step 3: Manage Universal Waste, Paint, and Used Oil



Place labeled bins around your shop to collect and recycle non-hazardous universal waste items such as alkaline batteries (lead-acid batteries are hazardous),

de-pressurized aerosol cans, packaging materials, rubber, paper, and plastic.

Solvent-based paints are hazardous. Send your paint cans, rags, and antifreeze offsite for recycling.

Collect, recycle, or burn used oil to heat your shop. It’s not hazardous, and you can recycle those oily rags and filters.

Step 4: Waste Not, Want Not



For those who were thrifty before it was cool, here’s your chance to shine. Reduce, reuse, and recycle items like scrap metal, unused paint, unserviceable parts, tires, bulbs, and mercury switches and thermostats. Don’t buy more than you need. Save a tree and go digital. Invest in LED lighting to save on your power bills.

Step 5: Educate Your Customers and Train Employees



Research shows that consumers prefer and will pay more for eco-friendly products. Let them know your shop is green — you’ll be more competitive, and crisp green dollars will sprout on your balance sheet. Establish an employee training program (initial and annual) on health hazards, proper handling/labeling, emergency procedures, and management of spills and leaks.

Adopting sustainable practices and using alternative products is not difficult, and it doesn’t take a lot of resources to get started. One step at a time, and you can do your part to be environmentally conscious.

Jennifer Caron is FAA Safety Briefing’s copy editor and quality assurance lead. She is a certified technical writer-editor in the FAA’s Flight Standards Service.

AN APPROACH TOWARD FRIENDLY-FLYING

For many folks in the aviation industry, myself included, there's something extremely alluring about the sounds of a general aviation airport. Whether it's the chug-chug-chug of a starter motor bringing life to a small internal combustion engine, the distant whirring and purring of airplanes taxiing to and fro, or the piercing chirp of rubber meeting the runway on landing, the collective sounds are almost symphonic, even intoxicating. But, as they say, beauty is in the eye (or maybe ear) of the beholder. What some hear as pleasing can be just noise to others.

This subjectivity is just one of many factors the FAA looks at when considering the effects of noise exposure on airport communities. As explained in "Cutting Through All the Noise," in this issue, the FAA is focused on ways to address this problem, which recent survey results indicate have become an increasing annoyance. While general aviation operations don't typically raise to the same level of noise caused by air carriers, there are a number of ways we, as pilots, can reduce the aircraft noise footprint over sensitive areas.

Be a Better Neighbor

A good first step is to follow any noise abatement procedures already in place at your airport or any other airport you visit. If a slight course deviation during departure or arrival can reduce your impact on the community, it is well worth the adjustment. If your airport doesn't have noise abatement procedures, ask airport management to consider whether it might be helpful to establish such protocols. Even slight lateral flight path adjustments can have notably positive impacts on noise sensitive neighbors. Before you head

out to the airport, check the remarks section of the applicable U.S. Chart Supplement for noise abatement procedures, and make it a point to comply unless safety requires otherwise.

In addition to making lateral adjustments to reduce noise, consider vertical adjustments (altitude) as well. Since the airport and its immediate surroundings can be considered insensitive to noise, why not use V_x (best angle of climb speed) on departure? By thinking in terms of angle rather than rate of climb, we can increase the altitude gained before exiting airport property. That, in turn, means a lower noise signature on the ground because of the greater vertical separation from noise-sensitive neighbors.

The caveat is that safety should always come first. A V_x climb may compromise forward visibility and make it more difficult to track an aircraft you're following. Also be mindful that V_x reduces your margin above the 1-g stalling speed. If you haven't done much flying at best-angle-of-climb, consider hiring an instructor to practice.

Another noise-friendly tactic is to reduce power and/or prop speed when it is possible and safe to do so. This technique applies particularly to those with constant speed props. Even a modest reduction in RPM can make a significant difference to your neighbors. As with the previous technique, though, never compromise safety of flight.

There are good, noise-friendly flying techniques for helicopter pilots as well. The Fly Neighborly Noise Abatement Training program, created by the FAA and endorsed by Helicopter Association International, teaches pilots and operators noise abatement procedures

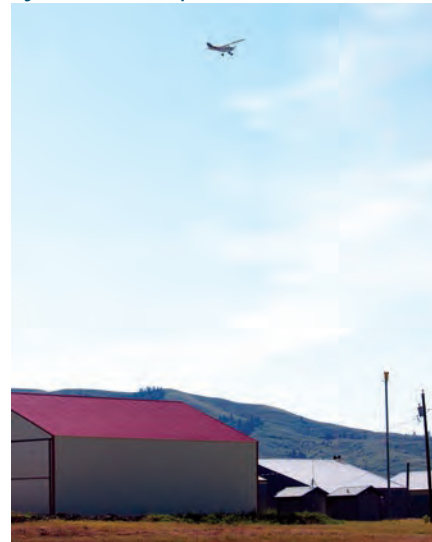
and situational awareness tools that can minimize the effects of helicopter noise on communities. Some takeaways: climbing turns are quieter than level and/or descending turns, and steeper takeoffs and approach glide paths can greatly reduce your noise footprint. To view the course (ALC-500), go to bit.ly/ALC500.

With Hearts and Minds

Another strategy for being a good neighbor involves reaching out to your community to improve your airport's public image. Since many people fear what they don't know or understand, an event like an airport open house or barbeque could go a long way in helping demystify the GA environment and tout the joy of personal aviation. These events could also provide pilots a chance to better understand and appreciate airport neighbors' concerns about noise, safety, and perhaps other issues. Now that "sounds" like a plan!

FAA Safety Briefing's assistant editor James Williams contributed to this article.

Tom Hoffmann is the managing editor of FAA Safety Briefing. He is a commercial pilot and holds an A&P certificate.



THERE'S ELECTRICITY IN THE AIR

Friends from Iowa often describe that state's seasons as too hot, too cold, and too short. Further east, Mark Twain once quipped, "If you don't like the weather in New England now, just wait a few minutes." Here in Texas, people say it gets so hot that hens lay hard-boiled eggs.

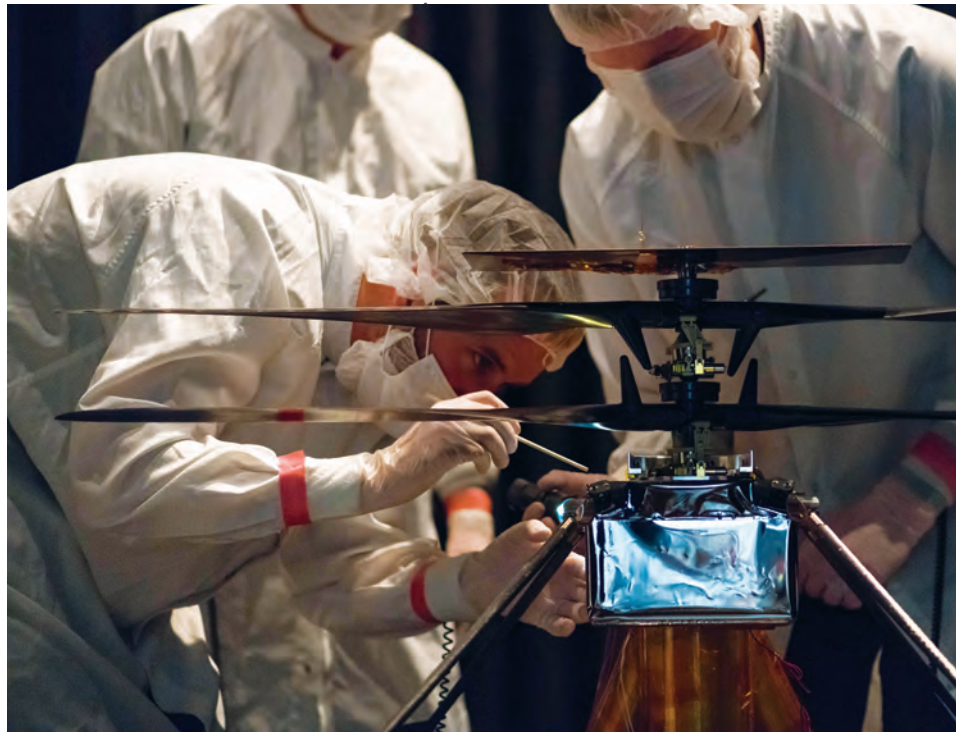
We all have locale-based weather stories that climate change tends to complicate and/or exacerbate. The Environmental Protection Agency reports that in the United States, eight of the top ten warmest years on record for the contiguous 48 states have occurred since 1998, looking at years 1901 through 2015. 2012 and 2015 were the two warmest years on record.

In addition to sparking more frequent wildfires and wreaking havoc on the farming industry, temperature increases also impact helicopter flight performance. Warmer air is less dense, causing rotor blades to produce less lift. Engine power output is reduced.

The Crossroads in U.S. Weather

The helicopter industry understands these concerns and is sensitive to the needs of the environment. One way they have responded is by developing electric helicopters and vertical take-off-and-landing (eVTOL) vehicles. The FAA started working with these companies early on as they began developing technology that could transform American transportation.

In 2018, an electric helicopter set a Guinness World Record for the farthest distance traveled by an electric helicopter. The lithium battery-powered manned rotorcraft flew 30 nautical miles to an 800 foot altitude with an average speed of 80 knots.



eVTOL is also taking off. Many companies are looking to create urban air taxis that fly above heavy traffic getting people quickly to their destinations. Some also will be designed to fly long distances. For example, there is a six-passenger battery-powered eVTOL currently in development that is expected to fly up to 250 nautical miles between charges.

NASA's solar-powered helicopter, Ingenuity, represents another innovation. Ingenuity's Mars flight was the first aircraft in history to make a powered, controlled flight on another planet. The initial flight lasted 39.1 seconds.

"We have been thinking for so long about having our Wright brothers moment on Mars, and here it is," Ingenuity project manager MiMi Aung said in a statement. "We will take

a moment to celebrate our success and then take a cue from Orville and Wilbur regarding what to do next. History shows they got back to work to learn as much as they could about their new aircraft, and so will we."

Gene Trainor works as the communications specialist/executive technical editor for the FAA's Compliance and Airworthiness Division.



Check out our GA Safety Facebook page at [Facebook.com/groups/GASafety](https://www.facebook.com/groups/GASafety)

If you're not a member, we encourage you to join the group of over 14,000 participants in the GA community who share safety principles and best practices, participate in positive and safe engagement with the FAA Safety Team (FAASTeam), and post relevant GA content that makes the National Airspace System safer.

Just the Facts

To whoever is involved with the subject content and "posting" of GA Safety Enhancement Fact Sheets in the *FAA Safety Briefing* online site (bit.ly/GAFactSheets), AWESOME JOB! I love them, some of them have even become part of my signature on emails!

- One of the many great ones is called the "WINGS Pilot Proficiency Program" (bit.ly/WINGSFactSheet (PDF)).
- Is it possible to come up with one for the "AMT Awards Proficiency Program" too?

THANK YOU for everything you do! Many of us do notice, including the aviation public, and we appreciate

and enjoy everything relating to the *FAA Safety Briefing* and aviation safety in general!

— Javier

Hi Javier — Thanks for taking the time to write, and we appreciate the feedback. Our Safety Briefing Magazine and FAA Safety Team members work hand-in-hand to help educate airmen by way of the magazine and the fact sheets, and it's always nice to know when we've hit the mark. Thanks too for your suggestion. This is something we've thought about and will certainly consider. In the meantime, check out our Aviation Maintenance Safety Minute videos on YouTube at bit.ly/AviationMaintSafetyMinute.

Runway Crossing Crosswords

Thanks for the Airport Surface Safety Crossword Puzzle in the Mar/Apr 2021 issue:

bit.ly/SurfaceSafetyCrossword (PDF). It was fun. Helps to reinforce pilot knowledge. More for us in the future? ATC crossword puzzle? Weather? Jepp charts vs. NOS charts? Just sayin.' Thanks again.
— Steve

Hi Steve — Happy to hear that you enjoyed solving the crossword puzzle. I'll pass along your comments to our Runway Safety Group who developed the puzzle as a fun and engaging way to learn more about surface safety.

Thanks too for suggesting that we do more of these — we may just take you up on that!

Please be advised that the online version of the article, "Rolling out the Rules — New Drone Rules Advance the Vision," in the May/June 2021 issue of *FAA Safety Briefing* has been updated. You can find the updated article online at faa.gov/news/safety_briefing_and_in_our_Medium_blog_at_medium.com/faa/rolling-out-the-rules-7e0c3a2221f3.



For more stories and news, check out our new blog "Cleared for Takeoff" at medium.com/FAA.

Let us hear from you! Send your comments, suggestions, and questions to SafetyBriefing@faa.gov. You can also reach us on Twitter @FAASafetyBrief or on Facebook at facebook.com/FAA.

We may edit letters for style and/or length. Due to our publishing schedule, responses may not appear for several issues. While we do not print anonymous letters, we will withhold names or send personal replies upon request. If you have a concern with an immediate FAA operational issue, contact your local Flight Standards Office or air traffic facility.



EVERY STEP MATTERS

Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has.

— Margaret Mead

“Do you see the flames?”

The terse text from my neighbor put a quick end to what had been a relaxed Saturday evening. I dashed to the patio and — yep, I saw flames lighting the iconic mountains. It was shocking. Yes, I knew it was wildfire season. Yes, I knew there had been reports of a “human-caused” fire a few miles northeast of my home. Yes, I knew that Arizona’s missing summer “monsoon” rains had made 2020 the “nonsoon” season. Yes, I knew that the Grand Canyon State had been baking to a crisp in a stretch of scorching triple-digit temperatures. Still, there is nothing like seeing flames you think you can touch to bring home the reality of Western wildfire.

That June night marked the start of the “Bush Fire,” which burned for weeks and went into the books as one of Arizona’s biggest wildfires. I got an all-too-close view of two more in the weeks that followed, and there

were many more devastating wildfires across Arizona and multiple Western states before the summer ended. Many friends and colleagues were directly affected by the wildfires, and still others later found themselves lashed by other forms of dangerous and destructive weather all over the country.

Anyone who flies, whether as a pilot or a passenger, has a unique perspective on the environmental impacts — both good and bad — that we humans have on planet Earth. From the aerial vantage point, I’ve been privileged to view scenes of incredible beauty throughout the world and around the United States. Unfortunately, I have also seen evidence of environmental devastation and destruction. The massive “burn scar” from the June 2020 Bush Fire is all too visible from the air and seeing photos of charred Saguaro cactus is sobering. I suspect you probably have your own mental album with examples of both Earth’s natural beauty and the environmental blunders that threaten its survival.

For an anti-pollution Earth Day poster in 1970, comic strip artist Walt Kelly adapted a famous phrase from

a War of 1812 naval battle to become even more famous. Specifically, Kelly’s comic strip character Pogo changes the original line — “We have met the enemy and they are ours” — to “We have met the enemy and he is us.” As one commentator observed, Pogo’s remark deftly summarizes the human tendency to create our own problems — and that we have only ourselves to blame for many of the environmental crises we now face.

The good news is that it is also within our power to reverse at least some of that damage. I was fascinated to see some of the “then-and-now” photos made during the past year. The “before” pictures showed landmarks obscured by smog-induced haze, while the “after” photos captured the same scene in crystal clear skies. While global shutdowns are obviously not sustainable, those photos still gave me hope that we humans really can change things for the better. I am also heartened by the fresh focus — some of which we have reviewed in this issue of *FAA Safety Briefing* magazine — on ways that the transportation sector can contribute to climate solutions. In addition to the things we can do as a society, this issue has also looked at some of the steps we can take as individuals, and as individual aviators. We all have a role in protecting and preserving the incredible splendor of our world and, as scientist Margaret Mead famously said in the quote above, we should never doubt that even a small group of thoughtful and committed people can change the world. Let’s make it so.

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MIKE MILLARD

Aviation Safety Inspector, FAA General Aviation Operations Branch

A 21-year career as an aircraft maintainer in the U.S. Air Force was the catalyst that eventually brought Mike Millard and his immense experience to the FAA. He was a crew chief on F-16s, U-2s, T-38s, and A-10s, which included a three-year whirlwind global tour performing with the Thunderbirds. His civilian aviation accomplishments include certification as an airframe and powerplant mechanic with inspection authorization, designated mechanic examiner, pilot, and senior parachute rigger.

Mike also earned a bachelor's degree in professional aeronautics and a master's degree in aeronautical science from Embry-Riddle Aeronautical University.

For the past eight years of his 17 years with the FAA, Mike has been the FAA Flight Standards Service lead environmental specialist and a subject matter expert for parachute, balloon, glider, ultralight, and banner towing operations. He is also involved with unique new technology like jet packs and flying hover bikes, and he provides safety presentations for numerous inspection authorization renewal seminars, FAAS team pilot safety seminars, and at the FAA safety forums during the annual Sun 'n Fun Aerospace Expo in Florida.

Mike oversees two environmental contractors working for the FAA.



He manages their day-to-day environmental review calculations and determinations for both general and commercial aviation. The environmental work involves screening aircraft noise and emissions to ensure they are within National Environmental Policy Act (NEPA) limits for adding scheduled service for more than 400 domestic and international air carriers. The environmental responsibility also covers approximately 200 aerobatic practice areas, planned aviation events, and unmanned aircraft systems (UAS) environmental reviews.

"With the advancement of UAS technology and scheduled drone delivery services, we have made huge environmental strides in the review of vehicles and operations to address environmental impact," Mike explained.

The General Aviation Operations Branch does more than environment assessments. They are responsible for FAA policy and regulatory development related to the GA operational aspects of 14 CFR part 91 for amateur-built, recreational, and personal operations of aircraft, aerobatic practice areas, aviation events, balloon events, air races, parachute demonstrations, aerobatic contests, and fly-overs. The branch also provides guidance and regulatory support for parts 91, 101, 103, and 105.

In Mike's role on the team, one of the biggest challenges is dealing with the distinct differences between environmental reviews and GA safety reviews because they have different timelines and require coordination with multiple FAA lines of business.

"Environmental reviews often go beyond what is required for a safety review," he said. "Depending on the



type of proposed operation, I may need to contact Native American tribes, state historic preservation offices, U.S. Fish and Wildlife and/or National Parks, and city parks and recreation departments, to name just a few."

With regard to possible changes in the environmental review process for aerobatic practice areas and new commercial activities at airports, Mike sees the software, policy/procedures, and the tools used to evaluate noise, emissions, and visual effects shifting to accommodate new technology like UAS and other new aircraft, propeller, and engine designs. Also, new tools like the Noise Complaint Initiative (which will help the public submit noise complaints and help the FAA to gather data to reduce or eliminate aviation noise concerns) will assist the FAA in its work to embrace the environment.

Beyond helping the FAA to be a better environmental steward, Mike loves the great outdoors. He devotes some of his free time to teaching wilderness survival techniques to both aviation and non-aviation groups.

Paul Ciano is an associate editor and the social media lead for FAA Safety Briefing. He is a U.S. Air Force veteran, and an auxiliary airman with Civil Air Patrol.



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