Contaminated Jet Fuel In Nigeria

Chris Shieff
20 July, 2023

Last week, a fleet of jet aircraft were grounded in Nigeria after **significant volumes of water were found in their fuel tanks.** One became airborne and suffered malfunctions in flight.

The Nigerian Civil Aviation Authority (NCAA) confirmed the issue was **not confined to that one airline**, describing the situation as ‘dire.’ Anyone uplifting fuel there right now should be seriously concerned.

Max Air identified Octavus Petroleum as the source of the contaminated fuel which led to the grounding of its 737 fleet.

The NCAA has issued an urgent All Operators Letter to refuelers and operators to follow the proper procedures – but with **sixty days** to comply. That's over two months of potentially **contaminated fuel** still being used at airports in Lagos, Abuja, and Kano – without mandatory procedures in place to check it.

What do pilots have to do?

The NCAA note requires a thorough inspection of refuelling equipment, and testing of the fuel it carries or pumps. More notably, there will also be a **mandatory requirement to take samples** from fuel tanks before and after refuelling too. **This will apply to anyone operating an aircraft in Nigeria.**

It is becoming mandatory to test fuel samples both before and after refuelling.

The advice is sound though – be **hyper vigilant** of anything going into your tanks there at the moment. Of course, perhaps the best mitigator right now is **not to refuel at all**, and to **tanker instead.**

Where is the water coming from?

Problems with infrastructure and how it is stored is likely to blame. Aside from particulates and fuel-loving microbes, there are **multiple opportunities** for water to accumulate. This can include water that gathers in low spots within pipelines, rain-water contamination, changes in temperature during storage or while being pumped and even the moisture content of air when tanks are unsealed to add or remove fuel.


JET FUEL JP8/F34
JET FUEL JP8/F34

There are plenty of opportunities for water to contaminate jet fuel in storage and transfer, especially if proper procedures aren't followed.

A Little Vs A Lot

If you suspect contamination while airborne you should **land immediately.**

The impact depends on how much water is actually in your tanks. In small amounts, it can rust and corrode important components of your fuel system including fuel nozzles that can eventually fail. Water can also wear out fuel pumps that rely on fuel to stay slippery and cool.

You may also notice **unusual engine operating temperatures, surging, and technical faults** with your aircraft's fuel system.

In larger quantities the issues become critical. Icing can restrict or stop the flow of fuel to your engines leading to **flame outs** (remember water freezes at just 0 degrees C, while pure Jet A1 can remain liquid in temps as low as -47 degrees C).

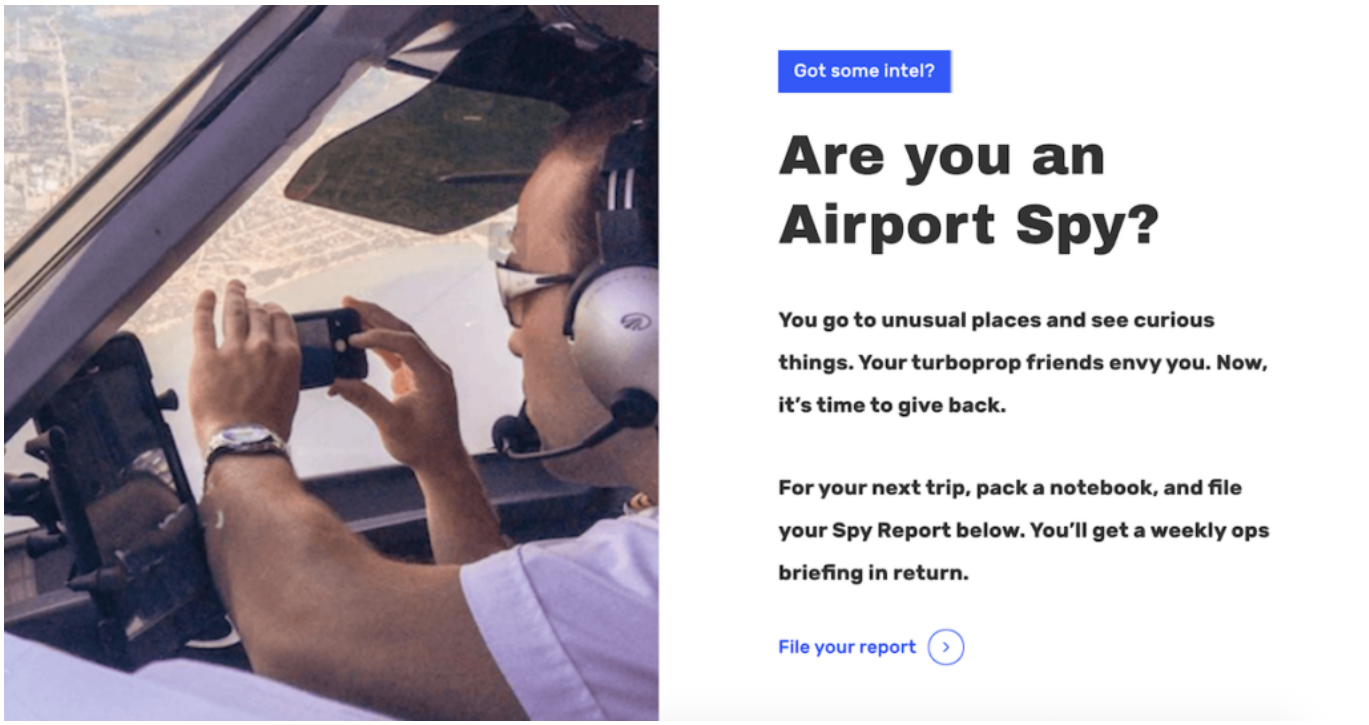
Icing can clog filters and prevent fuel from reaching your engines.

Also, water doesn't burn, so if it reaches your combustion chambers in any significant quantities you can say sayonara to your engines producing thrust – in other words you could have a **multiple engine failure** on your hands.

Make Sure You Report

If you do detect fuel contamination in Nigeria, it must be **reported to the NCAA.** Their contact details are found in the above letter.

And make sure you let us know too so we can help spread the word, and keep everyone safe. You can reach us on team@ops.group or by submitting an **Airport Spy** report.



Coming soon: a new global format for runway surface conditions

OPSGROUP Team
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ICAO's new Global Reporting Format methodology comes in on November 4, 2021, but a few authorities have decided to implement it sooner than that.

So here is a quick rundown on what GRF is, and what the requirements are for implementing it.

Runway Excursions

We have talked about these before. So have ICAO. They are a big deal, but they shouldn't be. Or rather, **they shouldn't still be happening.**

Despite numerous incidents, accidents, reports, mitigation plans, you name it, runway excursions are still one of the most common (and often most dangerous) aviation events that are occurring.

A runway excursion is any lateral of longitudinal overrun (not due to any system or component failure of malfunction, or because of an abnormal runway contact).

The primary causes for runways excursions are pretty much an unstable approach was flown, or proper performance calculations weren't done. **Or a combination of both.**

A study of commercial aircraft accidents between 1999 and 2019 showed that **16% of all fatal accidents and 36% of all hull loss accidents** were due to runway excursions.

So, if we can stop them from happening, a lot of aircraft and people will be saved.

What is GRF?

GRF stands for **'Global Reporting Format'** and it is a new methodology which ICAO are implementing which aims to standardise how **runway surface conditions assessments and reporting** is done.

The issue in the past is that some places still give braking coefficients (not really handy because it means different things for different aircraft). Some places were not really assessing surface contamination properly, and some pilots were not really understanding the implications of what they were being told.

RCAM

So GRF will use **RCAM – a runway condition assessment matrix** – and this will give pilots a runway

condition code.

1-6. Nice and easy.

The code is determined by an assessment of what it is contaminating the runway. Snow, ice, water, spilt tomato soup… and then a downgrade assessment criteria is applied. This looks at how the contaminant will impact the deceleration and the directional control of aeroplanes.

It is simplified. No more coefficients and frictions. Just simple “yep, that’s slippery and slide-y” assessments. Pilots will also give braking action reports, rating the action they experience from “Good” down to “Less than Poor”.

This matrix ties in with the new Snowtam reporting format which you can read about here.

Who does it impact?

It impacts a lot of people because it is not just a case of “here is a new format, go”.

Airport authorities will be required to train their staff to ensure they are aware of how to carry out the assessments and to ensure reporting is standardised.

Operators will need to ensure their staff (flight planners and pilots) are aware of the new format, and more importantly – that they are aware of why and how to use it!

Pilots will also need to familiarise themselves with it, and ensure they have a decent grip on what the assessments mean, how to apply them to their performance calculations, and also **how they too can assist in the reporting.**

What’s the official source?

ICAO Annex 14. Or rather **amendment 13-B to Annex 14.**

Here is the amendment letter.

Here is the main ICAO page for all things GRF.

The U.K. CAA GRF page has a nice summary of all the official references too.

November 4, 2021

This is the date to know because this is the implementation date. However, familiarising yourself with all the info on it before then might be a good idea because **several authorities have already implemented this.**

NAV CANADA and EASA have both brought it in on **August 12, 2021**

EASA have a bunch of handy info on it from how it was developed to Q&As.

And here is NAV CANADA's page on it.

The FAA have their own project – TALPA – which has pretty much already implemented exactly this so you might not notice much of a change.

Bottom line

- **Pilots** should familiarise themselves with the new format and understand what it means and how to use it.
- **Operators** should ensure all their staff are trained on it (and throw in some additional unstable approach, excursion mitigation and performance calculation training and awareness too if you fancy).
- **Airports and authorities** should be ensuring they are implementing the new format, and training their staff on its use and importance.

Hopefully this helps **reduce the number of runway excursions** due contamination and performance issues. Of course, for this to work we need to make sure we are also flying a stabilised approach, and flying one to the runway we did the performance calculation for…

Bad Air: Fumes and Contamination

Chris Shieff
20 July, 2023

Fumes. Chances are if you've been flying for a while you've already experienced them. A recent study showed that in the US alone there are on average five fume events reported every day, and those are just the ones we know about. NASA previously eluded that these reports are just the 'tip of the iceberg.'

It's an industry-wide issue and there's no magic bullet in sight to fix it. As long as we continue operating aircraft that use bleed air, the risk will persist and we need to take it seriously.

Each time we hop in an airplane we run the risk of being exposed to bad air – a threat that has potential to incapacitate both pilots. It's happened before – just google Spirit Airlines Flight 708.

What do we actually mean by 'fumes'?

It's important to understand they are not the same thing as a smell. **Smells** can be unpleasant but are not necessarily a cause for concern. Your first officer may be to blame, or perhaps a dirty oven. They can also indicate a fume, but aren't necessarily dangerous on their own.

Fumes on the other hand – *are* dangerous. In a nutshell, they are anything that produce physiological symptoms when inhaled. Fumes can be colourless, odourless and difficult to detect until they are already affecting you.

What about the regs?

So if it's that bigger deal, **why aren't we testing the air?** Both FAA and EASA airworthiness rules require cabin air to be free from harmful or hazardous gases and vapours but fall short of ongoing testing.

Detection systems are also required for safety critical systems but they have never been enforced for monitoring bleed air. Which is surprising considering it is what we breathe. Both IFALPA and ICAO have previously expressed concern at the lack of regulation out there to protect us and our passengers from contaminated air.

The reality is that **most airplanes don't have air detection – nor are they required to**. Essentially it has become an acceptable risk that we need to deal with.

So, what can we do about it?

Knowledge is key. The more we know about fumes, where they come from and what to do in the air, the

better we can deal with them safely.

Where are they coming from?

(Almost) all turbine aircraft in service use heated air drawn or 'bleed' from the engines or the APU for air conditioning and pressurisation. This is air is taken through ports before being cooled and mixed with recirculated air and distributed into the cabin and cockpit.

We rely on seals to keep the air clean of a load of nasty chemicals that turbine engines need to operate properly. Unfortunately when those seals leak or fail they allow toxic substances to enter the air we breathe.

What kind of substances?

Modern aircraft are complex, and we can be exposed to a surprising variety of chemicals – none of which do our bodies any favors.

Here are some of the major ones:

Synthetic engine oil. The number one culprit. Engines need it for lubrication and to keep bearings spinning smoothly. While accessories such as starter generators and accessory gear boxes rely on it. The problem is that it contains organophosphates – manmade chemicals that are toxic when inhaled. Oil contamination is often described as smelling like dirty socks, mustiness or 'wet dog.'

Hydraulic fluid. Leaks and spills on the fuselage can be drawn into the APU inlet along with air intended for the cabin. They also contain organophosphates and are often characterised by a very acrid, bitter and oily smell.

De-icing and anti-icing fluid. Be careful of this one. There are usually some pretty specific procedures to follow. If they're not done properly fumes can enter the aircraft through a running engine or APU intake. These fluids often contain chemicals that are dangerous to humans such as Diethylene Glycol.

Fuel. Fuelling operations at the airport, tank venting and failed relights can all allow fumes to enter the cabin. Excessive build ups will start to make people feel very unwell very quickly. Ventilation is your friend here.

Electrics. Electrical fumes can be caused by failed or faulty electrical systems and may precede a fire. Recirculation fans are also known to fail and produce smoke in the cabin.

Speaking of which, **don't forget the cabin!** There are lots of things in there capable of producing fumes including what passengers have brought on (nail polish remover is a classic), cleaning products, galley equipment (dirty ovens, anyone?) and the lavatories.

Know the signs…

How badly fumes affect you depends on what you have been exposed to and how much of it was in the air. Generally speaking, most "fume events" result in some of the following:

Here's the **good news**. In the overwhelming majority of cases, bad symptoms will last a few hours or perhaps a few days. Long term effects are possible but rare. The initial actions should be about protecting yourself and those in your aircraft.

So if you think you have fumes, what should you do?

Get on Oxygen. And 100% too. Don't dilute it as you'll still be breathing in what you're trying to keep out.

Communicate. Get in contact with your cabin crew. At this stage you need to figure out what it is. Your two biggest clues will be where is it coming from, and it's odour. Also talk to ATC – let them know you have an issue.

Run your safety procedures. Get that QRH out and look for a fumes removal checklist. Be careful if your checklist is combined with smoke removal. In some cases you will increase pack flow. But if that's where the problem is coming from, it may make things worse.

Think about health. You may have incapacitated crew or passengers. If it's a pilot, you likely have a procedure for that too. Consider getting help from a service such as MedLink. If things have gotten really bad, you may need to declare an emergency and divert.

You're back on the ground and breathing that good ol' fresh air again. Here's what you need to do.

De-brief your crew. Find out whether anyone felt unwell or couldn't perform their duties properly. If so they should stop operating right away until they have seen a doctor.

Report it! As much as you can, no matter how minor. Most operations have a form which will help you. Try and include as much detail as you can as trying to find a 'bad smell in cabin' is like trying to find a needle in a hay stack. Don't forget the tech-log too – help the engineers help you.

Consider **visiting your doctor**, particularly if you have persistent symptoms.

What can the industry do to stop this happening?

The ultimate solution is **bleed free design**. And the future is now – check out the Boeing 787. It's the poster boy/girl of this huge leap forward. But for most of us out there, we're stuck with it.

Filtration. They're not 100% effective but bleed air filters are a far cry from simple recirculation filters which are about as useful for fumes as a glass hammer.

Better chemicals. Okay, this one is out of our hands, but the industry should be prioritising this.

Detection and monitoring. The smoking gun. We are literally surrounded by chemicals that are bad for us in our tin cans up there. More needs to be done to make sure the air we are breathing is *good* air. We need to be able to know when something bad is in the air we breathe. It's a no-brainer.

The elephant in the room. Which airplanes are the worst?

The moment you've all been waiting for. Don't shoot the messenger. But statistics show that the **BAe 146** and **Boeing 757** appear to be the worst culprits. But the reality is if you are flying any airplane, you are at risk of fumes.

What about Aero-toxicity?

The question of long term effects from exposure to chemicals in planes is beyond the scope of this article and the research is inconclusive. But if you're worried about it, the Aerotoxic Association is a good place to start.

There's a ton of reading out there too if you want it. Here are a few good ones.

- ICAO Circular 344 – Learning, training and reporting fume events.
- IFALPA Human Performance Briefing – IFAPLA's guidance of fumes.

- What the FAA have to say about it.
- Some good stuff from the friendly folk ‘down under’.