

# Fuel or Water?

The helicopter didn't show any symptoms of engine trouble leading up to the accident – there was no noticeable surging, misfiring, or rough running, before the engine suddenly lost power. After the hard landing, a safety investigation found water present in the fuel lines and determined that the pilot had not sufficiently checked fuel quality before takeoff.

**T**his accident demonstrates the need for pilots to ensure that they have sound fuel management procedures in place, while also understanding the range of different ways that water can enter an aircraft fuel tank.

## Fuel Management

Start by checking that the fuel tank cap seals are in good condition. Rainwater frequently enters aircraft fuel tanks through defective seals, so if you notice that the cap does not fit tightly, get the seal replaced. A good idea is also to postpone refuelling the aircraft when it is raining heavily, and use a rag to wipe off water around the cap and filler area.

If you are using a portable fuel source, such as a jerrycan, check a sample from each source before fuelling the aircraft. Truck mounted tanks also need to be checked regularly for water or other contaminants. When checking a sample, ensure you view the fuel through a transparent testing vessel side-on, rather than looking down at it from above.

When you open a fuel cap, always close it before you depart for any reason, even to do a small task such as picking up a dropped item.

## Sampling

After refuelling the aircraft, allow the fuel to settle for as long as possible before taking a sample for testing. This will give impurities a chance to settle into the drain sump of each tank.

Learn what the recommended sample sizes are for your aircraft by referring to the aircraft Flight Manual. You should know how many drain points your aircraft has, and drain them daily and after each refuelling. If one of the drain points is blocked by sludge, ice, or other contaminants, or fails to work, get the system checked out by your maintenance provider before flying.

Most importantly, ensure that your sample isn't all water. If in doubt, a smell test can help you determine if it is fuel you are staring at, but be careful when relying on your nose, because water can carry an odour similar to fuel if the two have been in contact.

When water is mixed with Avgas, the presence of water will normally be indicated by small globules sitting on the bottom of the testing vessel. In contrast, detecting suspended water in Jet A-1 can be more difficult as Jet A-1 is clear, giving it a similar appearance to water. When checking Jet A-1, use fuel testing capsules or paste, as these are effective methods for detecting the presence of water. If the Jet A-1 sample has a 'cloudy' appearance, this can indicate that a lot of water is present.

When sampling with reduced natural light, check the sample under bright lighting and against a white background, such as a fuselage. This will make it easier to detect the colour and any debris or contaminants.

If your sample contains contaminants, empty it and keep testing until you get a clean sample. Do not tip the sample back into the aircraft tank, even if it is clean.

After you finish sampling, ensure that each drain valve closes securely afterwards to avoid inadvertent fuel loss.

## Trapped Water

Be aware that by draining the sumps, you won't always get all the water out of the fuel tanks. The fuel tanks in some aircraft are lined with rubber bladders, and wrinkles in these bladders can trap water and prevent it from reaching the sump. Also note that in aircraft types that have little or no wing dihedral, the contaminants will tend to spread out more evenly across the bottom of the fuel tank. Similarly, when checking the fuel on anything other than a perfectly flat surface, the drain point may not be the lowest point in the tank. In effect, obtaining a clear fuel sample may not accurately indicate the quality of the fuel throughout the tanks.

In these cases, this undetected water won't reach the fuel lines until shortly after takeoff when a few bumps have shaken it free. To avoid this, gently rock the wings and drain the tank sumps afterwards, and be sure to take fuel samples regularly.

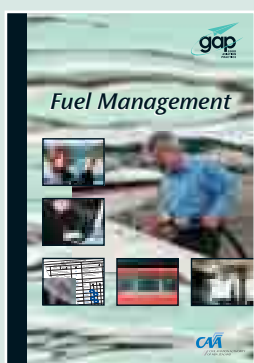
## Finished for the Day?

After a day's flying, ensure that the tanks are as full as possible (taking all-up-weight into consideration) to minimise the amount of condensation that can form inside the tanks. When possible, don't leave the aircraft out overnight. If left outside, dew can build up in the recesses around the fuel tank caps and can enter the tanks when the caps are removed.

## More Information

For a free copy of the Good Aviation Practice (GAP) booklet *Fuel Management*, email: [info@caa.govt.nz](mailto:info@caa.govt.nz).

Water contamination incidents should be reported to the CAA by following the process on the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), "Report Occurrences Online". ■



# Navigating to the Latest Charts



The current Visual Navigation Charts (VNCs) became effective 15 November 2012 and now detail the major changes to Queenstown's controlled and uncontrolled airspace. A number of other changes have been made, including the creation of new Visual Reporting Points in the Waikato and Auckland areas.

## To Order

To order your printed charts online, visit the web site, [www.aipshop.co.nz](http://www.aipshop.co.nz), and select one of the "BUY NOW" buttons positioned to the right of the Visual Navigation and Visual Planning Chart images. This will redirect you to the order quantity page. You can then view a different series of charts by clicking on either of the horizontal arrows located at the top of the order form as shown.

The VNCs can also be ordered by phoning Airways' Aeronautical Information Management (AIM) team on 0800 500 045. ■

[www.aipshop.co.nz](http://www.aipshop.co.nz)

## Chart List

North Island/South Island (1:1 000 000)	VPC A1/A2
Northland/Cook Strait (1:500 000)	VNC B1/B2
Waikato-Manawatu/Canterbury (1:500 000)	VNC B3/B4
Central Plateau/Southern Alps (1:500 000)	VNC B5/B6
Whangarei/Wellington (1:250 000)	VNC C1/C2
Auckland/Hawkes Bay (1:250 000)	VNC C3/C4
Bay of Plenty/Taranaki (1:250 000)	VNC C5/C6
Marlborough/Otago (1:250 000)	VNC C7/C8
West Coast/Queenstown (1:250 000)	VNC C9/C10
Southland/Mount Cook (1:250 000)	VNC C11/C12
Christchurch/Fiordland (1:250 000)	VNC C13/C14
Auckland Terminal/Christchurch Terminal (1:125 000)	VNC D1/D2