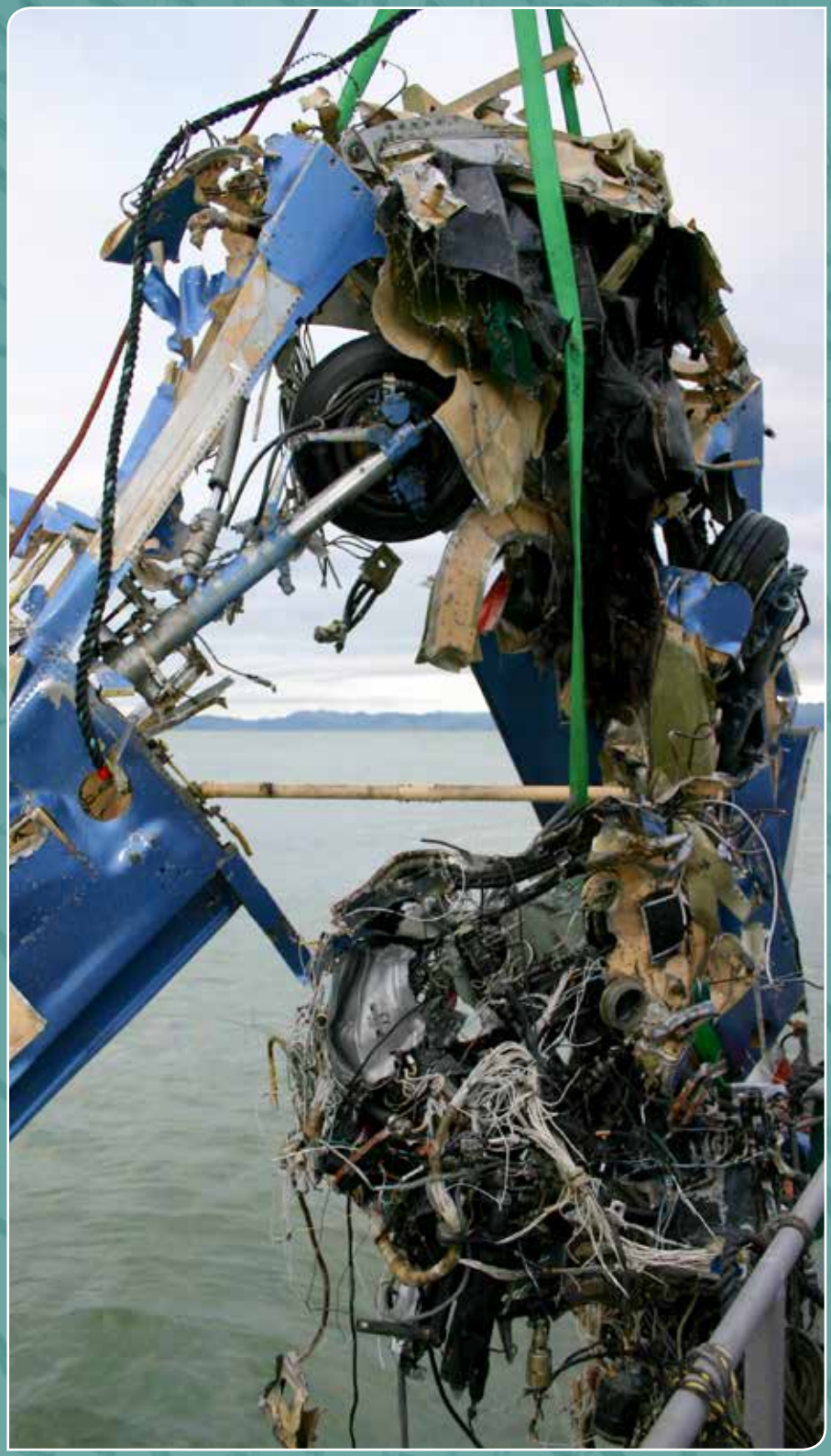
Anatomy of a **Safety Inves**

What does it actually mean when the CAA's safety investigators come calling? What they are looking for? Why? And what can you expect as a result?



It took just on two years for the CAA's Principal Safety Adviser, Alan Moselen, to find the cause of this accident. Safety investigations are often complicated by the extent of damage and the environment in which the accident occurs. For instance, in water, perishable evidence disappears quickly.

Every Tuesday morning, the CAA's safety investigators grab a coffee, and sit down to sift through the average 125 complaints, concerns, and reports that have flowed in to the CAA over the previous seven days.

"Not everything is in our scope," says Team Leader Paul Breuilly. "We will forward, for instance, information about a single bird strike to the airport concerned for it to deal with. Other reports we might put 'in the pot' to see if we get more like them."

The other issues are divided up among the seven-member team and each investigator, at any one time, is dealing with about 20 occurrences.

"Some reports can take up to 12 months to resolve. Others are dealt with in a single phone call.

"They can be anything from unruly airline passengers to mechanical defect reports, to airspace incidents, to runway incursions," says Paul.

"Each investigator has an area of expertise," says Safety Investigator Peter Stevenson-Wright. "We're all former or current pilots, engineers, or air traffic controllers. And we look at the particular issue we're assigned through that lens of experience.

"But we also work very much as a team. Institutional knowledge is really important in our area of work. While one person is assigned to investigate a particular issue, they may say to another team member, 'Weren't you looking at something similar last year?' So there's lots of information sharing, both formal and informal."

Report. Please.

Seven safety investigators cannot be with every pilot, engineer, and operator in New Zealand to witness every incident, so the team relies on reporting from the aviation community, the public, and CAA auditors.

"Obviously we want lots of reports," says Peter, "but we could also do with better detail in some of them. 'I landed

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late and hit the fence' doesn't tell us anywhere near enough.

"What we would like to know is what happened, in what circumstances – for instance, what was the weather like at the time, and the details of any relevant NOTAMs – why the occurrence happened, and what you've done to prevent it happening again."

A report can be done online, by email, over the phone, and now by using the new CAA app, *Here and Now* (see end of article).

Safety Investigator Siobhan Mandich says it would help the team's work if pilots also submitted a report even when the issue is one of maintenance. For instance, a chip light comes on, a magneto fails, or the aircraft experiences rough running or a loss of power.

"A defect report will tell us what the issue is, but a pilot's report will tell us more of the circumstances around what was experienced and felt.

> *"We're all former, or current, pilots, engineers, and air traffic controllers. And we look at the particular issue we're assigned through that lens of experience."*

"If we know what the pilot experiences, we can pass that on to other pilots to say, 'If you experience this… it could be this'.

"The more information we have to work with, the more chance we have of preventing a possible mishap."

The safety investigators work with operators or individuals to find out how an occurrence happened.

"The benefits of reporting to the safety regulator are two-fold," says Safety Investigator, Colin Grounsell. "Firstly, it allows us to accumulate data, identify trends in risk, and then do something about it. Secondly, reporting allows the operator or individual to reflect on why things went wrong.

"We can then discuss with them what might help.

"We recently worked with an operator who'd had an occurrence, which in the end came down to him being fatigued. He had 30 pilots, 15 aircraft, he flew every day himself, and he was also responsible for the day-to-day running of the operation.

"We needed the clout of the CAA"

Neville Williamson, Chief Engineer of Flightline Aviation in Dunedin, was just about the first person – in mid-2014 – to identify that something was awry with the fuel control units (FCU) in the R44 helicopter.

There'd been a major loss of power at altitude of an R44 engine in Queenstown a few months before, caused by a blocked injector, only a short time after an engine bulk strip.

"The FCU was removed and refitted at the time," says Neville, "but only to facilitate the bulk strip.

"So we checked the entire fuel system, concerned that new fuel lines and fuel tanks had just been installed and maybe some form of contamination had entered the system. Nothing was found and yet it had failed.

"The blocked injector had what looked like thread tape lodged in it which baffled us completely, as we never use anything like that in a fuel system.

"It was suggested by the manufacturer that the substance was pollen entering the fuel system through the refuelling process. To me, that suggested the manufacturer was also baffled."

But Neville soon found there had been other failures, including in Australia.

"Once the safety investigators at CAA realised it wasn't a one-off, they worked quite quickly to get things happening," says Neville.

"Paul (Breuilly) was persistent with the manufacturer, getting them to acknowledge the material in the fuel control unit was the problem. It turned out the culprit was the nylon type thrust washer in the mixture control valve on the FCU.

"Paul also liaised with CASA in Australia, FAA in the United States, and CAA in the United Kingdom.

"He liaised with the CAA guys who prepare the ADs, and it was him that eventually got a change in those units, to a different type of friction device, and that stopped the problem.

"I could never have got that kind of action, just some engineer from Dunedin. We needed the clout of the CAA, backed up by the FAA."

Neville advises other operators to get their ducks in a row before contacting CAA about an occurrence.

"Do your own investigation, and come up with remedies, so when you do bring CAA on board, you can say, 'This is what we're doing, or plan to do, to fix the problem'. They can see you've done your groundwork."

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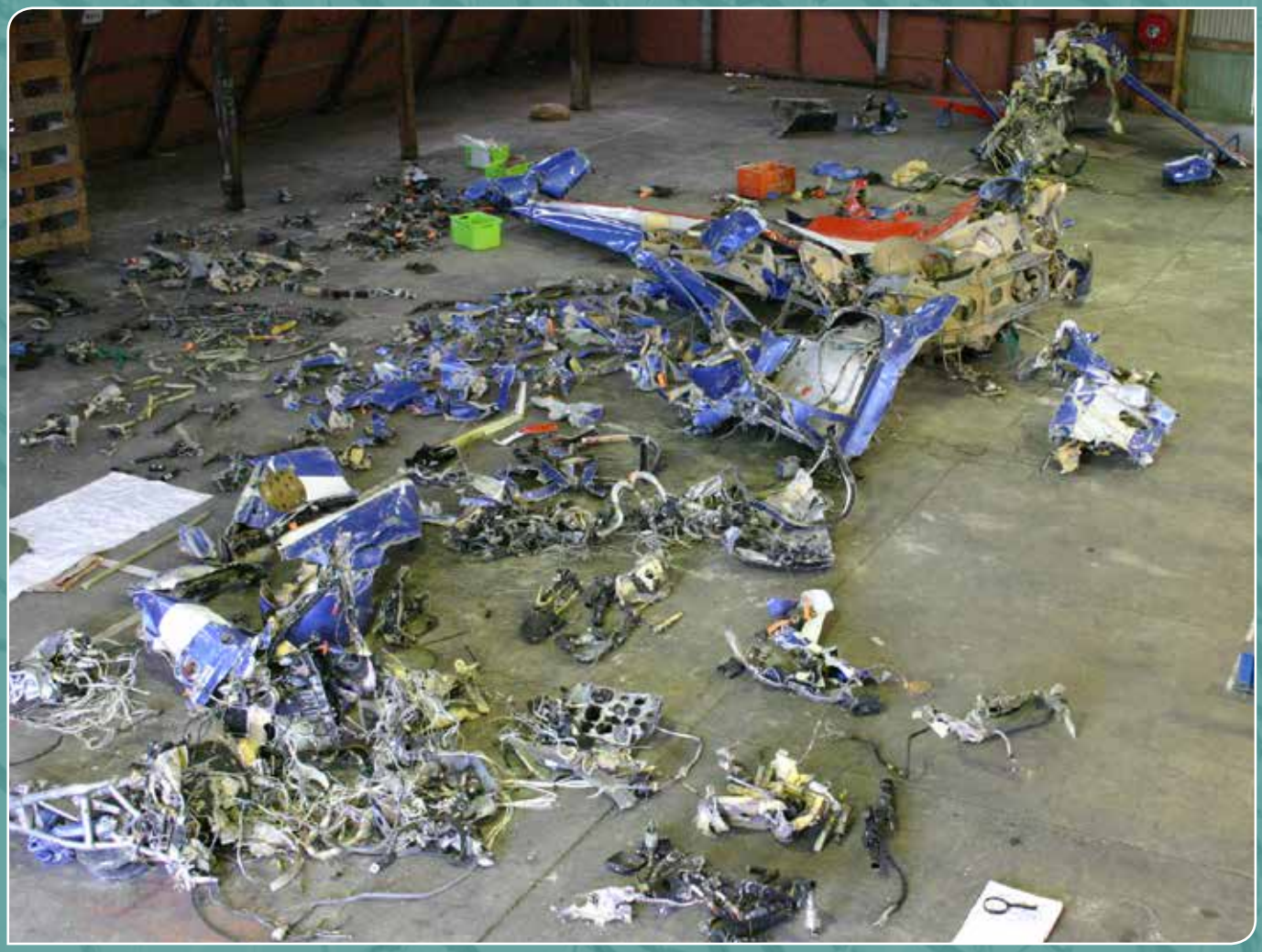

Once recovered from the water, Alan Moselen had to painstakingly lay out the wreckage of the aircraft to reflect its actual configuration, to eliminate or confirm the possibility of a mechanical problem.

"We suggested he get someone in to help. And he did. And that's all it took to fix the problem."

For other answers, the safety investigators are increasingly looking at the 'system' in which the occurrence happened, not just the occurrence itself.

"Understanding the system, and system influences behind occurrences," says Safety Investigator Matt Harris, "helps the appropriate safety-related decisions to be made.

"For instance, an occurrence could result from the pressure on operators to make the most of opportunities provided by growing tourism in New Zealand. While that appears to be unrelated to aviation, it is in the bigger picture, and could be influencing operator behaviour."

Report Good Stuff. Please.

The team would like to hear more reports of when things go *right*.

"When an operator says, 'This component is not normally inspected every three months, but we do that, and we are finding…' that gives us great information to disseminate through industry," says Siobhan Mandich.

"When you're hearing nothing but negative events, it can give you a distorted view of what is going wrong, compared with what is going right.

"But actually 90 per cent of stuff is being done just fine. It's only a fraction that needs fixing."

Safety Investigation Manager, Jim Burtenshaw, says a safety investigation doesn't look to apportion blame or liability.

"We're searching for the safety lessons for the individual, operator, and aviation system.

"It's extremely rare that we uncover reckless behaviour, or a flagrant abuse of the rules. But when we do, the safety investigation is suspended, and the appropriate CAA operational manager has to make a decision about what happens next. But as I say, such cases are remarkably few."

Paul Breuilly says, "In terms of criticising the operator when there's been a major accident, we find they're hard enough on themselves. We don't need to add to their anguish.

"Understanding the system, and system influences behind occurrences," says investigator Matt Harris, "helps the appropriate safety-related decisions to be made."

"We're there to help them find the cause of the problem and to suggest improvements.

"It's just about everyone going home safely at the end of the day."

Jim Burtenshaw says most of what we suggest to improve safety is practical. "It might be some of the senior hands spending time doing more training of the juniors, or rearranging a work schedule so people aren't so fatigued.

"People should be keen to use us. Our time and expertise costs them nothing. And we can be a conduit between them and other CAA units.

"The investigators are very aware that not every operator has the resources of a major airline, so we're not going in to say 'you have to buy this, and that, and the next thing'. We might instead say 'hey, have you thought of hiring this part, instead of buying it?'"

"It's extremely rare that we uncover reckless behaviour, or a flagrant abuse of the rules."

Investigating Accidents

When there's been an accident, CAA safety investigators attend the site to try to establish how the accident happened.

They want to find the causes and prevent them happening again. They want to identify areas that may pose a threat to the strength of the entire aviation system, and they want to identify emerging risks and provide information to those creating interventions to stop accidents occurring.

"Some of the things that determine if the CAA is going to investigate an accident," says Safety Investigator Dan Foley, "include whether there are fatalities, whether the accident comes under a high-risk area (and is therefore a priority for the CAA to investigate), the history of risk in that particular sector, and the probability of learning something we can use to improve the safety of the system."

Field investigations are highly resource-intensive. "Before leaving the office, we have to assemble all the information that we already have – that's from the Rescue Coordination Centre, the Police, the CAA database, and the MetService.

"Then we do a health and safety risk assessment to ensure anything that may be a hazard to the investigators is identified and mitigated.

"After that, we make all the logistical arrangements such as flights and accommodation. We assemble all the equipment we think we might need and travel to the site.

"We do a physical examination of the scene, interview survivors and witnesses, gather documents and items, and move the wreckage to storage.

"And then the real task begins: analysis, discussions, research, more interviews, writing. Sometimes it can be as long as 18 months for a fatal accident report to be completed.

"But it's worth all that work if it means we can keep others in the system safe," says Dan.

How to Report

The easiest way to report an occurrence is online, www.caa.govt.nz/report.

Or use the *Here and Now* app, available on iOS and Android. The app uses your phone's GPS functions to pinpoint the exact location of the accident or incident. You can also attach photos to your report by using the '+' button under the location map.

The *How to Report Occurrences* booklet is available free by emailing info@caa.govt.nz. ■

"A new set of eyes"

On 7 January 2015, a new pilot working for Skydive Taupo was conducting his first day of unsupervised flying, when his aircraft's engine suffered a catastrophic failure a few minutes after becoming airborne.

The pilot, six crew, and six passengers all evacuated safely, but the aircraft, a Pacific Aerospace P-750XL, crashed into Lake Taupo.

The subsequent CAA investigation focussed on staff training – including procedures for emergencies – and aircraft maintenance.

Company Chief Pilot, Mark Funnell, says being under investigation can be a daunting experience.

"But we were reassured by knowing that I, the company, and the engineers had all done everything right.

"We also had the paperwork to back up what we said we'd done. The experience confirmed why keeping records is essential. The CAA investigation was much broader than an audit. If the investigator wants to look at something outside of what might be looked at in an audit, they just jump straight into it.

"But there's nothing to worry about if you don't have anything to hide, and we found the investigators were very friendly, and complimentary about the organisation.

"Between our own reflection on events, and discussions with the investigators, we found a few areas to improve.

"A new set of eyes sometimes sees things you may have missed. We aim to be continually improving, but it's sometimes not until procedures are tested that room for improvement can be found. We therefore embraced the suggestions of the investigators, and quickly acted on them."