The Safety Wire

October 2017

Calories are posted on the menu at many restaurants now. I hate that.

I understand that a bacon double cheeseburger offers few health benefits and that other options are much better for my weight loss goals and general health. These facts are usually easy to argue, diminish or simply ignore, especially if I am hungry. That is, of course, unless the actual content of the food is displayed in front of me in black and white. They used to be kind enough to hide those facts on the back of the wrapper or on a separate piece of paper. Now, I often change my order to a healthier choice because the content of the choices is right in front of my face when I'm making the decision. Risk management is like that too.

What traditionally makes risk management something so easy to argue, diminish or simply ignore, is that we don't quantify the risk associated with hazards. Our estimation of 'danger' is like our estimation of how a cheeseburger impacts our health, which is subjective and easily manipulated by the situation. Training seems critical for safety, until it starts to cost money or complicate the work schedule. Flight gloves or boots are important for safety, until summer arrives and it gets hotter out. A deep-dish pizza and garlic bread is bad for my borderline cholesterol count, unless I'm really hungry.

I have a calorie counter app on my phone. I hate it. The calories I take in add up faster than I expect. The calories I burn during exercise seem way too low for the amount of work I exert. Still, I cannot argue the fact that I adjust my lifestyle when I see quantified facts in front of me. It is possible, but not as easy, to ignore numbers.

A Safety Management System (SMS) is like the calorie counter app on my phone. An SMS can add the calorie count, or risk level, to hazards at your operation, eliminating guessing and assumption. SMS can then count how many risk calories are going in, and how much your program is lowering that count. The numbers are clear and hard to ignore, and sometimes people will not like what they see. Just like calories, ignoring risk because it is inconvenient does not make it go away. Risk management during critical events is like going grocery shopping when you are hungry. These are the times when informed decision making is needed the most because the intense pressures of the situation will draw us away from the right choices.

In both aviation and the local diner, we may sometimes hate to hear the truth, but our bodies will thank us for it later.

"There's a big difference between skill and judgment"

~ Kurt Robinson

Practical Safety Management

What does a 12 mean on your risk matrix? How did you determine the probability of a hazard creating an unfavorable outcome was ‘remote’? The reason we want to use a risk matrix in our Safety Management System (SMS) is to remove subjectivity and establish a base line for all hazards being worked on in your program. In order to accomplish this, you should take the time to define all of the categories in the matrix. This should be a group effort, best accomplished in the safety committee. It does not matter if your matrix assigns the highest number to high risk or low risk, or if you use three colors or four. What is important is that it is done uniformly throughout all safety program efforts. Also, it is better to use numbers instead of letters so you can track changes in risk over time numerically (50% reduction in risk, 10% increase in probability, etc.).

Likelihood, or probability, levels will vary depending on how your agency operates. The highest level could be: every mission, every day, once a week, etc. Severity levels are typically set by monetary damage and/or injury. The top level is typically defined by a total loss of aircraft and/or fatality. Other severity levels may include a dollar amount or levels of injury. The last consideration is to add a level of severity that does not involve equipment damage or injury, but damage to reputation. We all know a major incident can cause embarrassment to the agency and its leaders, which has a very negative impact on our aviation unit. If something could cause us to lose the confidence of those we serve, it carries a risk that needs to be addressed.

The risk matrix below is a sample from the ALEA SMS Installation Guide, which is available for free on the ALEA website.

		Probability				
		5	4	3	2	1
Severity		Frequent	Probable	Occasional	Remote	Improbable
5	Catastrophic	25	20	15	10	5
4	Critical	20	16	12	8	4
3	Marginal	15	12	9	6	3
2	Negligible	10	8	6	4	2
1	Reputation/Brand/Support	5	4	3	2	1

SEVERITY *Enter the defined levels for each category - usually in terms of injury and/or damage (often in $$ amounts or loss of usage time)*

5 __________
4 __________
3 __________
2 __________
1 __________

PROBABILITY Enter the defined level for each category - usually in terms of how often the hazard occurs, or has the potential to occur (per flight, duty day, etc.)

5 __________
4 __________
3 __________
2 __________
1 __________

Resources

NTSB Helmet Chord Safety Advisory:
Written version: https://www.ntsb.gov/safety/safety-alerts/Documents/SA-068.pdf
Video version: https://youtu.be/JMinY5tg5P0

NTSB Maintenance Safety Bulletin:
https://www.ntsb.gov/safety/safety-alerts/Documents/SA_054.pdf

US Helicopter Safety Team - Safety Enhancements:
http://www.ushst.org/MobilApp.aspx

European Helicopter Safety Team – Helicopter Flight Instructor Manual *Issue 2*:
https://www.easa.europa.eu/document-library/general-publications/ehest-helicopter-flight-instructor-manual-0

HAI Rotor Safety Tips:
https://www.rotor.org/rotornews/Aug17/SafetyTipoftheWeek-HelmetVisors.jpg

NASA Safety Newsletter – CRM
https://asrs.arc.nasa.gov/publications/callback/cb_453.html

Aviators Code of Conduct:
http://www.secureav.com

ALEA Online Meetings

The schedule for upcoming ALEA online meetings is as follows.
If you would like to join, send an email to:
safety@alea.org

UAS:
Wednesday, November 8, 2017
1:00 PM - 2:00 PM EST (1800 UTC)

Safety Officers:
Thursday, November 9, 2017
1:00 PM - 2:00 PM EST (1800 UTC)

Maintenance:
Tuesday, November 14, 2017
1:00 PM - 2:00 PM EST (1800 UTC)

"A nation that draws too broad a difference between its scholars and its warriors will have its thinking done by cowards, and its fighting done by fools."

~ Thucydides

Reality Check...

Note: *The following reports are taken directly from the reporting source and edited for length. The grammatical format and writing style of the reporting source has been retained. My comments are added in red where appropriate. The goal of publishing these reports is to learn from these tragic events and not to pass judgment on the persons involved.*

Aircraft:	**Cessna T206H**
Injuries:	**2 Minor**
NTSB#:	**WPR15IA263**

https://app.ntsb.gov/pdfgenerator/ReportGeneratorFile.ashx?EventID=20150921X05442&AKey=1&RType=Final&IType=IA

During the initial climb, the pilot retracted the flaps, and having reached about 200 ft above ground level the passenger began to see smoke. The pilot initiated a turn to the crosswind leg, and smoke rapidly filled the cabin. The passenger opened the side window, and concerned that it may fan the source of the smoke, the pilot asked him to close it. The pilot then put on his oxygen cannula but it did not provide relief, and by now he was having trouble breathing due to the smoke density. The smoke was now obscuring the instrument panel, but he could partially see the runway and immediately turned the airplane towards it. He opened his side window and put his head outside for a better view, however, the force of the wind made breathing difficult. The

Photo 2 - Separated Tailpipe

Source: NTSB

pilot then pushed the airplane's nose down, initiating a steep dive to the runway. He could not recall the final stages of the landing, but as soon as the airplane touched the ground, he applied full brake action, locking up the wheels. Once they had come to a stop, the pilot shutoff the fuel mixture control and they rapidly egressed.

Examination revealed that the airplane experienced an in-flight fire due to the separation of the engine’s turbocharger wastegate overboard exhaust tailpipe from the turbocharger housing. The hot gases from the exhaust system subsequently burned through the battery’s electrical cable insulation, which resulted in arcing, a short circuit, and fire. The airplane manufacturer had issued a service bulletin (SB) 16 years before the incident, which recommended installing a tailpipe lanyard to prevent the separation of the tailpipe.

Photo 3 - Battery

Source: NTSB

About 6 months before the incident, the airplane experienced a similar separation of the tailpipe. The damage was less severe, and it was limited to the battery and its electrical cables. After that event, the tailpipe clamp and gaskets were replaced, but the owner did not comply with the SB. No lanyard was found on the airplane, and no record was found indicating that the owner had complied with the SB at any time. However, the airplane was operating under the provisions of 14 Code of Federal Regulations Part 91; therefore, compliance with the SB was not mandatory. Although complying with the SB was not mandatory for this airplane’s operations, the owner should have complied with the SB to ensure the continued safe operation of the airplane.

The National Transportation Safety Board determines the probable cause(s) of this incident to be: An in-flight fire during initial climb due to the separation of the engine's turbocharger wastegate overboard exhaust tailpipe. Contributing to the accident was the owner's decision to not comply with a service bulletin that addressed the tailpipe separation.

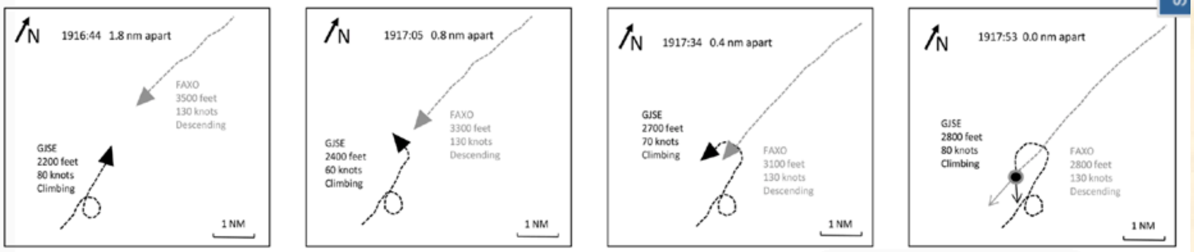
Aircraft: **Cessna 172P and 185E**
Injuries: **2 Fatal, 1 Uninjured**
TSB Canada#: **A15W0087**

http://www.tsb.gc.ca/eng/rapports-reports/aviation/2015/a15w0087/a15w0087.asp#figure-01

The Cessna 172P (C-GJSE) was conducting a day visual flight rules instructional flight in the practice area northeast of the [airport]. A privately operated Cessna A185E (C-FAXO), equipped with amphibious floats, was inbound on a flight plan. At 1917 Mountain Daylight Time, the 2 aircraft collided at 2800 feet above sea level (1300 feet above ground level). The collision separated the left float from C-FAXO and displaced the right float, which remained attached. The pilot, who was the lone occupant of C-FAXO, was able to land at CYMM. C-FAXO was substantially damaged, but the pilot was uninjured. C-GJSE broke up in flight; the student and instructor were fatally injured.

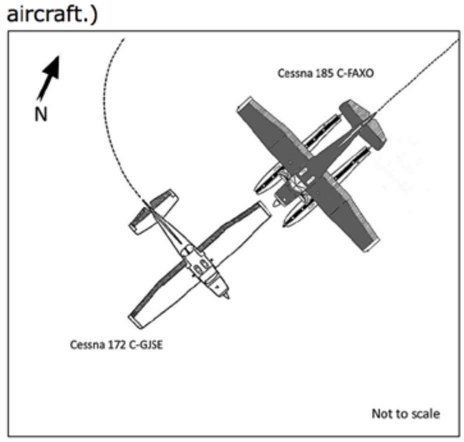
The lesson plan for the flight was climbing and descending turns with the student in the left seat and the instructor pilot in the right seat. Ten minutes after departure, the aircraft entered the southwest corner of the practice area. The training flight continued uneventfully for the next 26 minutes.

Figure 2. Radar data showing the positions of FAXO and GJSE in the practice area before the collision



C-FAXO departed with only the pilot on board at 1843 climbing to an altitude of 4400 feet above sea level (asl). At 1917:34, FAXO made contact with CYMM tower, and was assigned a transponder code. At the time of that communication, GJSE momentarily paralleled FAXO's track in a southwesterly direction, as the aircraft continued in a gradual left-hand turn. FAXO's ground speed was greater, and the aircraft was overtaking GJSE. At 1917:42, the CYMM tower controller advised the pilot of FAXO that there was a Cessna 172 in the area. At 1917:53, the 2 aircraft collided. GJSE broke up in flight due to collision forces and fell to the ground. Both of GJSE's occupants were fatally injured.

Figure 3. Collision angle between C-FAXO and C-GJSE (Note: Aircraft images are close approximations of the actual aircraft.)



Limitations of the see-and-avoid principle

The see-and-avoid principle is based on active scanning, and the ability to detect conflicting aircraft and to take appropriate measures to avoid such aircraft. TSB aviation investigation reports A12H0001 and A12C0053 addressed the limitations, previously established in a 1991 Australian Transport Safety Bureau (ATSB) study, of the see-and-avoid principle for preventing mid-air collisions between VFR aircraft. The ATSB study presented the following summary, which is consistent with known physiological limitations of human vision:

Cockpit workload and other factors reduce the time that pilots spend in traffic scans. However, even when pilots are looking out, there is no guarantee that other aircraft will be sighted. Most cockpit windscreen configurations severely limit the view available to the pilot. The available view is frequently interrupted by obstructions such as window-posts, which totally obscure some parts of the view and make other areas visible to only one eye. Window-posts, windscreen crazing and dirt can act as ‘focal traps' and cause the pilot to involuntarily focus at a very short distance even when attempting to scan for traffic. Direct glare from the sun and veiling glare reflected from windscreens can effectively mask some areas of the view.
Visual scanning involves moving the eyes in order to bring successive areas of the visual field onto the small area of sharp vision in the centre of the eye. The process is frequently unsystematic and may leave large areas of the field of view unsearched.

However, a thorough, systematic search is not a solution as in most cases it would take an impractical amount of time.

The physical limitations of the human eye are such that even the most careful search does not guarantee that traffic will be sighted. A significant proportion of the view may be masked by the blind spot in the eye, the eyes may focus at an inappropriate distance due to the effect of obstructions as outlined above or due to empty field myopia in which, in the absence of visual cues, the eyes focus at a resting distance of around half a metre. An object which is smaller than the eye's acuity threshold is unlikely to be detected and even less likely to be identified as an approaching aircraft.

The pilot's functional visual field contracts under conditions of stress or increased workload. The resulting ‘tunnel vision' reduces the chance that an approaching aircraft will be seen in peripheral vision. The human visual system is better at detecting moving targets than stationary targets, yet in most cases, an aircraft on a collision course appears as a stationary target in the pilot's visual field. The contrast between an aircraft and its background can be significantly reduced by atmospheric effects, even in conditions of good visibility.

An approaching aircraft, in many cases, presents a very small visual angle until a short time before impact. In addition, complex backgrounds such as ground features or clouds hamper the identification of aircraft via a visual effect known as ‘contour interaction'. This occurs when background contours interact with the form of the aircraft, producing a less distinct image.

Even when an approaching aircraft has been sighted, there is no guarantee that evasive action will be successful. It takes a significant amount of time to recognise and respond to a collision threat and an inappropriate evasive manoeuvre may serve to increase rather than decrease the chance of a collision.

Australian Transport Safety Bureau, Limitations of the See-and-Avoid Principle (1991), available at https://www.atsb.gov.au/publications/1991/limit_see_avoid.aspx

There are no new ways to crash an aircraft…

…but there are new ways to keep them from crashing.

Safe hunting,

Bryan ‘MuGu’ Smith

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