The Safety Wire

September 2021

Possible or Probable?

We often get bogged down in safety-related conversations with endless conversations about what is ‘possible.’ A focus on possibility perhaps has a place in the initial brainstorming sessions undertaken to address a new problem or change. If we sit around stuck in the possibility discussion, we will never get anywhere because everything is possible. Our attitude towards an issue will drive the results because we will always find a way for success, or failure, to be possible according to our desires.

In effective safety calculations, we need to contemplate probability. If something is possible, what is the most reasonable probability of it happening? This can be a more difficult task than it seems. Safety Management Systems (SMS) have risk matrixes to help guide

these decisions. Most will label categories with titles such as, ‘frequent’, ‘occasional’ or ‘remote.’ Problem solved, right?

If we ask ten people to calculate the probability of any risk in our operation, we will likely get different answers covering the whole range of the scale. The labels used to define these categories are still a bit too vague. Also, are we estimating how often it actually happens, or how often it could happen?

The first step is to define each category more clearly. What does ‘frequent’ mean? What about ‘probable’? Your organization needs to define each of these based on your operational profile. If you fly once or twice a week, your definition of ‘frequent’ will be different than another agency that flies several times a day. See the example below for one hypothetical organization.

When calculating risk, we are not necessarily looking at actual occurrences or events. We are trying to determine the probability, or risk, of it happening and causing an unfavorable outcome. If the hazard in question has not actually caused an incident at your agency, it can be difficult to determine how often the potential exists. This is a time to use some external information from accident databases, academic or industry studies, or surveys to build a picture of probability. Our goal is not to wait for bent metal to produce data, but to act on reasonable predictions of those risks so we can stop probable incidents before something bad happens. We can sharpen those tools by clearly defining what we are aiming for.

“There’s a big difference between skill and judgment.”

~ Kurt Robinson

SAFETY MANAGEMENT SYSTEMS

Did you know that APSA has the resources you need to create your own Safety Management System? The APSA SMS Installation Guide contains step-by-step instructions and all of the sample documents you need to ensure your agency is following industry standards and maximizing the professionalism of your organization. Here is an example of a risk matrix that addresses the content mentioned above. For more information send an email to: safety@publicsafetyaviation.org

		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

5 Severe bodily injury/death or loss of aircraft
4 Serious bodily injury or > $100,000
3 Injury needing medical attention or $50,000-$100,000
2 Injury not req medical attention or <$50,000
1 Damage to reputation, brand, reputation

PROBABILITY

5 Every flight
4 Every day
3 Monthly
2 Yearly
1 Never happened

EMERGENCY PROCEDURE OF THE MONTH

In each monthly emergency situation, discuss what you would do, as a crew, to respond to the following emergency. If the EP does not apply to your specific aircraft, think of something similar.

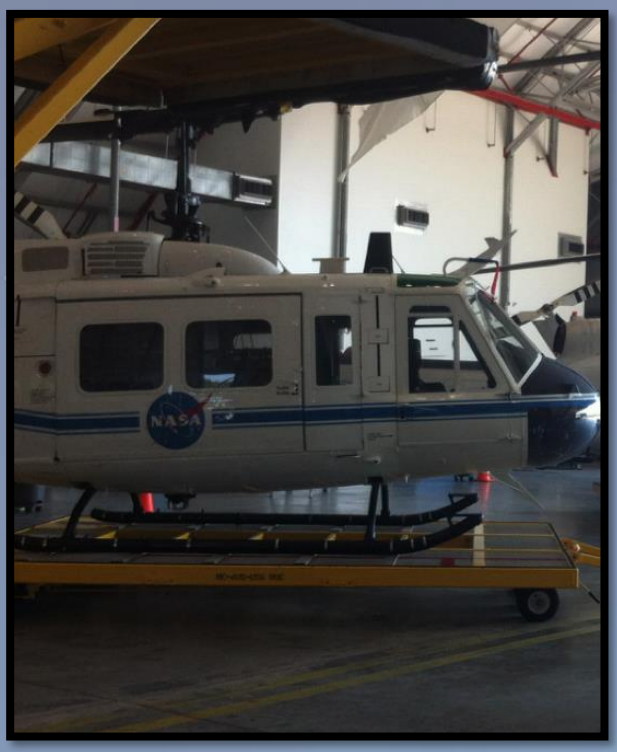
Pilot incapacitated (medical reasons, bird strike, gunfire, etc.)

ONLINE MEETINGS

APSA conducts regularly scheduled online meetings for safety officers, maintenance technicians, SAR personnel, UAS operators and natural resource personnel via a conference call you can join using your computer, mobile device or phone. Online meetings are open to any APSA member. Contract maintenance providers to APSA members are welcome to participate in the maintenance meeting as well. If you would like to join, send an email to:

safety@publicsafetyaviation.org

The schedule for upcoming APSA online meetings is as follows.



Natural Resources:
Wednesday, October 6, 2021
1:00 PM – 2:00 PM EDT (1700 UTC)

Maintenance:
Wednesday, October 13, 2021
1:00 PM - 2:00 PM EDT (1700 UTC)

SAR:
Wednesday, November 3, 2021
1:00 PM – 2:00 PM EDT (1700 UTC)

UAS:
Wednesday, November 10, 2021
1:00 PM - 2:00 PM EST (1800 UTC)

Safety Officers:
Friday, November 19, 2021
1:00 PM – 2:00 PM EST (1800 UTC)

"An ounce of performance is worth a pound of promises."

~ Mae West

Resources

Air Support Safety

- https://store.bookbaby.com/book/AirSupportSafety
- https://www.amazon.com/Air-Support-Safety-Airborne-Public/dp/1736706500/ref=sr_1_1?dchild=1&keywords=Bryan+Smith+flight+support&qid=1626629875&s=books&sr=1-1

FAA Bird Strike Safety Awareness Bulletin

- https://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/(LookupSAIBs)/AIR-21-17?OpenDocument

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: **Bell 407**
Injuries: **1 Fatal**
NTSB#: **ERA16FA248**

https://data.ntsb.gov/carol-repgen/api/Aviation/ReportMain/GenerateNewestReport/93579/pdf

The pilot was performing a visual approach to a landing zone to board an additional crewmember. A witness reported that there were no abnormalities in the helicopter's sound or position, until it was approximately 75 to 100 feet above the ground. Suddenly, the main rotor tilted to the right. Immediately after, the entire helicopter banked to its right and fell to the ground on its right side, where it came to rest. The main rotor blades broke apart during the impact sequence. The engine continued to run after the accident, and was subsequently shut down by responding personnel.

An examination of the wreckage revealed that the collective lever, located at the front and bottom of the swashplate support, was disconnected from the pivot sleeve. The collective lever was designed to move the pivot sleeve vertically on the swashplate support, via direct linkage from the cockpit collective control, to change the pitch on all the main rotor blades simultaneously. The collective lever pins and screws that attached the collective lever to the pivot sleeve were missing; they were later found loose, near the main rotor area. The safety wires intended to secure the screws to the pins were missing. Examination of the hardware at the NTSB Materials Laboratory revealed that the safety wires not present, and the screws backed out over time, resulting in the complete loss of collective control in flight.

Maintenance on the helicopter was performed about 38 flight hours prior to the accident. The maintenance included a 24-month inspection that required examination of the flight control bolts and nuts. The collective lever pins were not specifically included in that inspection. Two mechanics and a maintenance foreman, all employees of the operator, performed the maintenance, and all reported during postaccident interviews that they did not recall removing the safety wire or examining the pins. However, the foreman added, "I could see why it [examination of the collective lever pins] could have been done. The 24-month flight control bolt inspection was being performed, why not pull them and look at them too. I've done it before." Two of the mechanics reported that they would occasionally be "pulled off" one aircraft to work on another, and there was no work interruption policy in place. Thus, given that the safety wires were missing, it is likely that they were removed and not replaced during the most recent maintenance and

that maintenance personnel did not recall taking that action due to possible work interruptions.

After the accident, the operator implemented numerous safety initiatives to prevent recurrence, including two independent safety audits, a formal fatigue risk management program, a Safety Management System, a formal tool/material accountability program, new work interruption policies, creation of a formally-trained Safety Officer position, and a formal process for the communication of safety-critical information.

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Company maintenance personnel's inappropriate removal without replacement of the safety wires on the collective lever pin screws during a recent maintenance inspection, which resulted in the screws backing out and led to a loss of collective control in flight.

Aircraft:	**Cirrus SR22**
Injuries:	**1 Fatal**
NTSB#:	**WPR15FA082**

https://data.ntsb.gov/carol-repgen/api/Aviation/ReportMain/GenerateNewestReport/90588/pdf

The noninstrument-rated pilot departed during the late afternoon and flew over the southern portion of the Great Salt Lake. According to data recovered from the airplane's avionics system, which did not capture altitude, the duration of the flight was about 9 minutes. During the final minute of the flight, the airplane conducted a gradual left turn at an engine power setting of about 2,200 rpm. Shortly thereafter, the airplane impacted the lake. Postaccident examination of the airplane revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

Local meteorological observations indicated that restricted visibility and fog were forecast throughout the area about the time of the accident. It is likely that the pilot encountered these conditions inflight and lost visual reference to the ground and/or horizon. Given the pilot's lack of an instrument rating and of recent instrument flight experience, the loss of visual reference likely resulted in spatial disorientation.

Toxicological testing on the pilot revealed the presence of bupropion, an antidepressant; hydrocodone, an opiod analgesic; and diphenhydramine, a sedating antihistamine. The investigation was unable to determine if the use of bupropion or the cognitive effects of any underlying depression contributed to the accident. Because the hydrocodone was found in the urine but not the blood, it no longer caused systemic effects and played no role in the accident. However, it is likely that the effects of diphenhydramine impaired the pilot's cognitive and psychomotor performance at the time of the accident, and contributed to his spatial disorientation.

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The non-instrument rated pilot's decision to depart into low visibility conditions, which resulted in spatial disorientation and a loss of control. Contributing to the accident was the pilot's impaired performance due to his use of the sedating antihistamine, diphenhydramine.