

How Safe is DANGEROUS? *By Scott Tyrrell (IHST team member)*

In the 1979 courtroom drama film titled “And Justice For All,” an eccentric judge played by actor Jack Warden takes a lawyer played by Al Pacino for a hair-raising ride in his personal Bell 47 helicopter over the Baltimore harbor and Fort McHenry. The judge laughs as he tests how far they can possibly go without running out of fuel, while Pacino’s character, his terrified passenger, begs him to land the helicopter immediately. The judge is a veteran of the Korean War, is possibly suicidal, keeps a rifle in his chambers at the courthouse, a 1911 pistol in his shoulder holster, and eats his lunch on the ledge outside his window four stories up.

There are many who believe that reality mirrors film and that some films mirror reality; but certainly this type of dangerous behavior doesn’t exist in the world of aviation where professionalism, rules, regulations, and extensive training are required prior to entering the cockpit. The actual facts, however, may be surprising.

The International Helicopter Safety Team (IHST) was formed in 2005 to lead a government and industry cooperative effort to address factors that were affecting an unacceptable helicopter accident rate. The group’s mission is to reduce the international civil helicopter accident rate by 80 percent by 2016.

Human Factors and Pilot Decisions

An IHST sub-committee of helicopter experts from government and industry called the U.S. Joint Helicopter Safety Analysis Team worked from 2006 to 2011 to complete an in-depth analysis of three years (2000, 2001, 2006) of U.S. helicopter accident data. The analysis team used 15 different industry categories to categorize each of the 523 accidents.

In describing why each accident happened, the analysis team organized their findings from each accident into Standard Problem Statements. The team arranged the Standard Problem Statements according to a continuum of detail that ranged from high level (Level 1), to more detailed (Level 2), and to the most specific level of detail (Level 3). Pilot Judgment & Actions was noted as a Level 1 standard problem in 969 instances within the 523 accidents studied. This indicates that there were many cases where Pilot Judgment & Actions was cited multiple times in the same accident.

Within the area of Pilot Judgment & Actions, the IHST analysis team also noted that the Level 2 standard problem of Human Factors-Pilot’s Decision occurred frequently across a high number of accidents. Finally, the Level 3 area associated with Human Factors-Pilot’s Decision resulted in the following table.

Standard Problem Statement	Count	Percentage of ALL Occurrences
Level 3 for Human Factors – Pilot Decision		
Disregarded cues that should have led to termination of current course of action or maneuver	92	8.6%
Pilot Decision Making	45	8.6%
Willful disregard for rules and SOPs	32	6.1%
Failed to follow procedures	28	5.4%
Pilot misjudged own limitations/capabilities	25	4.8%
Willful disregard of aircraft limitations	11	2.1%
Disregard of rules and SOPs	11	2.1%
Management Disregard of known safety Risk	9	1.7%
Not in possession of valid airman/Medical Certificate	8	1.5%
Sense of urgency led to risk taking	6	1.1%
Failure to enforce company SOPs	4	0.8%
Pilot disabled warning system	2	0.4%
Human Factors – Pilot’s Decision – Other	1	0.2%

If the pilots had chosen a different decision or operation to follow, this could have led to the elimination of a number of these accidents, and would have certainly been a step in the right direction towards the IHST goal of an 80% reduction in the accident rate.

Possible Preventions

To describe how each accident could have been prevented, the team organized their analysis from each accident into Intervention Recommendations.

They are included in the following tables:

Level 1 Safety Management Systems	Count	Percentage of ALL Occurrences
Level 2 Risk Assessment/Management		
Intervention Recommendations Level 3		
Use Operational Risk Management Program (Preflight and Inflight)	62	11.8%
Personal Risk Management Program (IMSAFE)	53	10.1%
Mission Specific Risk Management Program	41	0.7%
Establish/Improve Company Risk Management Program	5	0.1%

Level 1 Training/Instructional Level 2 Safety Training Intervention Recommendations Level 3	Count	Percentage of ALL Occurrences
Training emphasis for maintaining awareness of cues critical to safe flight	47	8.9%
Risk assessment/management training	28	5.4%
Aeronautical Decision Making Training	26	5.0%
Flight Training on common operational pilot errors	19	3.6%
Pilot judgment training risk assessment	15	2.9%
Crew Resource Management Training	14	2.6%
Training Emphasis on techniques for maintaining visual alertness	10	1.9%

Rogue Behavior

Recent NTSB accidents have revealed that these types of accidents are still occurring in today's environment of aviation professionals. Examples of helicopter pilots exceeding their presumed flying qualifications or level of expertise can be found in recent news headlines:

“Helicopter pilot killed trying to herd plastic-wrapped bull”

“Helicopter crashes while flying out of hangar”

Former pilot and internationally recognized expert in the field of aviation human error Tony Kern explains this issue succinctly:

“Failures of flight discipline can – in a single instant - overcome years of skill development, in-depth systems knowledge and thousands of hours of experience.”

The aviation community must demand accountability at all levels so that full adherence to the highest level of flight discipline will ensure the safest flying environment. “At Risk Behavior” - A behavior in which an individual is willing to assume “*unnecessary risks*” while performing a particular task in his or her everyday life – along with rogue management, operations, pilots, aircrew and maintainers have no place in the profession of aviation.

Ignoring the Rules

A clear example of “at risk behavior” occurred on October 15, 2002, when a CFI was providing night VFR cross-country instruction to a student in a Schweizer 269C helicopter. They had discussed their low-fuel situation, but elected not to stop and refuel because neither had a credit card.

On the last leg of their flight, the low-fuel light illuminated, followed a few minutes later by complete loss of engine power. During the autorotation, the helicopter was substantially damaged when it struck trees and the tail boom separated from the airframe. Miraculously, neither pilot was injured.

This is not the first accident of this kind and, unfortunately, probably will not be the last: The IHST analysis team's data revealed 12 occurrences of the standard problem, *Unaware of low fuel status leading to fuel starvation/exhaustion*, and this accounted for 2.3% of all accident occurrences. A quick FAA Rotorcraft Accident Database query of "fuel exhaustion" during the five calendar years from 2007 to 2011 results in 14 accidents with 6 fatalities.

During that helicopter scene in the movie "And Justice For All," after a low level flight under a bridge and in close proximity to other structures, the judge reaches the infamous halfway point for his fuel. After repeated requests from Pacino, the judge finally turns the helicopter and heads back to the heliport. Pacino is terrified that they will not make it back and the judge tells him to trust his instincts. Shortly thereafter, however, the engine experiences fuel exhaustion and quits. The judge enters into an autorotation maneuver and lands short in shallow water. He says, "Almost right on the button. I told you that I had good instincts. Another 90 feet and we would have made it. Let's swim to the shore."

What's the lesson to be learned? It's simple. The "Rules of Aviation" may sometimes appear unintelligent, or arbitrary, or irritating. But only dumb luck will help you if you break them.

Scott Tyrrell, a former U.S. Air National Guard officer, is a Continued Operations Specialist and Accident Investigator in the FAA Rotorcraft Directorate. His previous experience includes over 20+ years in aircraft maintenance including extensive knowledge of C-130 aircraft maintenance, as a Commander of an Aircraft Maintenance Squadron and Mission Support Group.