Pacific Southwest Aviation Lessons Learned
Wire Strike
Incident With Potential
August 14th, 2015

Event Description:

On August 14th, 2015 at 1402 hrs., a Bell 205A-1, made an emergency landing after striking a communication wire that stretched across San Gabriel Reservoir on the Angeles National Forest. The pilot was not injured, but the aircraft did receive damage.

Initially this incident was classified as an accident, by the National Transportation Safety Board (NTSB), based on photos sent to the NTSB, and a USDA Forest Service Aircraft Accident Investigation Team was assigned. However, a more thorough on-scene review of the incident by the FAA and Forest Service Investigators determined the event did not meet the criteria to be classified as an accident. The NTSB (not present at the scene) concurred with the on site assessment and downgraded the occurrence to an Incident. The Forest Service further classified the event as an Incident with Potential (IWP).

CONDITIONS:

Location: San Gabriel Reservoir, Azusa, CA
Mission: Water Drop/Initial Attack
Injuries: None
Weather: VFR and Clear

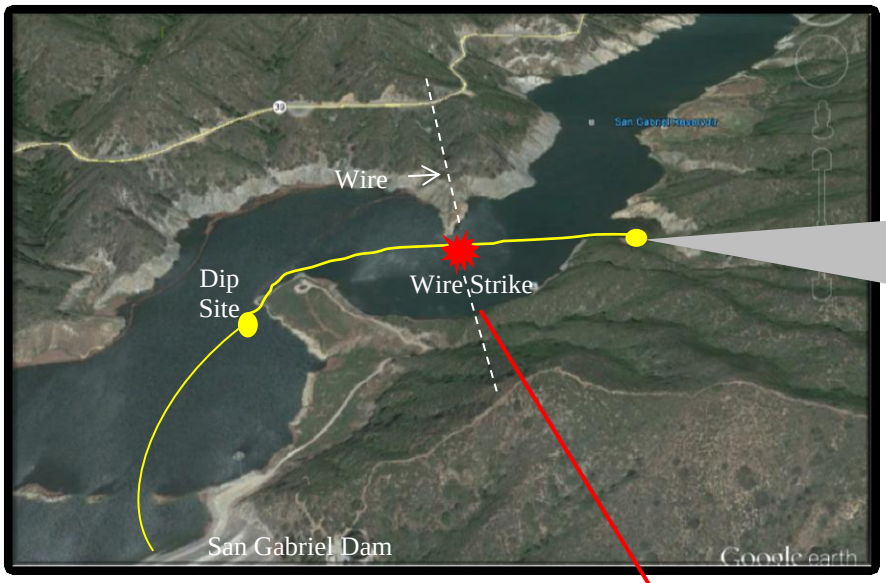
San Gabriel Reservoir, August 15, 2015

Sequence of events:

The helicopter, equipped with a fixed tank and snorkel, was responding to an initial attack of a fire that would later be named the "Cabin Fire". After a recon and size-up of the fire, the pilot and manager conducted a recon of the dip site (San Gabriel Reservoir) as they flew to the helispot located on the San Gabriel Dam. During the recon, numerous wires were noted and verbally acknowledged by the pilot.

After offloading the crew and configuring for snorkel operations, the helicopter took off and proceeded directly to the reservoir to fill the tank and begin water drop operations on the fire. After filling the tank, the helicopter initiated forward flight and began climbing and accelerating out of the reservoir and towards the fire. The pilot did not see the unmarked black communication wire and silver cable, and collided with the wires at about 50 knots and 50 ft. AGL. The wire and cable contacted the nose and chin bubble on the right side of the helicopter before severing and breaking away. At some point, the leading edge of both main rotor blades contacted the cable, yielding minor damage to the blades. Control of the aircraft was momentarily compromised after the strike occurred, but the pilot was able to regain control, make a "mayday" call and execute an emergency landing on the shore of the reservoir.

I heard it, shouted "Hey helicopter hit power-lines". I looked up and saw the helicopter almost vertical with nose up. My jaw dropped.
~ Helitack Crewmember



Emergency Landing Site

Approximate wire contact angle

The wire that was struck was a single, black, communication wire a little over an inch thick, along with a steel cable about the same diameter. The wire <u>did not</u> contact the wire strike protection system. ***There were no visibility markers on this set of wires***.

Damage was to secondary structure involving denting and tearing starting at Fuselage Station (FS) -7.5, Water Line (WL) 26.0 and Buttock Line (BL) 26.0 and continuing aft and upwards along the right side of the aircraft. This area of damage terminated on the leading edge of the pilot's door frame at FS 30.0, WL 44.0.

Wires – The Invisible Threat

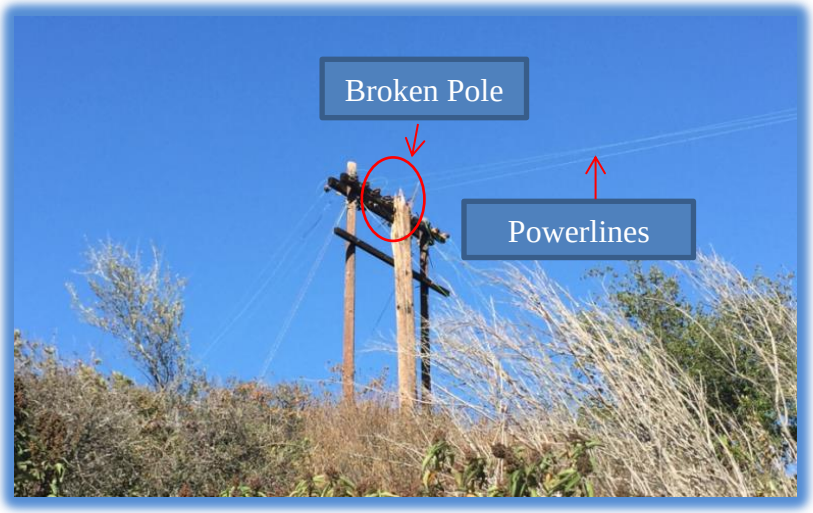
A vast majority of helicopter operations supporting fire suppression are conducted below 1000 ft. AGL, which also happens to coincide with the location of wires associated with power and communication transmission. This area below 1000 ft. AGL is referred to as the ***"wires environment"***. Familiarity with an area flown before is no guarantee the environment is still safe and does not have new, introduced hazards. The threat of wire strike accidents increases daily as the web of power lines grows to meet demands across the nation. Not all wires are marked, and at typical flight speeds, they can be invisible. In fact, multiple NTSB accident reports support claims that wires are often hard to distinguish while in flight resulting in collision.

> "The wires just sit there and wait for you. At typical flight speeds, wires are almost invisible and are difficult to see, partly because the way the human eye functions and partly because of the effects of some backgrounds and light angles in camouflaging wires. The eye starts to lose its visual acuity at 3° off center. Unless you're looking right at the wire, you're unlikely to see it."
>
> ***~ Utilities/Aviation Specialists President Robert Feerst, expert in wire strike prevention, in the HAI video, at:***
> https://www.rotor.com/Publications/HAIVideosLibrary/SurvivingtheWiresEnvironment.aspx

Dr. Warren Deltaan, Optometrist describes ***"Visibility Science"*** in the HAI video and how hazards are detected and avoided; wires in particular:

1) There needs to be an image on the retina---in other words, the pilot *needs to see it*
2) The pilot must *perceive* that the image is a threat
3) The pilot must project the flight path and *make assumptions* that he/she might be on a collisions course with the wire
4) The pilot must make a *decision on how to react* – descend, climb, turn, etc.
5) The pilot must *move the controls*
6) The *helicopter must respond to the control inputs*

THIS PROCESS CAN TAKE UP TO 5-6 SECONDS, AND DEPENDING ON AIRSPEED, AN AIRCRAFT CAN TRAVEL A SIGNIFICANT DISTANCE IN THAT SHORT TIMEFRAME.



Wooden power pole that snapped as a result of the wire strike event: Note the faint visibility of the wires associated with this communication line against the blue sky background.

Wire Strike Statistics - AOPA

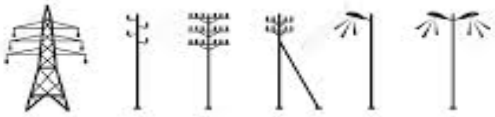
Rotor-craft average 66 wire/obstruction accidents per year;
30% of those accidents are fatal

During Instrument Meteorological Conditions or at night, the ability to detect wires goes down and the fatality rate increases to 60%

In the past 10 years, wire strikes is the number 1 cause of rotor-craft fatalities

Wire Strike Prevention

Given that wires are often extremely difficult to detect during flight, wire and obstruction accidents are still preventable. The best defense is knowledge of where the wires are likely to be and how to detect them.



"Know what the enemy looks like"

~ Robert Feerst, President- Utilities/Aviation Specialists *in* the HAI video, link listed above

Pilots are taught to look for towers or poles that support wires, because they are easier to detect than the wire itself. In this case, one of the towers was behind the helicopter and out of sight. The other tower, made of wooden poles, blended in with the vegetation and colors of the hillside behind it. Detecting a wire in flight is much like walking into a spider web, or like a bird flying into a window; the pilot was unaware of the wire and did not see it until it was too late.

Maintaining a high level of awareness during every operation in the wires environment is critical to safe flight. Precautions such as review of a sectional or forest flight hazard map as well as recon flights are essential but may not be an adequate enough practice for detecting all wires in the environment. Detection during flight can be degraded by dirty windshields, smoke, fog, haze, lack of contrasting backgrounds, low light, or too much light when flying directly toward the sun.

"In hindsight, it is possible that I would have been able to see the wire if I had conducted a full 360 degree orbit around the reservoir during my reconnaissance, rather than just overflying it one time."
~Pilot

There is no substitute for training. On-line courses exist that teach core survival skills for low level operations, which include Crew Resource Management (CRM) for not only the pilot, but all occupants of the aircraft. In fact, ***Pacific Southwest Region has provided the opportunity for Helicopter Superintendents and Helicopter Captains to attend a 2-part live "Flying in the Wire and Obstruction Environment, which is a combined 16- hour Course".*** The course is an acclaimed multi-media seminar that provides low-level flight crews the essential skills needed to safely operate an aircraft in wire and obstruction environments provided by Utilities Aviation Specialists. The training recognizes that it is critical to have everyone engaged in the search for hazards and CRM is a core component of the wire strike prevention courses completed. More information about this course can be found at: http://www.helicoptersafety.com/training/fitwe.jsp

While new wire strike prevention technologies hold promise to reduce the number of accidents, not all aircraft are equipped and not all wires are marked. Technology is useful, but it is no substitute for training. "The best methods for reducing the wire strike threat include education about this potentially lethal environment and increased vigilance in the cockpit."

Lessons Learned

Hazards Identification: The San Gabriel Dam is often used as a helispot/helibase when responding to fires in this area. Although this particular set of wires was known to exist, they were not identified on the Forest Aerial Hazard Map.

Education: All aviation personnel (crews and pilots) should be encouraged to view the HAI video "Surviving the Wires Environment" (website listed on page 3).

Communicating Hazards: Utilize the challenge and reply technique to ensure that the hazard is properly identified (Are you looking at the same hazard?).

Visibility: Pilot was wearing a tan flight suit, which had a camouflage effect against the dry vegetation which made him very hard to see and locate. A high visibility vest should be kept in the aircraft or a pilot can utilize his Personal Floatation Device when the situation warrants, for visibility.

Emergency Locator Transmitter (ELT): Pilot left the scene to find an area of cell phone coverage, and his whereabouts were uncertain for nearly 4 hours. If the situation warrants leaving the accident/incident scene, take the ELT or a handheld radio (if available) to assist with locating flight crew.

Drought Conditions: The water level in the San Gabriel Reservoir was lower than normal, making the position of the wires higher with reference to the water surface. The boat operator for the dam noted that they could once stand in the boat and "touch those wires". The significance of this is that wires that were once closer to the surface of the water are now at a higher position and therefore potentially located within a natural flight path. (What used to be a slight hazard is now a significant hazard due simply to the lowering of the water level).

Dip Site Selection: Though, this was not a factor in this IWP, the pilot stated, "That he could have flown closer to the fire for a dip site, instead of getting water right away".

Primary Initial and Extended Attack Helibase : A risk assessment and operations plan should be developed for helibase's that have been historically utilized as primary base of operations for aircraft.

Visibility Markers for Hazardous Wire: The LA County Department of Public Works, operator of the San Gabriel Dam, has placed a ***recommendation*** on the permit for Verizon in the replacement of the communications wire across the water.