Airbase Read File Items

Reviewing the Read File is not required, however the contents are considered critical Safety of Flight material. Please review all of the provided information and sign the appropriate box when completed.

	BLM Safety Trng Summary	Airward News	NTSB Lithium Battery Recm	ASHE	IAAPB 15-02 Landing Sites	IAAPB 16-01 Runway Incursion	IALL 15-01 Load Mgmt	IALL 15-02 Fire Whirls	IALL 15-03 Chip Lights	IASA 15-01 UAS Ops	SA-11 NTSB Thunderstorms	
Name												

BLM Aviation Safety & Training FY 2015

Safety Management Systems (SMS)

The BLM continues its dedication to SMS. 2015 was the third field season for Exclusive-Use (Ex-Use) Helicopter reviews and the first year for Fixed Wing (Air Tactical, Smokejumper, SEAT and Utility) Ex-Use aircraft reviews in the L48 and AK.. BLM reviewed: 30% of Ex-Use SEATs which included 7 of 9 companies on Ex-Use contract, 40 % of Ex-Use Helicopters which included 9 of 15 companies on Ex-Use contract. FY16 goal to review 25-30% of all Ex-Use contracts in L48 & AK.

Safecom Summary FY15 (98) total

- Helicopter (45)
- SEAT (9)
- Airtankers (1)
- Airplane (36)
- UAS (4)

Non-Fire Training (IAT)

- 824 IAT course completions in the classroom.
- 2830 online course completed.
- 115 webinar course completions.
- 12 courses taught by BLM Instructors, total of 324 student completions.

Summary

Accident

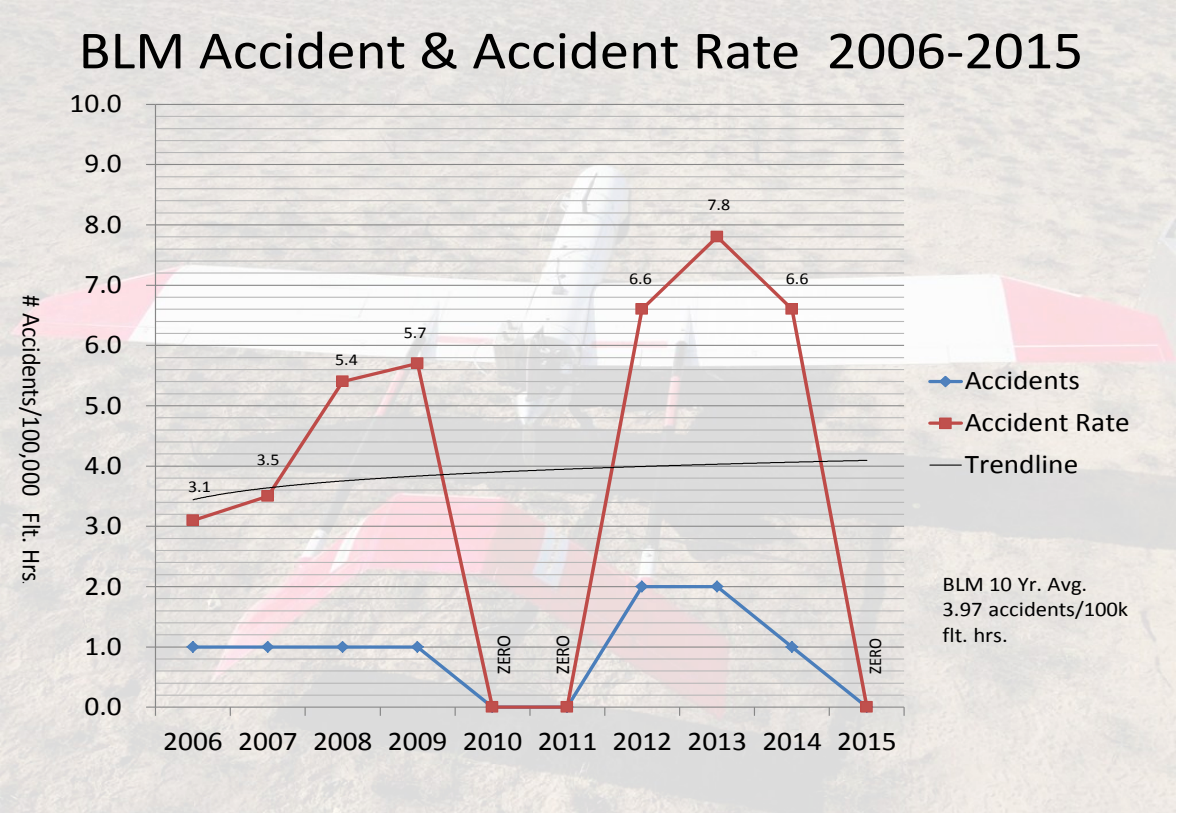
- Zero accidents in FY15. The BLM ten year (2006-2015) average accident rate per 100,000 flight hours dropped from 5.11 in 2014 to 3.97 for 2015.

Incident with Potential (IWP)

- April 16, 2015, Carrizo Plain National Monument (60 miles SW of Bakersfield, CA) UAS Mission-Aerial Photography, Super Bat inadvertently launched from catapult prior to engine startup. Impacted ground approx. 40 ft. in front of catapult. Substantial damage. No injuries.

Elevated Safecom

- No Elevated Safecoms for FY15.



Aviation Leadership Development Initiative (ALDI)

ALDI #3 ongoing through Fall 2016. Current two candidates have completed/participated: college courses in Aviation Safety Management Systems (2 each), Aviation Manager job shadowing at the national and state levels, FW & RW aircraft inspections, NWCG course coordination, Pinch Hitter course completion & coordination, aviation OJT on fire assignments, National Aerial Firefighter Academy (NAFA 1 & 2), FAC-COR Training. Next ALDI program will be advertised Spring 2017.

Questions or comments, contact Kirk Rothwell Aviation Safety & Training Advisor 208-387-5879 or mrothwell@blm.gov

2015 Issue 1

SAFE ATTITUDE AIRWARD NEWS

In Recognition of Professional Performance during a Hazardous Aviation Event or Significant Contribution to Aviation Mishap Prevention

Emergency Landing with Oil Covered Windshield

On July 21 a Cessna 182 departs the Coeur d'Alene Airport on a fire detection mission with the Pilot, **Lyle Drader** and Aerial Observer, **Glenn Bredeson** onboard. Near Thompson Pass on the Idaho-Montana border, approximately 1.5 hours into their patrol flight, they heard a pop in the forward engine compartment. The engine began running roughly, so the Pilot reduced the power on the engine and trimmed the aircraft for maximum glide speed. He then made plans for an emergency landing while checking the engine indicators to help establish an idea of how much longer the engine may continue to run.

As engine oil began to cover the aircraft's front windshield, it was apparent that engine failure was imminent so the pilot issued a mayday call over the emergency frequency of the VHF radio. They then began to assess and discuss potential emergency landing areas and selected a pasture in the Coeur d'Alene River drainage as their best option. While descending, engine oil continued to completely cover the windshield—making it very difficult to see. Due to their impaired visibility through the front windshield, they had to rely on looking out the side windows. They determined they had sufficient altitude and airspeed for a single pass by the pasture to scan for hazards. They set up for a 180 degree turn to final, allowing a look at the landing area and to lose altitude. While turning to final, they identify a large tree in the pasture's center which they would have to clear as well as a power line that crosses the pasture beyond this tree.

Left to Right: Lyle Drader, Glenn Bredeson, Bud McConnaughey (Idaho Panhandle FAO), Mary Farnsworth (Idaho Panhandle Forest Supervisor), Leanne Marten (Northern Rockies Regional Forester)

As they descended for the final approach, with the wind at their tail, they clear the tree and fly beneath the power line, the pilot now forcing the aircraft to the ground as they were running out of landing area. Upon impact, they bounced back up into the air. On the second touchdown, the front landing gear is torn off. They begin to skid on the rear landing gear and nose of the airplane. The right wing impacts the ground, creating substantial damage to the wing. They continue to skid nearly straight, coming to a halt 75 to 100 yards from the tree line at the pasture's end. The Pilot and Aerial Observer emerge with bruising on their arms and sore backs and necks from the forward and lateral forces that occurred in the cockpit during impact.

While they had been searching for an opening to land, the Pilot's mayday call was picked up by an Aerial Supervision Module (ASM) and a U.S. Army helicopter flying in the area. The helicopter landed in the clearing and checked on the Pilot and Aerial Observer. When the ASM arrived on scene, they notified Coeur d'Alene Dispatch that the plane was upright and it appeared that there were no serious injuries.

Lyle and Glenn are commended for their professional performance, airmanship and Crew Resource Management during this emergency aviation event, Nice Job Guys! SAFECOM 15-472

Quick Decisive Action by Helicopter Crews Result in Successful Evacuation

The helibase received a call at 1115 for a medivac while both helicopters were out doing water drops. The helibase had the aircraft return to helibase and the helibase manager decided to use the 206-L4 as the helispot was designated for use by type III aircraft. The helibase was in the middle of an "incident within an incident" drill so they immediately transitioned to the real thing. There was a fair amount of confusion at the incident site and the Lewistown Helitack crew made some key decisions to take action which included:

- Configuring the helicopter for litter configuration.
- Getting a manager, helitack crewmember and EMT manifested and ready once the aircraft was configured.
- Launching to the scene once configured. They decided getting the person off the hill was the first priority and patient transport was second.

Once on site, EMT Lanier took control of the scene, diagnosed the situation, and realized the seriousness and continued care and packaging. During all this there was a lot of radio chatter between the helibase, dispatch and the fire about ordering Life Flight, where transfer of the patient would occur, and would they use an ambulance.

The folks at the helibase kept their cool and decided the best course of action was to load the passenger and head directly to the hospital in Dillon, MT. This decision was based on the diagnosis of the problem and knowledge of what was required to best help the patient. During this time the pilot had the forethought to return to helibase and top off on fuel while the patient was being readied for flight. The helibase personal also reconfigured the aircraft as the patient was not ambulatory but could sit up.

Due to all the radio chatter that was occurring between the fire and helibase and dispatch, Ward Hiesterman (Helibase Manager) contacted dispatch on a satellite phone and advised them they were taking the patient directly to the hospital as it was the fastest way to get to advanced life support.

The aircraft returned to the helispot and the patient was loaded and arrived at the hospital in Dillon, MT around 1140. It was determined by the doctor that they made it with little time to spare as the patient was in a declining state of health. The action taken by Hennery Galliard, Ward Hiesterman and the rest of the folks at the helibase made the difference in what turned out to be a life or death situation. They did a great job and deserve to be commended for their decisive action.
Things that they did right included:

- Knowing where the hospital was early on as this was the first full shift on the fire.
- Having an EMT with the crew.
- Have the forethought to game out and drill on an "incident within an incident" early on.
- Having equipment like a sat phone and litter at the helibase, both were provided by the helicopter crews.
- Having trained helicopter personnel.

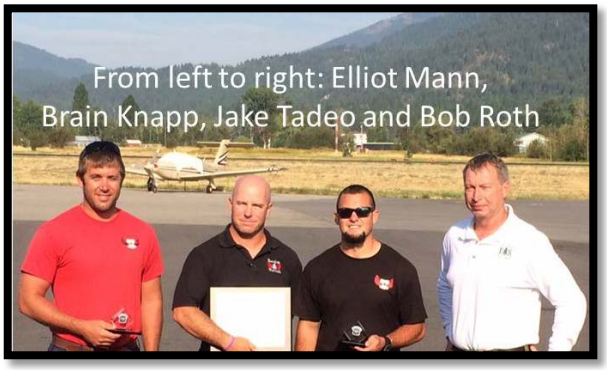
Participating Crewmembers: BLM Lewistown Helitack: **Henry Gilliland, Anika Tuss, Jacob Pastorius, Dan Gilfeather, Reggie Horel, Gabe Marroquin and Dillon Lanier**. Crewmembers USFS: **Ward Hiesterman, Lacy England, Matt Schutty, Chris Trotter and Nick Capobianco**. Unfortunately we were unable to get photos of everyone receiving their award, but Thanks and Congratulations to everyone involved.

Bob Roth and Matt Schutty

Left to right: Anika Tuss, Jacob Pastorius, Bob Roth and Henry Gilliland

Lacy England and Bob Roth

Hog Fire Helicopter Incident



The Helicopter was performing an aerial reconnaissance mapping mission on the Hog Fire on the Coronado NF. During the flight a caution light illuminated and the helicopter had to land immediately. Due to the terrain the only landing spot that was available was approximately a quarter mile from the fire and about 200 yards from the road that was the control line for the fire. The fire was backing towards the helicopter and at the rate it was moving, the helitack crew estimated that it would take approximately 3 hours to reach the ship.

After shut down the pilot pulled the chip detector and found a small piece of metal on it. He cleaned off and replaced the detector and ran the helicopter on the ground for 15 minutes without the chip light coming back on. The pilot again shut down the aircraft and pulled the detector, he did not find any metal on the plug on this inspection. Upon start up the chip light came back on so again the helicopter was shut down. At this point the helitack crew realized they could not get the aircraft moved before dark or the fire reached them.

Travis Stanfill (right) receiving Airward from Coronado Forest Supervisor Kerwin Dewberry (left)

They ordered another helicopter to help slow the fire and an air attack. When they first landed the Incident Commander had some Hotshots and the two engine crews on the fire cease operations and stage on the road behind the helicopter. They then had the hotshots come up to the helicopter to help plan a burn out around the ship and had the engines put in a hose lay. Another helicopter on forest was dispatched and dropped some buckets on the section of fire that was about 100 yards away. At around 1915 the hotshots had completed the line around the helicopter and started burning.

The mechanic showed up about the same time as the burn out started. He was able to look over the aircraft but didn't have time to work on it. The burn went off with no problems and was completed around 2045. The helitack crew stayed with the aircraft overnight and the mechanic and pilot returned the following morning and was able to get it moved. Helicopter Manager **Brain Knapp**, Crewmembers **Jake Tadeo** and **Elliot Mann** along with the Incident Commander **Travis Stanfill** are applauded for their professionalism and actions resulting in a successful outcome. A GREAT job by all! SAFECOM 15-293

Aviation Safety Leadership

Left to right: Douglas Morris, Lars Herbst, Jason Glynn and Sue Dwarnick

Captain **Jason Glynn**, Era's Operations Manager for the Gulf of Mexico, has been deeply involved in providing "behind the scenes" leadership and technical assistance in the development of video safety briefings for each of Era's aircraft. Recently, Captain Glynn has been the key figure in updating and enhancing the pre-flight briefings given to Bureau of Safety and Environmental Enforcement (BSEE) inspectors to ensure that lessons learned from near misses are incorporated into the daily briefings.

Captain Glynn has also been instrumental in managing the quarterly aviation safety meetings between Era pilots and BSEE inspectors hosted by each District's Lead Pilot. This opportunity to exchange aviation safety information will enhance team-building and break down communications barriers. For these reasons, BSEE proudly recognizes the contributions Captain Jason Glynn has made to the safety of BSEE's personnel and the accomplishment of BSEE's mission. Congratulations Captain Glynn!

Outstanding Airmanship

On the morning of August 29 at 0500 a call came in from Minors Peak Lookout that one of the McCall Smokejumpers assigned to structure wrap the Lookout had fallen off the catwalk and sustained serious injuries to his head and back. The request for immediate evacuation of the injured person was placed. Due to the time of the incident the only viable option was to order an air ambulance out of Boise, ID. The Manager of a USFS exclusive use helicopter assigned to the Rapid Incident was contacted and requested to have aircraft ready to fly as soon as possible. **Jim Hood**, the pilot of the helicopter was at the helibase and ready to fly at 0630. The air ambulance arrived at the Minors Peak Lookout at approximately 0615 but after a couple of attempts to land was unable to land at the helispot due to winds. At 0630 the exclusive use helicopter took off from Cascade Helibase and was on scene at approximately 0645. The helicopter was able to land and drop off 1 Helitack Crew Member, 1 Paramedic and 1 EMT. After lifting off the Pilot was able to demonstrate an approach and talk the air ambulance pilot into the helispot. Due to the pilots knowledge, skills and ability he was able to successfully get the air ambulance safely into the helispot and facilitate a quick and efficient extraction of the injured smokejumper.

By emphasizing good CRM, all flight crew members were able to assist in a safe and very successful effort to extract the injured firefighter. All three crew members are highly trained in their professional field and the end result showed. From starting with a through briefing to the execution of the mission, the flight crew functioned at the highest levels of safe and efficient work. Thanks Jim for an awesome job ☺ SAFECOM 15-776

Bird Strike Incident

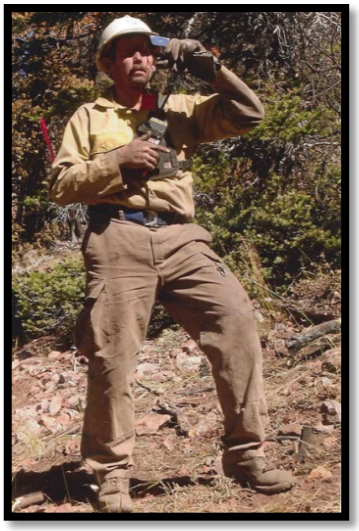
On February 11, 2015 **Captain Alan T. Bell Jr.** was pilot in command of an ASTAR 350 B2 helicopter, N182EH, providing support to the Bureau of Safety and Environmental Enforcement (BSEE). As Captain Bell and three BSEE passengers approached the New Orleans International Airport for landing, he and his passengers saw several flocks of birds in the area. The birds were at various altitudes, from the surface up to 3,000 feet above the airport. Captain Bell kept the flocks in sight and maneuvered to avoid them as he continued to the airport.

Left to right: Stephen Dessauer, David Emilien, Alan Bell, Sue Dwarnick, David Trocquet and Darryl Williams

While still in cruise flight approximately 5 miles southeast of the airport, Captain Bell spotted a single seagull immediately in front of the aircraft. Captain Bell quickly made a correction to the right to try and avoid the bird, but the seagull struck the front of the aircraft damaging the nose section just below the windscreen. The impact created a 12 inch hole in the nose of the aircraft and showered the left seat passenger with bits of the nose section and bird remains. Captain Bell quickly conducted a brief damage inspection and determined that the aircraft was safe to continue the planned approach and that all personnel were unharmed. Captain Bell slowed his airspeed to minimize any subsequent damage and began a descent to land at the New Orleans Airport

As he made his approach, Captain Bell alerted the New Orleans Air Traffic Control tower that his aircraft has suffered a bird strike and gave the altitude and location of the strike so that they could warn or re-route other aircraft. Captain Bell then made a separate call to all other pilots on the BSEE frequency to warn them of the birds in the area. The landing at the New Orleans airport was uneventful and after landing Captain Bell submitted SAFECOM 15-0095 that thoroughly documented the event. This is Captain Bell's second Airward, CONGRATULATIONS Captain Bell!

Aviation Mishap Prevention



On July 1, 2015, J-49 (N49SJ) was delivered from the local contract maintenance facility in Boise, ID and repositioned back to the jump base ramp at NIFC. The aircraft was brought over for unplanned non-critical maintenance on its hydraulic and de-ice systems the night prior, following the securing of jump operations June 30th. On post-taxi inspection while preparing the plane to return to an "IA Ready" status, the spotter, **Dennis Geving** discovered a disconnected cannon plug, back in the rear cargo compartment which was leading to a backup power supply (battery) for the aircraft avionics system. Maintenance was dispatched immediately to the ramp, the cannon plug reconnected and the aircraft was returned to service. Following apologies, it was explained why the cannon plug was disconnected. This wasn't debriefed to the pilot on initial delivery which would've directed his attention to check the work completed, not only on the hydraulic and de-ice systems.

Mr. Geving's actions and attention to detail are commendable as this wouldn't have been apparent to the cockpit, until a complete electrical failure had occurred and the backup power supply was needed. Thanks Dennis! SAFECOM 15-0371

Contribution to Aviation Mishap Prevention

Recently **William (Bill) James**, OAS Aviation Safety Compliance Specialist observed that the flight data recorder was in a maintenance state; the light was blinking and could not be extinguished. This means one of two things; one the system is not working correctly and probably won't do its job of recording exceedances, or two an exceedance has occurred. This system has a history of throwing a nuisance code that doesn't mean anything. An exceedance occurred while the aircraft was in maintenance; so he refused to fly the aircraft until the code was cleared. As it turned out this was an excellent call. Bill's good judgement has tempered a can do attitude in the right direction.

Contribution to Aviation Mishap Prevention

David Myers (right) receiving Airward from Brian Salerno (left)

The Department of the Interior has for years used the safety slogan "If You See Something, Say Something". **Mr. David Myers**, a Senior Lead Operator for Wood Group, exemplifies that philosophy.

On September 1, 2015, two BSEE inspectors were testing equipment on the East Cameron Block 278 C platform (EC 278 C), an oil and gas facility located approximately 80 miles offshore. After being at the platform for about 30 minutes, the pilot had to take off and circle the platform so another vendor could drop off passengers. After landing back on EC 278 C, Mr. Myers noticed oil on the deck under the helicopter. Mr. Myers immediately intervened and alerted the pilot. The pilot carefully inspected the aircraft and found a hydraulic oil line leaking.

The aviation service provider grounded the aircraft pending replacement of the hydraulic line and the BSEE personnel returned safety to Lake Charles in other aircraft. Mr. Myers' alertness in identifying an unsafe situation, and his willingness to get involved and report that situation likely prevented an in-flight emergency. Mr. Myers' actions set a great example for us all and serve as a reminder that active hazard reporting is a foundation of a positive safety culture. For his significant contribution to the safety, we are proud to recognize Mr. David Myers with an Airward.

"ASHE" Acronym review.

The following are some thought provoking reminders when reviewing the "ASHE" visual indicator.

Approach… *(…What you do first affects everything afterwards.)*

Have I set up an approach that is clear of obstacles?

Will my approach allow for deviation of my flight path if required?

Will my approach allow me to maintain complete control of my aircraft?

Have I set up an approach that is appropriate for the drop area?

Have I set up an approach that aligns me with the target?

Have I set up an approach that allows maximum time to visually acquire the target?

Will my approach allow for a safe exit?

Will my approach allow the maximum safety margins possible?

Will my approach angle allow for an easy transition to the appropriate drop height?

Will my approach allow me to maintain an elevation above the "minimum drop height"?

Will my approach allow…?

"ASHE" Acronym review.

Speed *(…speed is life.)*

Is my airspeed within the performance envelope for the drop sequence?

Is my airspeed Increasing or decreasing?

Is my airspeed radically different from my ground speed?

Will I need to adjust my airspeed drastically to remain within the flight envelope for the drop?

Will my airspeed be appropriate when I reach the target?

Will my airspeed be adequate to fly through the “Spool up” delay during climb out?...even if I have retained the load?

Am I reducing my airspeed to compensate for poor pilot technique?

“ASHE” Acronym review.

Height *(…you can only tie the world record for low flight.)*

Am I maintaining a safe height during a “Dry Run”?

Am I maintaining a safe height that does not threaten the “Minimum safe Drop Height”?

Am I maintaining a safe height throughout the entire drop sequence?

Am I familiar with the “Appropriate drop height” for the conditions in the target area?

Am I able to maintain a safe height…?

“ASHE” Acronym review.

Exit *(…canyon flying is inherently dangerous.)*

Does my **A**pproach, **S**peed, and **H**eight allow for a safe **E**xit from the drop area?

Is my exit flight path free of obstacles?

Is my exit corridor safe even if I have to retain the load?

Is my exit visible during the drop sequence?

Does my planned exit corridor require a radical change of direction or elevation?

Does my exit corridor provide options should I lose power or lift?

Is my exit flight path…?

Executive Summary

On Sunday, September 14, 2014, a Bell 206L-1 (NXX) contractor owned and operated aircraft was involved in a mishap while conducting a fire suppression operation approximately 50 nautical miles south of Burns, Oregon. The fire suppression mission was in response to a scheduled prescribed burn for the Moon Hill RX that exceeded the set boundary (although within the designated project area). The mission was under the operational control of the BLM.

An ignition specialist controlling the fire was in a separate helicopter (NXXX) while NXX (mishap aircraft) was igniting the surface with an attached helitorch. A spot fire erupted on the west side of the burn area where there was a small rise in terrain. The ignition specialist directed NXX to return to the Moon Hill Helibase, off-load the helitorch, and return with a Bambi bucket to help extinguish the spot fire.

At approximately 1620 Pacific Daylight Time (PDT)[1] the mishap pilot departed the helibase with the helicopter configured with a 108 gallon Bambi bucket cinched to 80%. NXXX joined up and followed him to the dip site and then to his first drop.

Given the fire activity, time of day, and ground access to the spot fire, the Ignition Specialist directed the aircraft he was flying in NXXX to return and reconfigure with a Bambi bucket to assist with the fire suppression effort if needed. After observing NXX's first drop, NXXX departed for the helibase to reconfigure.

The mishap pilot filled the Bambi bucket a second time and dropped water on another spot fire that he discovered while working on the original spot fire. Prior to dropping the water from the bucket, the pilot noticed a small 6 to 8 foot fire whirl had developed on the spot fireline edge. A fire whirl, also colloquially known as a fire devil or fire tornado is a whirlwind induced by a fire and often made up of flame. Fire whirls may occur when intense rising heat and turbulent wind conditions combine to form whirling eddies of air. These eddies can tighten into a tornado-like structure that sucks in burning debris and combustible gases.

While pulling up from the drop, the pilot felt the aircraft climb rapidly. In response, he lowered the collective (reduced power) in an attempt to arrest the climb, but the aircraft kept climbing.

The pilot stated that he then heard a loud "bang" and felt "tightness" in the controls. Once the aircraft was stabilized, the pilot said he looked down to check on the bucket but didn't see it. When he looked to the back of the aircraft, he saw that the bucket was draped over the tail boom with the cable still attached, just a few feet away from the tail rotor.

The pilot immediately looked for a safe landing zone away from the flame front. He located a

[1] All times are Pacific Daylight Time (PDT) unless otherwise noted.

safe landing zone approximately 75-100 yards from the fire and landed at approximately 1630.

Once on the ground, the pilot shut the aircraft down, exited the aircraft, removed the bucket from the tail boom, and inspected the main rotor blades, tail section and the tail rotor. With no indications of damage to the main rotor blades and only minor damage to the tail rotor, the pilot decided that the aircraft could be flown back to the helibase.

At approximately 1650, the mishap pilot (hereafter also known as "the pilot") noticed that fire activity was intensifying and heading towards the aircraft. The pilot re-attached the cable and Bambi bucket to the aircraft, lifted the aircraft into a hover, tested the controls and decided the aircraft was capable of flying back to the helibase.

NXXX arrived back on scene about the time the mishap pilot had started the aircraft.
The two aircraft flew back to the Moon Hill Helibase at an altitude of approximately 200 feet above ground level (AGL) and airspeed of approximately 40 knots. Landing at the helibase was uneventful.

CONTRIBUTING FACTORS:

Gusting winds resulting in the formation of a "fire whirl" was a contributing factor in this mishap (paragraphs 27-33). At the time of the incident, the Malheur Portable Remote Automatic Weather Station (RAWS) data indicated the wind was gusting up to 18 mph. Fire whirls may occur when intense rising heat and turbulent wind conditions combine to form whirling eddies of air. These eddies can tighten into a tornado-like structure that sucks in burning debris and combustible gases. The pilot stated that he felt the aircraft climb at approximately 3,000 feet per minute immediately after releasing water from the bucket and seeing the fire whirl.

SEQUENCE OF EVENTS

Background.

On Saturday, September 13, 2014, the mishap pilot arrived in Burns, Oregon in preparation for an upcoming BLM prescribed burn mission.

On Sunday, September 14, 2014 at 0800, a mission brief was conducted at the Burns BLM Helibase located at the Burns municipal airport. The brief consisted of project objectives, safety and emergency procedures for personnel involved in the prescribed mission. After the brief, the pilot departed for the Moon Hill Helibase, located approximately 36 miles south southeast of the Burns municipal airport.

The mishap aircraft, NXX a 1978 Bell 206L1 C30P, was initially configured with a helitorch used for aerial ignition of ground fuels (Figure 1and 2).

Figure 1. Generic picture of a helitorch

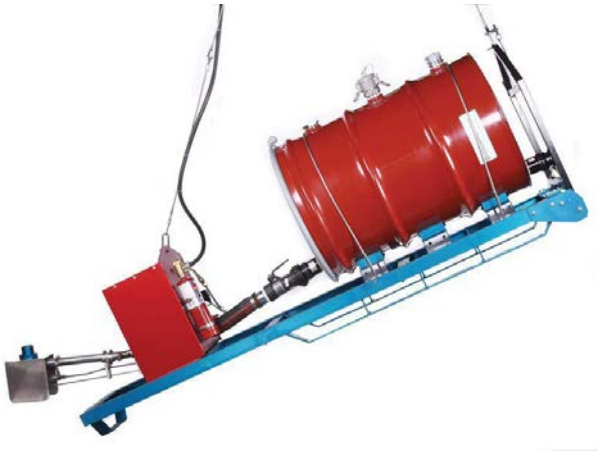


Figure 2. Helitorch attached to a helicopter

According to the pilot, helitorch operations were in progress from 1230 to approximately 1600.

At approximately 1530, the holding crew on the south end of the fire noticed spot fires erupting across the boundary line (but still within the designated project area). The pilot was on his way back to the helibase for another barrel of fuel for the helitorch when he got the call from the Ignition Specialist in aircraft NXXX directing him to reconfigure for fire suppression. The pilot landed and shut down to add fuel, remove the helitorch and to hook up the Bambi bucket. After performing the required preflight checks, he departed at 1620 for the fire with approximately 375 pounds of fuel on board.

Mishap Flight

The Bambi bucket, model 9011, [2] was cinched to 80% which allowed 86 gallons of water to be drawn and delivered. A 100 foot, 5/16" steel cable attached the bucket to the aircraft.

Figure 3. Representative photo of a Bambi bucket.

On the way out to the south boundary, the pilot received the name and position of the ground contact from the ignition specialist. The pilot contacted the ground contact and proceeded to draw water from a pond located southeast of the drop position. NXXX joined up and followed him to the dip site and then to the fire to observe his first drop.

[2] At 100% capacity, the Bambi bucket model 9011 is capable of holding 108 gallons of water.

Figure 4. Moon Hill RX Burn area.

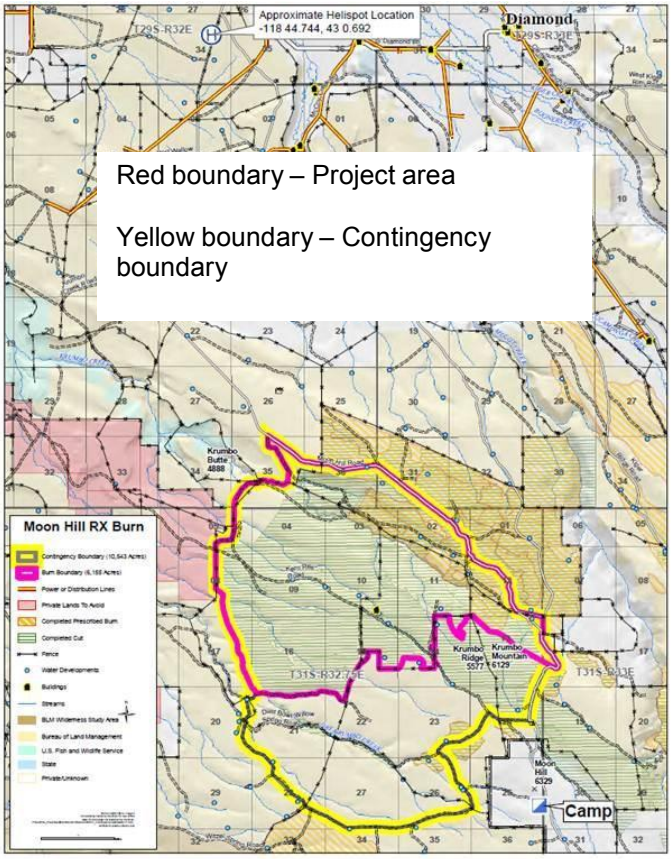
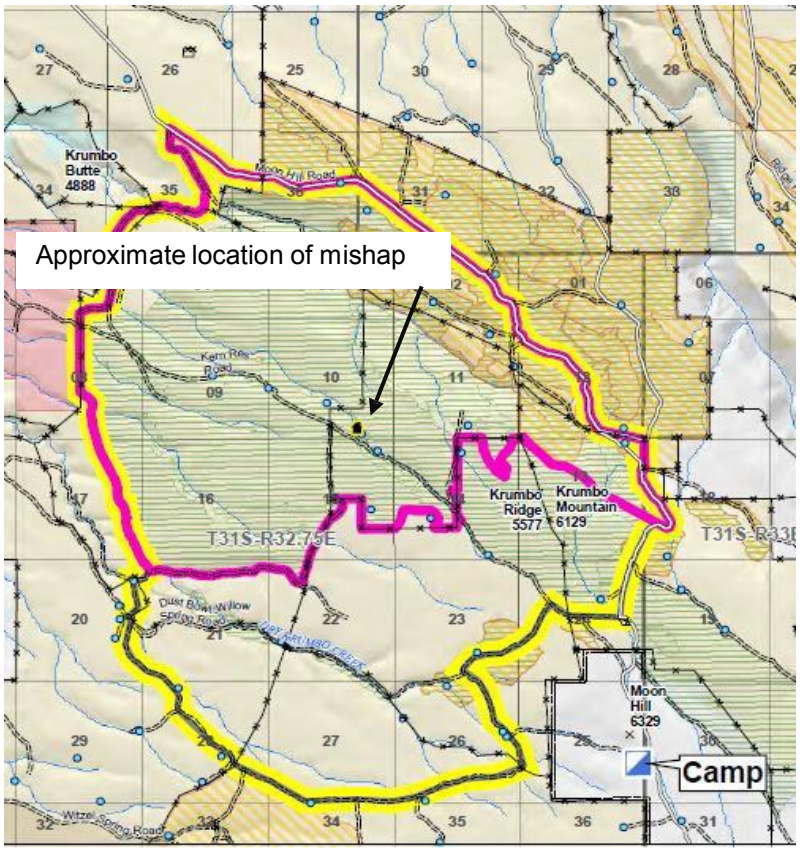


Figure 5. Mishap location.



The pilot was requested to slow the fire spread to the east but smoke laid over the area. Unable to get in to the eastern portion of the area, he informed the ground contact of the smoke and told him that the southeast area in front of the first eastbound Tatra engine[3] was accessible. The pilot performed a trail drop with the first bucket of water about 200 yards east of the Tatra in a westbound direction on the southern flank. The pilot stated that the drop was uneventful with wind out of the west at 8 knots or less. After the drop, the pilot returned to the dipsite to refill the Bambi bucket with water.

Given the fire activity, time of day, and ground access to the spot fire, the Ignition Specialist directed NXXX to reconfigure with a Bambi bucket to assist with fire suppression if needed. After observing NXX's first drop, NXXX departed for the Moon Hill Helibase.

On the way back to the fire with the second bucket, the pilot noticed another spot fire farther to the east that was cresting the small ridge above the south boundary road. The pilot

[3] A Tatra engine is a six-person crew cab, 6x6 all-wheel drive fire-fighting vehicle with a 2,400-gallon water/foam carrying capacity.

made a long left base to final into the wind for another trail drop across the head of the spot fire that just started on the flat above the ridge.

The pilot came in straight with a shallow descent on final to have the bucket about 40 feet above the terrain and Juniper trees. The fire was moving through the grass in a southeasterly direction just 10 feet from the crest of a ridge.

On short final, the pilot was set up for a trail drop with an airspeed of approximately 15 - 20 knots. He noticed a small fire whirl starting to form at the head as he looked down at the bucket to make the drop. As soon as the pilot dropped the water, he noticed that while the helicopter's attitude and heading remained constant, the aircraft was rapidly climbing. He shifted his focus back inside the aircraft in order to stabilize the climb. He then lowered the collective (reduced power) and held the attitude and heading steady.

With the collective lowered to around 30 % torque, the pilot stated that he heard a loud "bang." The helicopter continued to climb for a few more seconds then smoothly leveled out at an airspeed of approximately 20-30 knots in a westerly direction. As he pushed the cyclic forward to gain airspeed, he felt "tightness" in the controls.

When the pilot looked outside to check the bucket, he noticed it wasn't below the aircraft, but was behind the aircraft, hanging off the back of the left horizontal stabilizer. The cable was within a foot or two from the tail rotor with the bucket approximately 60 -70 feet below. The cable was causing the resistance to cyclic inputs by resting on the aileron on the back of the horizontal stabilizer.

The pilot lowered collective (reduced power) and eased back on the cyclic to reduce airspeed and slowly descend without getting the line any closer to the tail rotor arc. The pilot made a call to NXXX (who after watching the first bucket drop was heading back to base to reconfigure with his bucket) and told them that he was landing.

With airspeed less than 5 knots, the pilot landed in the first opening he saw. He landed the bucket in front of the aircraft and kept the line tight while backing and descending, careful not to put any slack in the line. When the skids were firmly on the scab rocks, he reduced the throttle to idle and performed a normal shutdown. He then climbed out and inspected the tail rotor blades, main rotor blades, tailboom and associated components.

According to the pilot, "there was a one inch mark on the outboard leading edge of one of the tail rotor blades (approximately .001 to .0015 inch deep scratch that did not show evidence of breaking through the stainless steel leading edge or delamination) that had made contact with the cable and electrical cord. There were no cracks on either tail rotor blade – span wise or length wise. Both pitch change links felt good, the knurled nut and balance wheel were still tight and safety wired, and neither side blade bearing had any play. The gear box was solidly mounted and full of oil and the pitch change shaft and vertical stabilizer had no signs of damage."

The pilot then inspected the cable to find any evidence of a blade strike. Approximately 40% of the 5/16" cable was cut and the electrical cord was severed 22 feet aft of the helicopter attach point (belly cargo hook). He then inspected the main rotor for damage and found nothing on either blade. Both blades are equipped with clear rubber tape on the outboard 7 feet of the leading edge. With no tears in the tape or evidence of contact, the pilot determined that the main rotor blades appeared airworthy, as did the tail rotor drive shaft cover, PC links and rotor head.[4]

From the top of the helicopter the pilot could see the fire advancing towards his position from the north. With the rate of spread he guessed he had 5 to 8 minutes to depart. He climbed down and removed the cable from the tail boom.

The pilot stated that he wanted to disconnect and load the bucket and long line in the back of the helicopter but did not have time. He stated that the minimum break rating for 5/6" cable is 8,500 pounds and he was confident that there was at least 50 to 60% of good cable remaining and estimated the breaking weight was at least 4,000 pounds, which exceeds the helicopter lifting capability by 4-5 times. He reattached the pear link to the cargo hook and prepared for takeoff.

By the time NXX was started, NXXX was on scene. NXXX ensured communication and escorted the mishap aircraft back to the Moon Hill helibase at an airspeed of approximately 40 knots and at an altitude of approximately 200 feet AGL. The pilot stated that the helicopter flew fine with no vibration in the pedals or cyclic and that all cockpit indications were normal with no warning or caution lights illuminated.

The flight back to the helibase and subsequent landing were uneventful. Photos taken later of the precautionary landing site confirmed that the fire had overrun the location.

On October 3, 2014 the inspection and replacement of sudden stoppage items were completed and the aircraft was returned to service.

The tail rotor blade returned to the manufacturer was found to be serviceable. The blade was cleaned, smoothed and returned to the contractor.

Facts, Analysis, and Contributing Factors

Methodology

Aircraft mishaps are the result of a chain of diverse, yet interconnecting links (events) that together produce unintended, yet predictable consequences. Each link can be sorted into one of several broad categories. Each category lends itself to certain preventative and prescriptive measures that if applied to future operations can preclude the forging of one or more of the links

[4] The pilot's determination that the aircraft was airworthy was made from his knowledge of the aircraft. He was not a designated Airframe and Powerplant (A&P) mechanic.

in a mishap chain. These links are identified through the mishap investigative process and are expressed in terms of ***"contributing factors."*** In aircraft mishaps, a contributing factor is identified as a deviation from expected norms that compromises established safeguards and risk mitigations and brings the pilot-aircraft system closer to a mishap. Other deviations to accepted norms uncovered during the investigation that did not contribute to the mishap, but should be corrected are characterized as "present but not contributing." **Preventing an aircraft mishap requires that only one link (contributing factor) in the mishap chain be broken.**

The Department of the Interior, Office of Aviation Services (OAS) employs the Air Force 5M model, [AFPAM 90-803, Risk Management (RM) Guidelines and Tools] as the framework for aircraft mishap reporting. The 5-M's are ***Media, Machine, Mission, Man,*** and ***Management***. These categories capture the broad range of elements that interact as a system to produce mission success or mission failure. Successful missions or mishaps do not just happen; they are the product of a system that includes Media, Machine, Mission, Man, and Management. Mishaps serve as indicators of how well a system is functioning and where improvements can be made to increase mission success and reduce loss/cost.

MEDIA

The Malheur portable RAWS station (TS674) was located approximately 3.5 miles from the mishap site. The weather data for September 14, 2014 is shown in Figure 6.

Figure 6. Weather data on the day of the mishap.

Time PDT	Temp° F	Dew Point °F	Relative Humidity %	Wind Speed mph	Wind Gust mph	Wind Direction
11:58	76	26.6	16	8	14	WSW
12:58	79	24	13	7	13	WSW
13:58	81	23.6	12	5	18	WSW
14:58	82	24.4	12	4	18	WSW
15:58	81	25.5	13	6	15	N
16:58	82	24.4	12	7	20	NNE
17:58	80	24.7	13	3	11	NNE

At the time of the incident, the wind was gusting up to 18 mph, with an associated wind shift from the west southwest to the north northeast. The mishap pilot stated that as he made the last water drop, he witnessed a 6 to 8 foot fire whirl starting to form.

A fire whirl, also colloquially known as a fire devil or fire tornado is a whirlwind induced by a fire and often made up of flame. Fire whirls may occur when intense rising heat and

turbulent wind conditions combine to form whirling eddies of air. These eddies can tighten into a tornado-like structure that sucks in burning debris and combustible gases.

A fire whirl consists of a core—the part that is actually on fire—and an invisible pocket of rotating air that feeds fresh oxygen to the core. The core of a typical fire whirl is 1 to 3 feet wide and 50 to 100 feet tall. Under the right conditions, large fire whirls, several tens of feet wide and more than 1,000 feet tall can form. The temperature inside the core of a fire whirl can reach up to 2,000 °F - hot enough to potentially reignite ashes sucked up from the ground. Often, fire whirls are created when a wildfire or firestorm creates its own wind, which can turn into a spinning vortex of flame.

Combustible, carbon-rich gases released by burning vegetation on the ground are fuel for most fire whirls. When sucked up by a whirl of air, this unburned gas travels up the core until it reaches a region where there is enough fresh, heated oxygen to set it ablaze. This causes the tall and skinny appearance of a fire whirl's core.

Real-world fire whirls (Figure 7) usually move slowly. Fire whirls can set objects in their paths ablaze and can hurl burning debris out into their surroundings. The winds generated by a fire whirl can also be dangerous. Large fire whirls can create wind speeds of more than 100 mph strong enough to knock down trees.

Figure 7. Representative photo of a fire whirl approximately 40- 50 foot tall.

The pilot stated that he felt the aircraft climb at approximately 3,000 feet per minute (fpm) just after seeing the fire whirl. As he reduced power to arrest the rate of climb, the Bambi bucket was still influenced by the very strong updraft. During the short period of time between the large power reduction, level off and continued ascent of the Bambi bucket, the 100 foot cable wrapped around the tail boom, missing the main rotor blades and only impacting one tail rotor blade.

While there are no defined procedures for what to do in the event of encountering a fire whirl, other very experienced helicopter pilots opined that the best procedure would be to "hold what you have." In other words, do not reduce power but maintain forward speed in order to fly out of the pronounced updraft.

According to the pilot, the cable came up in front of the right horizontal stabilizer, went over the tail boom and behind the left stabilizer (figure 8). There were no witnesses to the event.

Figure 8. Re-enactment of the cable wrapped around the tailboom.

Media – gusting winds resulting in the formation of a fire whirl was a contributing factor in this mishap

MACHINE

NXX was a 1978 Bell 206L1 C30P[5] configured with a 5/16 inch, 100 foot steel cable. At the end of the cable was a model BB9011 Bambi bucket (Figure 9 and 10, page 13). The BB9011 holds 108 gallons of water[6] and weighs 85 pounds empty with a gross weight of 970 pounds. The Bambi Bucket in use was cinched to 80%, meaning that the bucket could only take and release 86 gallons or 717 pounds of water[7]. The long line was attached to the cargo hook on the helicopter.

The 100 foot cable is authorized for use for DOI missions. The Interagency Helicopter Operations Guide (IHOG), Chapter 9K states that "if a longline is used for water bucket operations, then the longline shall be a minimum of 50 feet in length to reduce the risk of entanglement with the tail rotor or tail boom."

Figure 9. Bambi bucket

Figure 10. Bambi bucket Control Head

The aircraft was equipped with Van Horn tail rotor blades.

The weight and balance / load calculation had been completed for the aircraft configuration and was within limits for the mission.

The aircraft and equipment were properly carded under the authority of the Department of the Interior on March 19, 2014 for the On Call Contract D13PC00145. The mishap pilot stated

[5] C30P designates the Rolls-Royce engine upgrade from the stock engine.
[6] Water weighs 8.34 pounds per US gallon (at 62°F).
[7] The amount of water was restricted due to the operational performance of the aircraft.

that there were no outstanding discrepancies with the aircraft and that it was operating normally at the time of the mishap.
Aircraft carding and operating condition were not contributing factors in this mishap.

Damage to the aircraft.

During the on-site investigation, the aircraft was inspected by an OAS Aviation Safety Compliance Specialist. The inspection was conducted to ascertain the extent of damage sustained to NXX and the maintenance requirements for the aircraft to return to contract availability. The visual inspection was performed in accordance with Bell Helicopter 206L1 Maintenance Manual, Chapter 5, Conditional Inspections, Paragraph 5-53, Sudden Stoppage/Acceleration, Van Horn Aviation, L.L.C. Instructions for Continued Airworthiness, ICA Manual No. VMM-206L1-305, Ch. 5 Inspection/Check Requirements and Lord Corporation SM-6470 Service Manual for Elastomeric Tail Rotor Flapping Bearing Kit for the Bell 206 Series Helicopter.

At the completion of a visual inspection, the only damage identified was the wire rope impact on tail rotor blade and the damage sustained to the long line and electrical cable. The Sudden Stoppage Inspection was performed in accordance with the Manufacturers recommendation (Bell Helicopter Textron), Van Horn's Instructions for Continued Airworthiness and Lord Corporation SM-6470 Service Manual for Elastomeric Tail Rotor Flapping Bearing Kit for the Bell 206 Series Helicopter. Both Tail Rotor Blades were removed and sent to Van Horn L.L.C. for inspection. The Lord Elastomeric Trunnion Bearings and Brackets were to be discarded.

The Non-Destructive Testing (NDT) certifications were competed and annotated in the maintenance aircraft logbook. The rotor blades were inspected and found to be serviceable. The leading edge of the blade with the strike was blended and returned. However, the company installed a complete tail rotor hub assembly with new tail rotor blades.

Aviation Life Support Equipment (ALSE)/Personal Protective Equipment (PPE). The mishap pilot was wearing ALSE/PPE appropriate for the mission flown in accordance with DOI and BLM policy. **Aviation Life Support Equipment/Personal Protective Equipment was not a contributing factor in this accident.**

The Aviation Safety Department at Bell Helicopter was asked if they knew of any similar case where the cable had wrapped around the tail boom on an aircraft. Their response was:
"There have been cases where the line/cable has come in contact with the tail rotor, when there is an empty bucket or line without anything on the end. However this is the first time we have heard of the line becoming completely wrapped around the tail boom."

MISSION

The mission was in support of a prescribed fire located approximately 35 miles south of Burns. Oregon. An imbedded mission was fire suppression in the event of spot fires occurring outside the scheduled burn areas (as was the case with this mishap). The prescribed burn was planned and staffed in accordance with the Interagency Helicopter Operations Guide (IHOG) and applicable DOI and BLM instructions.

A September 4, 2014 public affairs announcement issued to the public stated: "HINES,

> Ore. – Fire crews from the Burns Interagency Fire Zone expect to carry out within the next month a large prescribed fire in the Moon Hill area near Krumbo Ridge, approximately five miles southeast of Diamond, Oregon. If weather permits, officials say the project could start as early as next week.
>
> The Burns Interagency Fire Zone does a number of prescribed fire projects annually to reduce fuel loading and the risk of catastrophic large wildfires, increase forage for livestock and wildlife, and improve wildlife habitat. Fire Management Officer Ken Higle said, "These projects are important in our efforts to develop more fire resilient and healthier ecosystems."
>
> The 6,000-acre Moon Hill prescribed fire will last approximately three to seven days. There will be noticeable smoke and increased traffic around the burn area. The public should be aware of the activity and avoid the work site as much as possible."

Well-coordinated and widely distributed, **Mission was not a contributing factor in this mishap.**

MAN

The mishap pilot was an experienced pilot with over 6,300 hours in the Bell 206 series aircraft. He held a FAA commercial rating for rotorcraft aircraft and had a second class medical with no restriction dated October 9, 2013. The pilot was carded by DOI/OAS on June 14, 2014 with a longline vertical reference endorsement. The pilot had over 450 hours of flight time performing longline missions. **Pilot qualification was not a contributing factor in this mishap.**

The mishap occurred on the first day of the project. The pilot arrived in Burns, Oregon on the previous day, Saturday September 13, 2014. Total flight time for the seven days before the mishap was 2.6 hours. Flight time for the day of the mishap was 4.4 hours. He stated that he was well rested and ready for the flight. The pilot's crew day started at 0800 with a morning mission

brief at the BLM UAM office in Burns, Oregon. **Pilot crew day and fatigue were not contributing factors in this mishap.**

The mishap pilot stated that at no time did he encounter a loss of tail rotor effectiveness (LTE) or encounter any un-commanded yaws typical of a LTE event.

MANAGEMENT

The Project Aviation Safety Plan (PASP) was dated and signed by the Associate District Manager on 8/23/13. The PASP remained relatively the same and there was no formal review of the project in 2014. Current policy does not require an annual review.

Department of the Interior Operational Procedures Memorandum OPM 06 states:

> "Project Aviation Safety Plans will be developed for all special use missions. For those bureaus that perform similar special use aviation missions on a recurring or routine basis, the required PASP can be rolled into a station / unit aviation plan that is reviewed at least annually."

The intent of the OPM is to ensure Aviation Plans and Project Aviation Safety Plans are reviewed annually.

A Risk Assessment (RA) was included in the Project Aviation Safety Plan.

The daily Helicopter Operations Brief and the Helitorch Operations Go / No Go Checklists were completed prior to the mission.

CONTRIBUTING FACTORS:

Gusting winds resulting in the formation of a "fire whirl" was a contributing factor in this mishap . At the time of the incident, the Malheur Portable RAWS data indicated the wind was gusting up to 18 mph. Fire whirls may occur when intense rising heat and turbulent wind conditions combine to form whirling eddies of air. These eddies can tighten into a tornado-like structure that sucks in burning debris and combustible gases. The pilot stated that he felt the aircraft climb at approximately 3,000 feet per minute immediately after releasing water from the bucket and seeing the fire whirl.

RECOMMENDATIONS:

1. OAS Training develop a training module on fire tornados and the potential impact to flight operations. Include “best practices” procedures for encountering a fire whirl.

2. BLM reiterate the importance of reviewing PASP that are more than one year old to review and document any changes that might be required.

3. OAS Aviation Safety develop a Lessons Learned Publication to alert all aviation personnel on the dangers of fire tornados.

Event Type: Water Bucket
Power Line Strike

Date: August 21, 2015

Location: Kettle Complex;
Washington

This photo was taken approximately 100 feet from the power line.

NARRATIVE

On the Renner Fire on the Kettle Complex in Northeast Washington, a Type I Helicopter with a 150-foot longline is completing bucket work when—on its first approach for a dip operation at a new dip site (that had not previously been used)—its bucket strikes a residential power line.

The pilot expertly maneuvers the aircraft backwards to unfold the bucket from the power line and safely returns to the helibase to debrief and take a tactical pause.

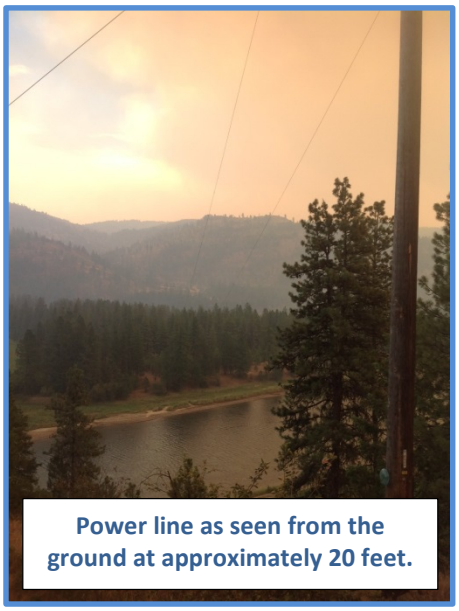
"The normal visual cues were not there, no poles seen, no houses seen. And, due to the winds, there was no reflection on the water. I was showing another pilot the powerline and it took them several minutes to locate the line even though it was right below them."
Helicopter Pilot

The bucket sustained minimal damage from the strike.

Due to the pilot's experience, quick thinking, and calm professional demeanor, the bucket did not need to be jettisoned. It sustained minimal damage, ensuring a precious resource could continue to be used on this high-priority incident.

This was the eighth bucket dipped by the pilot (at other dip sites) during the first cycle of operations for the day.

High-Priority Fire – Limited Resources
The Renner Fire was a fast moving fire that threatened multiple primary structures. It was identified as a high priority for the Kettle Complex. Due to the extensive level of fire activity in the Pacific Northwest, resources were extremely limited. The available resources were stretched thin.



Power line as seen from the ground at approximately 20 feet.

Suppression efforts on the Kettle Complex were challenged by lengthy response times from dip sites to drop locations due to the Renner Fire's rapid growth rates. During the dip operations, Air Attack had been ordered but was not in the immediate area because of the incident's high operational tempo.

Power Lines Nearly Impossible to See

The helibase was located more than an hour away by ground personnel. At that time, shifting limited resources to manage a dip site was not possible. In addition to the strapped-thin resources, conditions at the dip sites were smoky and the view from above created a dark background making the thin power lines nearly impossible to see.

Immediately after the bucket hit the power line and the pilot unfolded it, the pilot radioed over another helicopter to communicate and identify the strike site. That pilot had great difficulty seeing the power line that spanned the vast river—even after being informed of its exact location. After the incident, the pilot stated he would not have known it was a power line that was struck if the bucket had not folded over the line. "Because of the low airspeed," the pilot explained, "it felt similar to dragging a log onto a landing site. It was smooth and slow."

More Lessons:

Dip Site Rotor Strike Lessons Learned

Six Minutes for Safety, Powerline Safety

Six Minutes for Safety, Working with Helicopter Bucket Drops

Cabin Fire Rotor Strike RLS

LESSONS – REMINDERS

Tactical Pause

- ✓ Taking a tactical pause was an effective means to evaluate other factors that may have contributed to the water bucket striking the power line. It allowed all of the incident's pilots and helibase personnel time to reevaluate and improve their plan before moving forward. A conversation between the pilot, manager, and helibase manager determined fatigue was not an issue. The pilot was on day 8 of 12, only had 25 flight hours, and felt good throughout the operation. Taking a tactical pause even during a high-operational tempo provides any firefighter the time to evaluate how they are feeling and how to proceed with operations. External factors should never push us into a situation that compromises safety.

Coordinate Hazard IDs with Local PUDs

- ✓ Everyone interviewed emphasized the need to take the time to coordinate with local Public Utility Departments (PUD) to incorporate layers into hazard maps and—to enhance visibility—request that hazards be properly marked wherever possible. In this way, when emergency incident resources arrive during rapidly developing events they will be able to quickly identify known hazards. It is standard policy for all aircraft to perform a high-level reconnaissance and search for unknown hazards before descending below 500 feet (altitude above ground level) to conduct operations.

Do Not Rush Yourself or Others

- ✓ It is important not to rush yourself or those you are working with or supervising—even when the pressure of rapid fire growth rates and threats to values at risk are adding stress to managing an incident.

Use Existing Safe Dip Site Until Another Safe Site is ID'd

- ✓ Once a safe and accessible dip site is identified, continue to use that site until alternate sites are identified. In addition, when feasible, check dip sites from the ground.

Do you have a Rapid Lesson to share?
Click this button:

Share Your Lessons

A special thanks goes out to the Kettle Complex and their Aviation Unit's willingness to share their story so others may learn from their close call while engaging on a highly complex fire incident.

This RLS was submitted by Todd Legler and Damen Therkildsen, with support from the Pacific Northwest Wildfire Coordinating Group.

Pacific Northwest Wildfire Coordinating Group

Elevated SAFECOM 14-0270 [Helicopter]

Summary from SAFECOM submission:

While helicopter was enroute to a smoke report near Grantsville UT from the Pony Fire near Dugway Proving Grounds, a sound was heard in the cockpit. The pilot then saw a door light, pulled the aircraft nose left to shield airflow on the left side, and landed and shut down immediately at approximately 7500 feet on the east side of the Stansbury Mountain Range. Inspection revealed that the left sliding door was no longer attached to the aircraft. The left sliding door had been in the open and locked position, with the pilot door {left hand drive} removed. Some markings on the left cargo door were noted, as well as a small crack along the edge of the same left cargo door. The track the left sliding door slides on also had a small deformity near its aft termination. One cargo door latch was in the unlatched position. The tail, tail rotor, airframe, and main rotor were visually inspected by the pilot. No other damage was noted. The crew reported the incident to the local UAM and AFMO. The pilot elected to fly the aircraft to its base of operations nearby. The 4 helitack crewmembers walked off.

Findings

Sliding Aircraft Doors

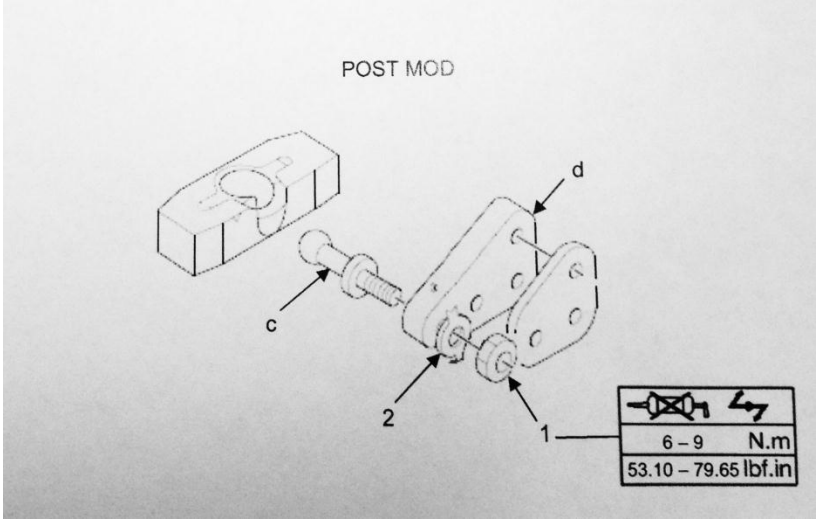
The aircraft doors were set in an approved configuration with the flight manual. When the cockpit door is removed for greater visibility during external load/water bucket ops, the rear door on the same side must be locked in the open position. The pilot reported that the helicopter airspeed was 90 KIAS at the point when they heard the loud noise in the aircraft. This is under the 100 knots maximum airspeed specified by the flight manual for that configuration.

The lower ball-joint bolt assembly that retains the aft sliding door appears to have little evidence of damage. Neither the track, the rail, nor the ball-joint retaining block appears to have been pulled by excessive force.

Figure 1 Ball-Joint Bolt in lower door slide remained in place after door fell off aircraft.

There are two Airworthiness Directives (AD 2013-23-9 and AD 2013-08-19) associated with this aircraft concerning the sliding doors. Logbook entries and witness interviews support the contractor's claim that they hadd complied with the requirements. The AD 2013-23-9 which addressed the lower ball-joint nut and washer was completed at the factory prior to aircraft delivery. The AD was released in 11/22/2013 and the contractor verified that the modification (Modification AL 4262) was completed on the aircraft (Figure 2).

Figure 2 Post Modification Ball-Joint Assembly specified by AD 2013-23-9



Labels:

1. Nut
2. Lock-washer

c = ball-joint bolt

d = ball-joint support attached to door

The door had been removed and then replaced in April 2014 for the “T” inspection. This is a 24 month/600 hour inspection. This inspection was completed and signed off by the contractor’s maintenance personnel on 04/17/2014 with 656.8 flight hours. The contractor’s shop policy is that the work is completed and reviewed by an IA. There is evidence that the contractor ordered parts against this inspection to replace the disposable nuts and lock-washers for both doors. The aircraft flew approximately 24.9 hours until it entered service on the “On Call” contract at aircraft hours 681.7 on the 06/08/2014. The aircraft was inspected by an OAS Safety Inspector on 06/09/2014 with approximately 694.2 flight hours.

When the door is installed, the door is supported by the upper and rear rollers and held in place by the lower ball-joint bolt assembly. If this one nut is removed, the door can be easily removed from the aircraft.

The condition of the threads and the surrounding components points to fact that the self-locking characteristics of the nut of the ball-joint bolt were lost. The nut backed off with aircraft vibration and allowed the door to become loose and become detached from the aircraft. The ball-joint bolt showed signs of rotational scoring (Figure 3) on the shaft of the bolt that came in contract with the door flange. Maintenance manuals specify proper torque requirements to prevent the ball joint from rotating and the potential for the nut to back off..

Figure 3 Ball-Joint Bolt showing rotational scoring

The modification specified in AD 2013-08-19 was in response to an incident where a sliding door became detached and was lost in flight. It added a tabbed lock washer and a different friction type locking nut to improve the protection against the nut unscrewing. Although the modification has a lock-washer and increased friction, the bolt is able to rotate if the nut loses its specified torque value (53.10 to 79.65 in-pounds). Even with the lock-washer in place, if the compression or torque value was lost, the bolt could work its way out with the tabbed lock-washer working as a nutplate. This modification doesn't connect the nut to the bolt like a castellated nut and cotter pin, but only prevents the nut from turning on the ball-joint support.

With this one bolt as the only fastener that keeps the door attached to the aircraft, increased vigilance is in order to make sure that on daily and period inspections that the ball-joint assembly is securely attached.

The Helicopter manager, who was in the helicopter at the time of the incident, stated that the left cabin sliding door was secure in its open and locked position. Locking the door back provides additional support for the sliding door. The rear locking assembly appears to have been deformed indicating sideward force on the locking mechanism as the door was pulled left and it departed the aircraft with the failure of the ball-joint bolt.

Figure 4 Left Sliding Door Lock Assembly showing deformation

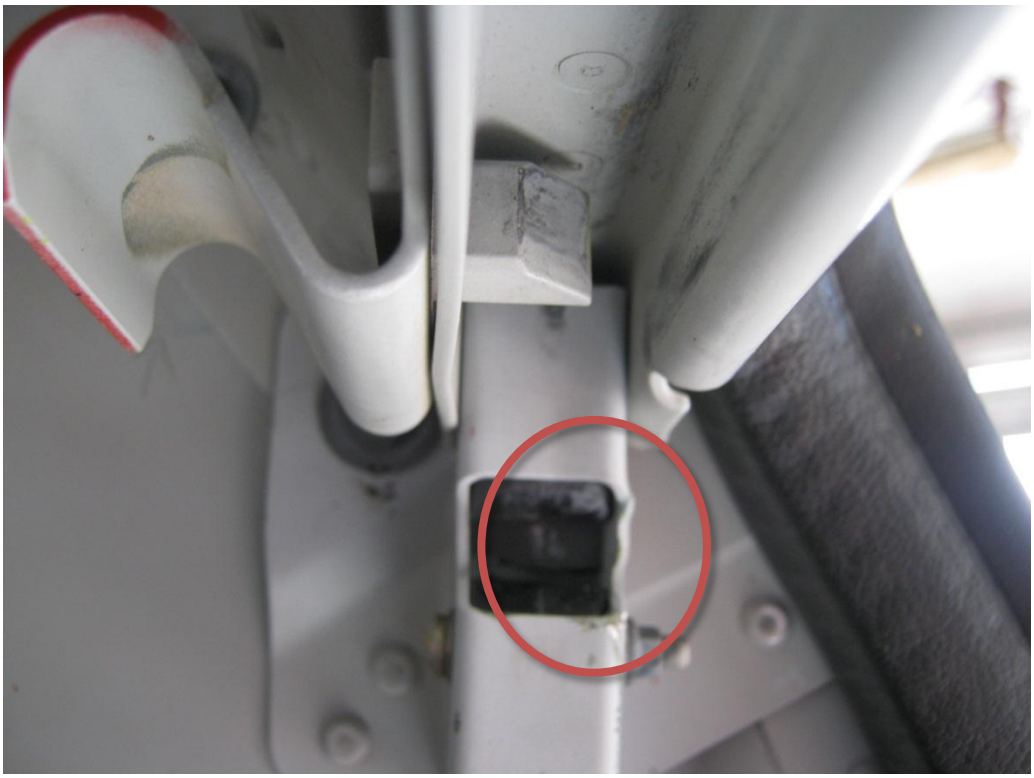
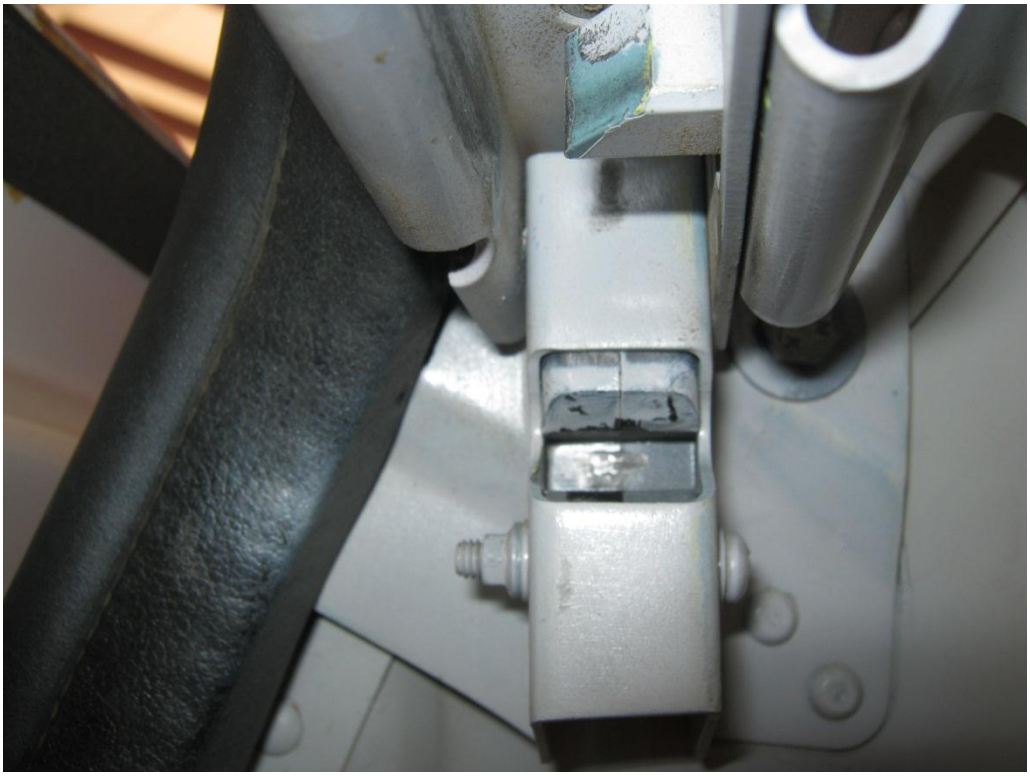


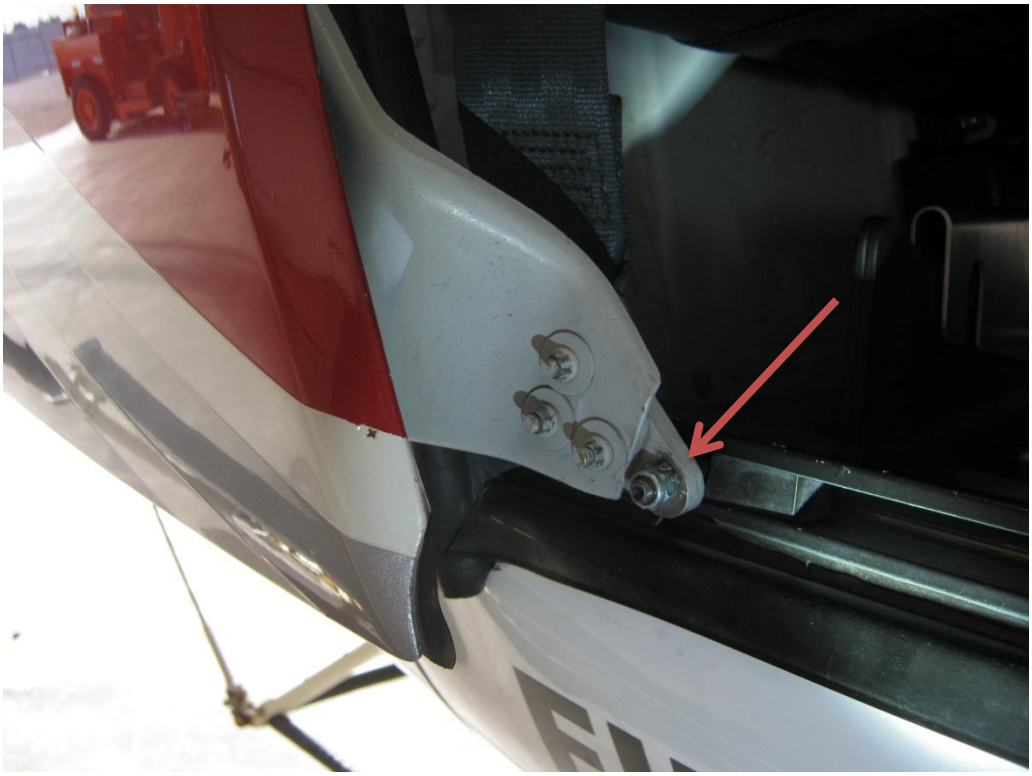
Figure 5 Right Sliding Door Lock Assembly with no deformation.



Conclusion

The primary security for the sliding door assembly on this model of helicopter rests on one fastener. Reviewing the bolt and the overall door assemblies on this helicopter, the evidence points to the failure of ball-joint bolt and nut. This fastener should receive increased focus on daily and periodic inspections to ensure that the door stays securely attached to the aircraft. It is readily visible every time the door is open and should be inspected often.

Figure 6 Ball-Joint Bolt and Nut are clearly visible when door is open



Recommendation

OAS Safety to issue Lessons Learned bulletin emphasizing the importance of proper installation of the ball-joint bolt, lock-washer, and nut; increased focus for daily and periodic inspections; ensuring the all crewmembers use CRM to ensure doors are secured in position; and to remind pilots to review airspeed limitations for open door configurations.

August 1st, 2015

PACIFIC SOUTHWEST REGION

Rapid Lessons Sharing

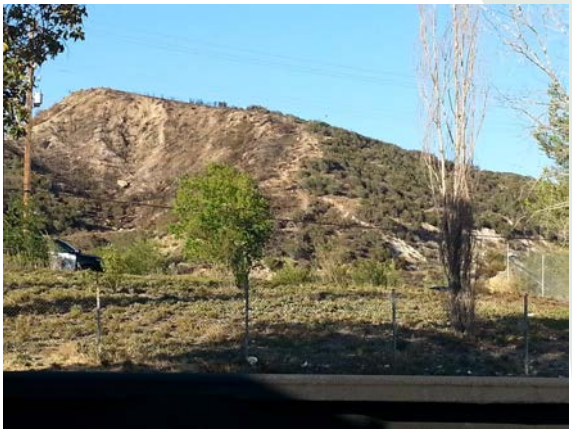
Firefighters Hit By Retardent

On August 1st 2015 during Initial Attack operations on the Scale Fire located on the San Bernardino National Forest Two engine crew members were directly hit by a retardant drop from an Airtanker. Both crew members received minor injuries as a result of the incident. The firefighter's injuries were evaluated in the field; one crew member was transported by ground to a regional medical center for further evaluation and released that day.

On August 1st 2015 the forest helicopter was flying a recon mission looking for lighting fires when they detected a ¼ acre fire off the Northbound Highway 15 at the same location of a vehicle accident was initially reported as a Multi Casualty Incident (MCI). The dispatch center started a 1st alarm response to the Scales Fire. The engine arrived around 13:10 and were instructed by the Incident Commander to take action on a new spot fire north of the main fire along a frontage road just off the highway. The fire was burning in grass and brush, when the engine crew engaged the spot fire that later became Division Z. The Assistant Fire Engine Operator (AFEO) and another firefighter started working on the heel of the fire to establish an anchor point. By the time the crew secured the anchor point the fire had grown to approximately 1/8 of an acre and was running up a small bowl. After the crew secured the anchor point they went to work on the right flank establishing a simple hose lay. They progressed about half way up the right flank when the AFEO heard radio traffic over Air to Ground that retardant drops would be coming in soon. After hearing this, the AFEO started scanning the sky for aircraft. The AFEO and one other firefighter continued working the hose lay while the other firefighter returned to the engine for another hose pack.

" Whenever you hear that drops are coming in you start looking for aircraft" AFEO

The first drop came in across the head of the fire running north to south. Division Z came over Tac 1 and advised the AFEO that drops would be coming in and apologized that he didn't get that info to him before the 1st drop. The AFEO assured Div Z that he understood and he heard the traffic on Air to Ground prior to the drop. After the initial drop the AFEO and firefighter extend the hose lay another 100 feet and stopped. They wouldn't be able to turn the corner until the fire finished burning out the bowl. As they waited they continued working to improve the existing control line.



The AFEO saw the airtanker approaching from the south east and making a turn to the West towards the head of the fire. He notified the firefighter that was with him of the incoming drops, they stopped improving the line and dropped their hose. They proceeded to clear the line moving into the black and down the line. They reached a point that they perceived to be a reasonable safe distance from the intended line. The aircraft finished its turn, leveled off for his approach. After 2-3 minor stick corrections the plane was headed directly at the crew. At no time did the AFEO lose sight of the aircraft until the drop was released.

"I saw the tanker approach from the south east and made a turn towards the head of the fire heading to the west. I advised my crewmember that a drop was coming in, we put down the hose lay and moved down the line and into the black to make way for the drop." ~ **AFEO**

The AFEO quickly recognized that there would not be enough time to escape further down the line and due to the terrain they could not move any further into the black. The AFEO directed his crewmember get down. The firefighters hit the deck head facing the drop. AFEO was about ¾ away from the ground when the drop hit him. Because of their location in the black both firefighters received minor burns. The AFEO received burns on the right knee, elbow and hip. The other firefighter was burned on the lower right leg as well. Once the drop had passed the AFEO checked on his fellow firefighter and notified the Air Attack of the incident. The two firefighters concluded that their injuries were minor and they'd be able to complete the hose lay before returning to the engine for further evaluation. After being examined by a medically trained firefighter the AFEO was transported to a regional medical center for further evaluation and was released later that day.

"Once the bay doors open and I saw the massive payload headed right for our location I gave the command to get down." AFEO

There is video of the airtanker drop, which identified that the drop was delivered at the appropriate drop altitude and that ground forces had been advised of the incoming airtanker drop.

Lessons Learned

All of the conditions present show sound decision making and judgment. The firefighters involved did what they where trained to do. The operational environment of initial attack, aircraft working direct with ground support is generally fast paced. The operational tempo this day was considered "normal" by all involved responders. The make up of the crew was very experienced and have worked together for sometime.

The firefighters cleared the area with intent, anticipating a direct drop. The fire was burning in grass and brush with no overhead hazards. They cleared the line and moved into the black for visibility: to be able to maintain a visual on the aircraft and as a means to be more clearly seen.

The AFEO was mindful in quickly recognizing any further escape was not assured due to the terrain. Moreover the concern for their safety and potential for injury would be higher if they got hit on the run. The firefighters utilized the emergency protocols outlined in the Incident Response Pocket Guide, Aerial Retardant Safety page 56.

When asked what insight would you offer from your experience the response was ***"Expect the unexpected!***" So how do we do that? When you really think about it, it falls into two arenas increasing our margins for error and validating our assumptions.

- A commonly used tool for planning is the PACE model. PACE stands for Primary, Alternate, Contingency, and Emergency. Going through the PACE model is a means to prompt decision makers to consider alternative courses of action that might not have otherwise.

- The validation of assumptions is part of a continuous self assessment and is supported by the 5 communication responsibilities referenced in the IRPG page ix: Brief others, Debrief you're actions, Communicate hazards, Acknowledge the message, and Ask if you don't know.

For more information follow the links bellow to review lessons from the 2015 RT-130

2015 WFSTAR , Margins: http://youtu.be/p-L9GlQd7yg

2015 WFSTAR, Tools for Communication: http://youtu.be/6MHeNCmAKdY

Interagency Aviation
Accident Prevention Bulletin

No. IA APB 15-01 **Date: January 6, 2015**

Subject: A Pilot's Guide to In-Flight Icing Online Course

Area of Concern: Flight Operations

Distribution: All Aviation Activities

Discussion: NASA's online **Pilot Guide to In-Flight Icing,** (http://www.cfmediaview.com/lp1.aspx?v=8_87739320_3228_17), offers information on the science behind ice creation, how it effects handling and performance related to flight operations and a host of exit strategies. The course is broken down into a number of categories that revolve around understanding the basics of ice formation, its impact on aircraft aerodynamics, and how best to consider icing hazards from weather briefings.

The course provides an in-depth look at specific examples of icing cues. In addition to a number of videos shot inflight and interviews with pilots discussing their icing encounters, the course offers quizzes to help pilots think through the process of what happens next. The course ends with a close-up look at the differences in aircraft handling characteristics related to ice induced wing stall versus ice induced tail stall. The guide also offers an extensive resource section including websites, databases, and other readings related to icing. The course provides a tremendous amount of information and it may not be possible to absorb it all in one session.

Who should take this course?
All pilots and aircrew exposed to potential in-flight icing.

What is covered in this course?
The course includes tools to deal with in-flight icing with an emphasis on avoidance, detection and exit. The effects of ice accretion on performance and handling, in addition to the particular icing hazard related to Super-cooled Large Droplets (SLD), is also covered.

How long will it take?
This course is fairly comprehensive. The entire course from beginning to end, including exploring the accident links, pilot testimonials and other related information takes roughly 4-6 hours.

For additional information on carburetor icing see DOI Safety Alert 11-01 *The Ice Man Cometh.*
http://oas.doi.gov/safety/library/alerts/FY2011/DOISA1101.pdf

/s/ Keith C. Raley

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Chief, Aviation Safety
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/s/ Gary Sterling

Gary Sterling
Branch Chief, Aviation Safety
Management Systems

Interagency Aviation Accident Prevention Bulletin

No. IAAPB 15-02 **Date: June 10, 2015** **Page 1 of 1**

Subject: Identification of Helicopter Landing Sites for Medical Transport/Evacuation
Area of Concern: Operations/Plans
Distribution: All Wildland Fire Aviation Activities

Discussion: The Dutch Creek incident serves as a reminder of our need to be proactive and plan for medical transport/evacuation of injured personnel. The Dutch Creek incident in 2008 provides several lessons why it's important to plan in advance. The Dutch Creek Serious Accident Investigation Report Response provides instructions on completing ICS 206 Block 8, Emergency Medical Procedures. Incident Management Teams (IMTs) need to include the following when planning for emergency medical procedures:

- Include timeframes (ETEs and ETAs) from and to specific locations
- Include GPS coordinates for key locations such as spike camps, drop points, **helispots,** etc.
- Identify specific concerns by location (division, group, geographic area or location)

Many IMTs have identified potential medical transport/evacuation sites on incident maps as "medevac sites." This nomenclature has caused confusion among aviation personnel as it is not standard terminology for helicopter landing sites. The Interagency Helicopter Operations Guide (IHOG) refers to four types of landing areas: Permanent Helibases, Temporary Helibases, Helispots, and Unimproved Landing Areas. Landing areas identified for repeated use should be improved to meet helispot standards outlined in the IHOG. When a medical transport/evacuation site is identified, it must be noted as an "unimproved landing site" on incident maps until it has been improved to IHOG standards. Improvements should be made as soon as possible, before it would be required for an emergency.

The IHOG working unit is planning to review and if necessary, modify Chapter 8 (landing areas) specifically, naming protocols. Using IHOG terminology will reduce confusion and improve operational effectiveness especially during times when needed most!

/s/ Keith Raley
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/s/ Gary Sterling
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USDA Forest Service

OAS-43A
(12/12)

Interagency Aviation Accident Prevention Bulletin

No. IAAPB 16-01 **Date: January 22, 2016**

Subject: Runway Incursions

Area of Concern: Airport Operations

Distribution: All Aviation Activities

Discussion: Last August an Aero Commander, contracted to provide aerial supervision for fire suppression operations, was on takeoff roll when a construction truck crossed the active runway near the departure end.

Fortunately there was enough runway available that a collision did not occur. However, the pilot's response to the situation resulted in substantial damage to the underside of the fuselage. The runway incursion was the major link in the mishap chain that resulted in the event being classified an accident by the NTSB (SAFECOM 15-0675).

What is a Runway Incursion?

The international standard, as defined by the International Civil Aviation Organization (ICAO) and adopted by the FAA in 2008, states that a runway incursion is any unauthorized presence on a runway, regardless of whether or not an aircraft, vehicle or pedestrian presents a potential conflict to an aircraft authorized to land, take off, or taxi on a runway.

The airport where this accident occurred was a non-towered airport, meaning that there wasn't an air traffic control (ATC) tower in operation to control aircraft and vehicle movement within the airport movement area. Traffic advisories and hazard awareness was via radio communication.

In FY15 there were 1,462 runway incursions reported to the FAA, below are the top 3 sub-categories.

Operational incidents: 325

Action of an Air Traffic Controller that results in: Less than required minimum separation between 2 or more aircraft, or between an aircraft and obstacles, (vehicles, equipment, personnel on runways) or Clearing an aircraft to take off or land on a closed runway.

Pilot Deviations: 883

Action of a pilot that violates any Federal Aviation Regulation Example: a pilot crosses a runway without a clearance while enroute to an airport gate.

Vehicle/Pedestrian Deviations: 245

Pedestrians or vehicles entering any portion of the airport movement areas (runways/taxiways) without authorization from air traffic control.

Recommendations:

1. Check applicable NOTAMs (Notice to Airmen) for your destination to see if airport construction is in progress.

2. If you are operating at an airport with construction in progress, make sure you receive daily briefings from the airport manager on the status of the construction and any impact to flight operations that may result.

3. Unit Aviation Officers with active Air Traffic Control (ATC) facilities should participate in local Runway Safety Action Team (RSAT) meetings.

4. Unit Aviation Officers should ensure construction activities and information on airport hot spots are included in unit orientation briefings to Incident Management Teams and updated throughout the assignment.

5. Use the SAFECOM system to report runway hazards and incursions. www.safecom.gov

Below is a link to the FAA Runway Safety Resorce website which has several resourses for runway safety, hot spots and statistics: http://www.faa.gov/airports/runway_safety/resources/

/s/ John Mills (Acting)
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Interagency Aviation
Lessons Learned

No. IA LL 15-01 **February 17, 2015**

Subject: Helicopter Load Management

Area of Concern: Helicopter Operations

Distribution: All Aviation Activities

Discussion Last summer, a contracted helicopter was destroyed when the pilot lost control of the aircraft while conducting external load operations in support of wildland fire operations. Fortunately, neither the pilot nor the firefighters who were in close proximity of the aircraft were injured. The investigation revealed the accident involved several links in that famous chain and lined up all the holes in the Swiss cheese model that contributed to the accident. In other words, it took a village.

Lessons Learned: Latent conditions that directly contributed to the accident were present in many places beyond the cockpit. Specifically, there were inaccurate passenger/cargo manifesting procedures and calculations in addition to a lack of understanding of how those calculations are applied. We continue to see improvements in the utilization of the Interagency Load Calculations card (OAS 67/FS 5700-17 07/13). Unfortunately, there are many opportunities for improving the quality of the data, the process of communicating/confirming the weights, and most important, understanding how those numbers apply to helicopter performance in relation to the type of landing zone (IGE, OGE) on every flight.

What happened? Starting off, the load manifest was incorrect resulting in a heavier load than what was on the form as well as what was communicated to the pilot over the radio. The Helicopter Crewmember (HECM) in charge of manifesting loads recorded the individual items in a separate notebook then entered the combined weight as one entry on the cargo manifest. Instead of using a scale as required by the IHOG (one was present), he used the average weight of personal gear (bags) and multiplied it by the number of bags. He also used the "Cubee/water (5 gal)" weight from the incident pocket guide which was listed at 40 lbs. but when weighed by the investigation team, they weighed 45 lbs. NWGC Memorandum No. 14-020 has revised this estimated weight. Result: the pilot picked up a load that was 172 lbs. more than what was communicated by the HECM and much more than the 852 lbs. allowable as HOGE jettisonable payload determined by the load calculation form. The load actually weighed 942 lbs. The helicopter was equipped with a load cell that indicated the weight of the load, but the pilot didn't note the difference from what was communicated. The added weight placed the helicopter closer to its performance limit.

Other factors: During the preceding load delivery, the firefighters requested that the next/last (mishap) load be delivered below the landing zone for matters of convenience. The original/designated landing

zone was on top of the ridge at an elevation of approximately 9000 feet. The requested landing zone moved the landing area below the ridge where winds were likely to travel downslope. Operating a helicopter with a long line places the helicopter in the environment that is conducive to Loss of Tail Rotor Effectiveness (LTE) due to increased weight and the requirement to HOGE. The pilot was likely experiencing turbulent wind conditions due to the rising terrain in this area. The unstable air mass and surface heating caused moderate winds (10-20 knots) that were measured at the surface. These winds were flowing up over and around the hilltop near the landing area creating updrafts on the windward side of the ridge and downdrafts and turbulence on the leeward side. A demarcation line, or the point that separates the up flow air from the turbulent down flow air, forms at the mountains highest point and extends diagonally upward. The velocity of the wind and slope gradient determines the demarcation line. The higher the wind speed and the steeper the terrain, the steeper the demarcation line angle is and the closer it forms near the crest. This would likely create the turbulent wind conditions near the location that the mishap aircraft would be hovering out of ground effect (HOGE). It's highly conceivable that the down flowing air reduced performance thus increasing the power required which in conjunction with directional winds, contributed to the onset of LTE. As the aircraft slowed to a hover to deliver the sling load, it began to rotate to the left. The pilot attempted to maintain control and to jettison the load, but was unable. The aircraft rotated several times, lost altitude, and impacted the ground.

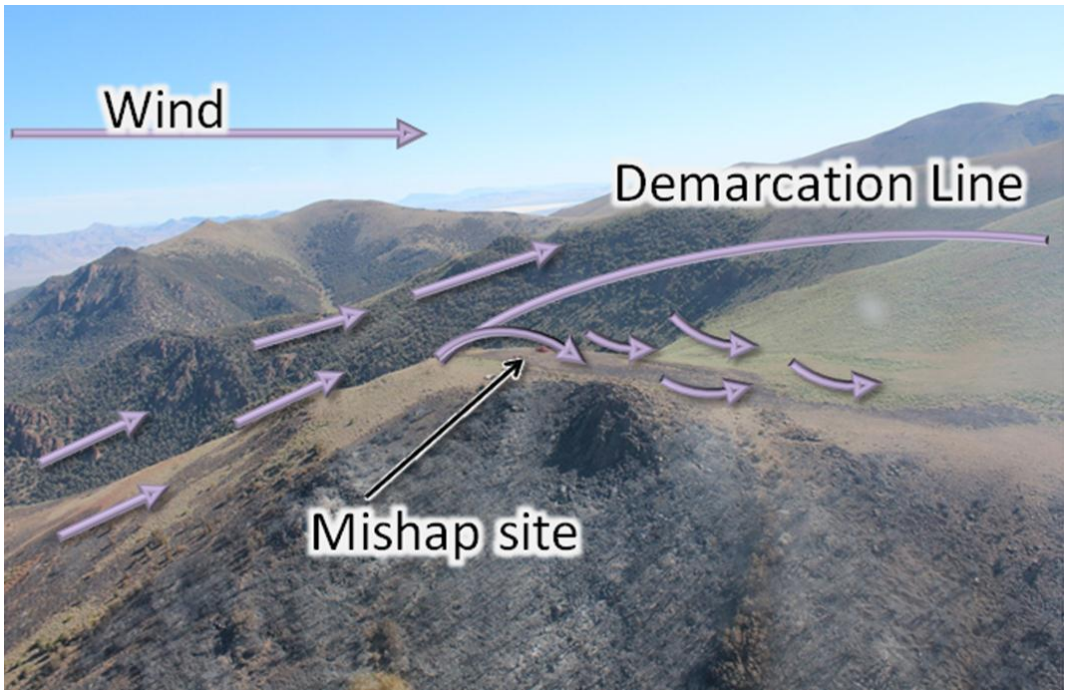


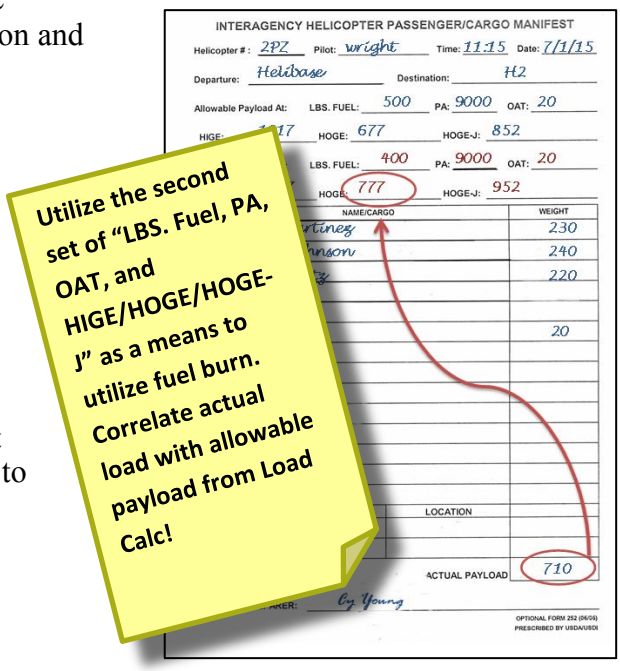
Figure 1 Wind flow over mountainous terrain contributed to increased performance requirements and the onset of LTE.

The goal in recovery is to gain airspeed without increasing power. Decreasing collective (reducing power) also decreases the power required for antitorque. The problem is that these recovery actions will also result in a substantial loss of altitude which may not be an option when operating in close proximity to the ground. Prudent pilot planning should include a clear escape route in these types of conditions/operations. Although it is not included in the AS350 B3e Rotorcraft Flight Manual, jettisoning the load will reduce weight and subsequently reduce the power required. This action should have been accomplished simultaneously along with the other procedures.

Repeat Offender. As part of the investigation, all of the helicopter load calculation and manifest forms for that fire were reviewed. The review uncovered many, similar errors as the mishap aircraft for

all the helicopters supporting of that fire. Many planned loads were greater than allowable payload weights for conditions, locations, and landing areas (IGE, HOGE, or OGE).

Errors of Omission. Most of the errors were simple omissions of required information. There are required items specified by the IHOG such as allowable payload weights for HIGE, HOGE, and HOGE-J. Without the performance data on the manifest, the individual creating the load is unable to correlate payload weight to the actual aircraft performance requirement/capability as determined by the load calculation and type of operation.



Utilize the second set of "LBS. Fuel, PA, OAT, and HIGE/HOGE/HOGE-J" as a means to utilize fuel burn. Correlate actual load with allowable payload from Load Calc!

Interviews also revealed that some were increasing the available payload by compensating for fuel usage. The only problem was that their figures weren't being recorded on load calculations or passenger/cargo manifests as directed by the IHOG (Feb 13 – Chapter 7, III.B.2, page 7-3).

Your full name here. Another area of concern was that many of the passenger/cargo manifests listed only last names. The passenger manifest may be the only document that can indicate who was actually on an aircraft and used to account for individuals in the event of a mishap involving passengers. The IHOG requires that manifests contain full names.

"Standard" Deviation. Individuals often deviate from established standards in order to become more efficient. It appears a lack of perceived negative consequences resulted in a gradual acceptance of these deviations from many. This is called "normalization of deviance." Individuals across the organization were found to be deviating from a known standard to which it became acceptable. Many times, when people omit steps or requirements, they are rewarded; time is saved, fewer tools are needed, fewer people are needed to do the job, etc. However, in this mishap, failing to adhere to standards set the stage for providing a load that was heavier than anyone expected and was one of the first links in the mishap chain. Complacency that often manifests during numerous routine tasks compounds this problem.

Bottom Line. The IHOG and other standards were designed to mitigate the risk of overloading a helicopter. Skipping steps and omitting information on the forms effectively removes safety measures required by those policies. Helicopter Managers and authorized individuals are responsible to complete a manifest for each flight leg flown. Creating accurate passenger/cargo manifests and correlating the actual load weight with the allowable payload weights is a safety measure that must be performed to ensure we are not placing the helicopter in an overloaded condition for the type of operation and landing area. Loads heavier than planned can be identified by either aircraft performance indications (i.e. torque, etc.) or load cell (if installed). Pilots have a responsibility to manage risk and that also means to ensure the quality of the data brought before them is consistent with requirements and expectations. Unfortunately, placing all of that responsibility squarely on the pilot will most often result in failure. In other words, it takes a village.

/s/ Keith Raley
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/s/ Gary Sterling
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Interagency Aviation
Lessons Learned

No. IA LL 15-02 **May 14, 2015**

Subject: Fire Whirls

Area of Concern: Wildland Aerial Firefighting Operations

Distribution: All Aviation Activities

Discussion: Just prior to dropping water on a spot fire, the helicopter pilot noticed an eight foot tall fire whirl on the edge of the fireline. A fire whirl, also known as a fire devil or fire tornado is where fire and wind simulataneously rotate vertically. Fire whirls may occur when intense rising heat and turbulent wind conditions combine to form whirling eddies of air. These eddies can tighten into a tornado-like structure that sucks in burning debris and combustible gases.

While climbing away from the drop, the pilot felt the aircraft's climb rate rapidly increase without any control input. In response, he lowered the collective (reduced power) in an attempt to arrest the climb, but the aircraft kept climbing. The pilot then heard a loud "bang" and felt "tightness" in the controls. Once the aircraft was stabilized, the pilot looked down to check on the bucket but was unable to see it. When he looked towards the back of the aircraft, he noticed the Bambi bucket draped over the tail boom with the 100 foot cable still attached and just a few feet away from the tail rotor.

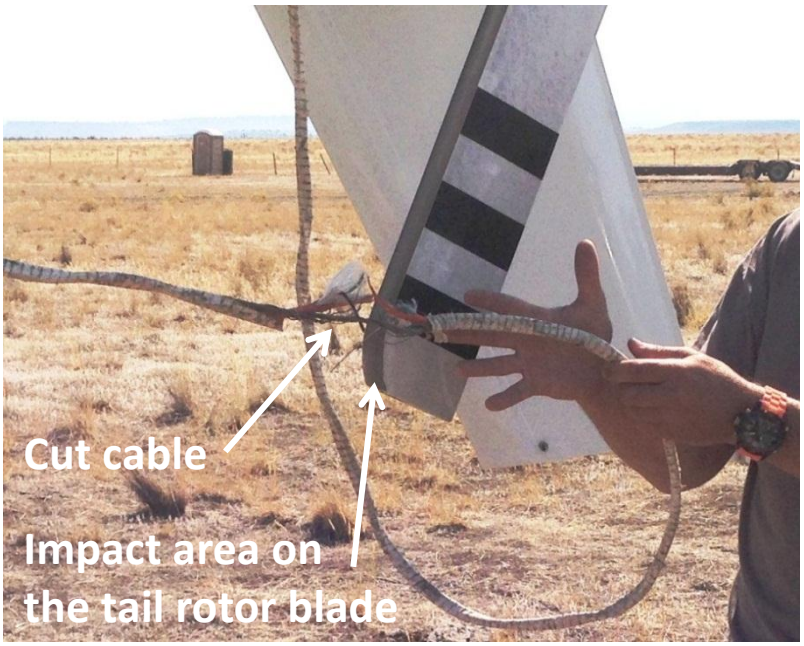
During the short period of time between the large power reduction and level off, the bucket continued its ascent along with the cable. The bucket and cable wrapped around the tail boom, missing the main rotor blades and impacting the tip of just one tail rotor blade!

Fire whirls usually move slowly. They can set objects in their paths ablaze and can hurl burning debris great distances. The winds alone generated by a fire whirl can also be dangerous. Large fire whirls can create wind speeds on the surface of more than 100 mph - strong enough to knock down trees. In one study, a fire whirl updraft was measured at 204 mph using video analysis!

While there are no defined procedures for what to do in the event of encountering a fire whirl, other very experienced helicopter pilots opined that the best procedure is to "hold what you have." In other words, avoid large control inputs (power or otherwise) and maintain forward speed in order to fly out of the pronounced updraft as soon as possible.

The Aviation Safety Department at Bell Helicopter said "There have been cases where the line/cable has come in contact with the tail rotor, when there is an empty bucket or line without anything on the end. However this is the first time we have heard of the line becoming completely wrapped around the tail boom."

Many buckets are now attached using a synthetic long line instead of a cable making the line approximately 60 pounds lighter.



Fire whirls are very dangerous but visually recongizeable. Miracles like this won't happen every time - so keep alert, maintain a safe distance and advise other air and ground resources if you see one!

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OAS-35A
(12/12)

Interagency Aviation Lessons Learned

Subject: Engine Magnetic Chip Caution Lights
Area of Concern: Helicopter Operations
Distribution: All Aviation Users

Discussion: On November 11, 2013, a contractor owned Bell 407 helicopter operating under an Exclusive Use Contract, departed an oil platform enroute to the home airport with a pilot and a bureau employee on board (SAFECOM 14-0030).

Approximately 5 minutes after takeoff, the engine chip Light illuminated and the pilot diverted to a nearby airport and performed a precautionary landing. The pilot called his company mechanic who coordinated for the services of a local Airframe and Powerplant (A&P) mechanic. The chip detector was removed and metallic fuzz and two metal slivers were discovered. The detector was cleaned, replaced, and the pilot performed a 15-minute ground run as instructed by the company mechanic.

During the first ground run, the engine chip light illuminated for a second time. The chip detector was inspected again revealing more metallic fuzz and small metallic debris. The chip detector was cleaned and replaced followed by second 15-minute ground run. During the second ground run, the engine chip light illuminated again for the third time. The mechanic and pilot repeated the same sequence of cleaning the chip detector and conducted a third 15-minute ground run. The mechanics assumed the detector had not been adequately cleaned from the previous events and even suggested using electrical contact cleaner.

The third ground run was completed without the chip detector light illuminating and the pilot and bureau employee departed for their return flight to home base.

What is a chip light?
Turbine engines have a system designed to notify the pilot of metallic particles or "chips" in the engine oil system possibly indicating an impending engine bearing or gear failure. Magnetic chip detectors on the engine gearbox attract the metallic particles within the oil system. The system will illuminate the engine chip annunciator light when metallic particles bridge the gap of the chip detectors.

Approximately 5 minutes into the flight, the engine chip light illuminated for the fourth time and the pilot immediately returned to the same airport. During the approach, the engine began losing engine oil pressure approximately ½ mile from the intended landing area. The pilot maintained a higher than normal approach airspeed in order to expedite the landing and to ensure adequate airspeed for an autorotation (if necessary). The pilot landed safely, but the engine was significantly damaged (seized).

Follow the emergency procedure. The Bell 407 Rotorcraft Flight Manual lists the emergency procedure for an engine chip light as "Land as soon as possible," which is defined as "land without delay at nearest suitable area (i.e. open field) at which a safe approach and the landing is seasonably assured."

These words imply that it's a time critical task to get the aircraft safely on the ground as soon as possible. A pilot can never know for certain as to the type of failure that causes the engine chip light indication to illuminate. The light indicates that there is a potentially unsafe condition that requires a landing sooner rather than later.

Chip lights are one of the most commonly reported events in the SAFECOM system. Most are benign which can contribute to the perception that they're "nuisance" lights. Most impending bearing/engine failures are preceded by metal wear that is discovered through routine maintenance or by the magnetic chip detector system prior to an engine failure. Although rapid failures may be uncommon, the pilot must assume that it will thus requiring an appropriate reaction to any chip light.

Follow the maintenance manual. Operations and maintenance procedures were not followed. After the first chip light event, the manufacturer's instructions for this helicopter (engine) requires that the chip detector be cleaned and replaced followed by a **30-minute (not 15-minute)** ground run. If the chip annunciator light illuminates again during the initial 30-minute ground run, it then requires the mechanic to **drain the oil (not done)**, **clean or replace the filters (not done)**, and perform a second **30-minute** ground run. **If the chip light illuminates during the second 30-minute run, the maintenance manual then requires the engine to be removed from service**.

Many pilots and mechanics possess experience on a variety of aircraft that contain unique maintenance procedures. This type of "corporate knowledge" can create confusion especially when procedures are derived from memory rather than the official/approved maintenance manual. Some operators train their pilots on these procedures so that they can address these malfunctions in remote areas without maintenance personnel, but the requirements are the same for both pilots and mechanics: **They must be trained and follow the maintenance procedures established within the approved manufacturer's maintenance manual.**

The bias created by the maintenance personnel resulted from an (incorrect) interpretation was that it was an indication problem which led them to believe that they weren't adequately cleaning the detector. Unfortunately, the indication system was performing exactly how it was designed to perform. This bias overcame their ability to properly diagnose the situation based on the data the indication system provided, despite the unusual number of occurrences within the period of time.

This type of bias is also known as "Plan Continuation Error" (or sometimes "Get-home-it is") and can be defined as those decisions in which a person continues with an initial plan of action, despite evidence suggesting that an alternative form of action would now be preferable. Ultimately, this "bias/error" led them all to believe that the aircraft was airworthy when it was not.

This aviation service provider has re-trained its maintenance personnel on the proper procedures for clearing engine chip detector lights and has reminded field personnel that an aircraft must be cleared by maintenance management in order to be considered airworthy following a precautionary landing (or in this case a chip light).

Chip detectors are a proven and effective means of providing crews with an early warning of an impending system or engine failure, but they are only valuable if properly interpreted and appropriate actions taken.

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OAS-35A
(12/12)

Interagency Aviation
Lessons Learned

No. IA LL 15-04 **September 1, 2015**

Subject: Helicopter Dip Site Operations

Area of Concern: Flight Safety

Distribution: All Aviation Activities

Discussion: Earlier this year, a helicopter crew was practicing dipping from a water tank on a private ranch. When they arrived at the tank, the pilot noticed that the water was flowing in from a pipe on the eastern side of the top of the tank, which protruded out one foot (horizontally) into the tank. The pilot hovered over the tank and dipped the bucket into the tank until it was almost completely submerged while attempting to keep the bucket away from the protruding pipe. When the bucket was filled, the pilot attempted to take off vertically but noted that it was taking an excessive amount of power to climb away. This was verified by the co-pilot, who was also monitoring the power. The pilot attempted to open the bucket release in order to discharge the water from the bucket, but the bottom of the bucket remained submerged. After multiple attempts to raise and lower the bucket, it finally broke free. After moving away from the water tank, the crew noticed that the bucket was torn and as a result, terminated the training and returned to the helibase to inspect the helicopter and bucket.

A more proactive mitigation would have been to inspect the site prior to the training mission which would have afforded a better risk assessment/hazard identification. The crew made the decision to continue based on an impulsive decision after arriving at the site. The pilot observed the pipe going into the tank and tried to mitigate the risk by attempting to stay clear of it. After the incident, the pipe was replaced with a flush mount filler. A better strategy would have been to replace the pipe before the training mission.

Always take time to study and understand all of the characteristics in your particular mission. Be sure that your risk tolerance matches the urgency/reward that management's provided. The tolerance/threshold for a training mission should be fairly low. Fortunately this incident resulted in nothing more than a torn Bambi bucket. It could have resulted in an accident.

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OAS-35A
(12/12)

Interagency Aviation Lessons Learned

Subject: King Air 200 Fuel System Management

Area of Concern: Fixed-Wing Flight Operations

Distribution: Aviation Operations

Discussion: A King Air 200 lost power on one of its engines during an air attack mission. The pilot had positioned the aircraft over the fire in a right hand orbit at 5,000 MSL in order to give the ATGS a better view of the fire's right flank. The pilot was operating the aircraft at 130 knots with about a 20-30 degree right bank and about 1/2 a ball out of trim or slightly more left rudder to increase visibility. The King Air has a low wing configuration and the engine's location can sometimes obstruct ground visibility. About 2.5 hours into the air attack mission, the crew felt a noticeable loss of thrust and confirmed the right engine was inoperative. The pilot maintained aircraft control and turned the aircraft toward the airport. The inoperative engine was restarted and the aircraft landed with two operating engines.

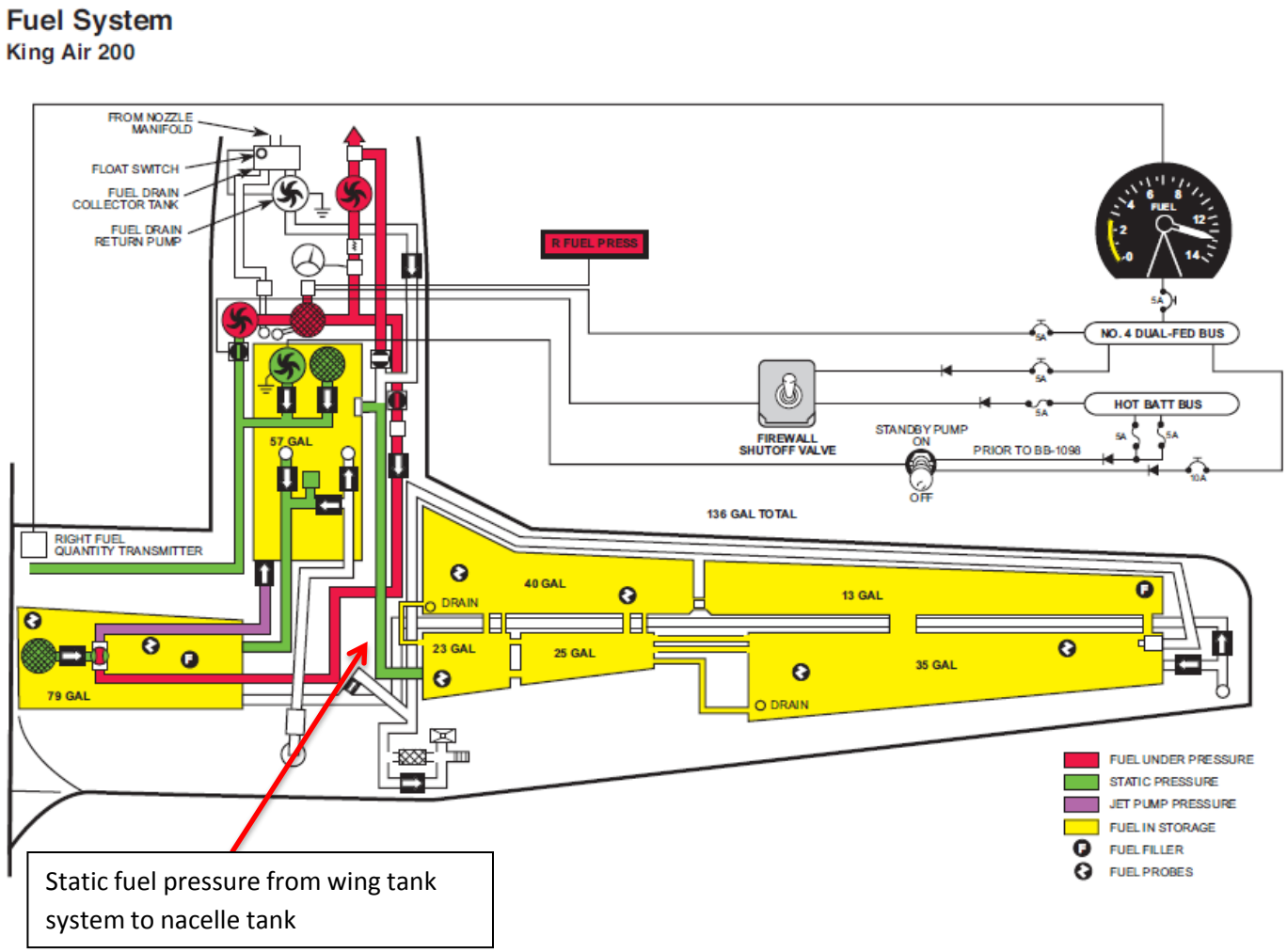
Each wing contains an auxiliary fuel tank (aux tank) and fuel is transferred from the aux tank, by a pump, to the nacelle tank; which directly supplies the engine. When the aux tank is empty, the nacelle is supplied with fuel from the wing tanks. There is no wing tank pump, so fuel is transferred by gravity. The nacelle tank carries 57 gallons and under normal consumption rates (38 – 46 gallons per hour), can be depleted in less than one hour if not replenished from the main wing tanks. Flying the aircraft in steeper bank angles when close to the observation area and using rudder pressure to skew the wing to improve visibility may inhibit adequate fuel transfer by gravity to the nacelle tank.

A maintenance check was preformed on the fuel system using "Trouble Shooting Flame Out" section in the Maintenance Manual Ch. 72; with no discrepancies discovered. It was determined that prolonged uncoordinated flight with the aircraft banked in a right hand orbit resulted in inadequate fuel transfer from the right wing tank to the right engine fuel nacelle tank that ultimately resulted in fuel starvation. SAFECOM 15-0369

Recommendations for limiting the risk of fuel starvation include:

- Uncoordinated flight should be entered into prudently and with a complete knowledge of the potential consequences.
- Limit the time of uninterrupted steep turns to reduce the probability of experiencing a fuel quantity condition that would prevent fuel from feeding into the nacelle tank. This can be done in many ways including rolling out to a wings level attitude or reversing the direction of the turn for a period of time to allow for fuel to refill the nacelle tank.
- Orbiting further from the fire area (less bank angle required and better visibility)

Flight crews are reminded to review and maintain familiarity of the fuel system and continue to perform daily system checks.



Static fuel pressure from wing tank system to nacelle tank

/s/ Keith Raley
Chief, Aviation Safety, Training
& Program Evaluations
DOI, Office of Aviation Services

/s/ Gary Sterling
Branch Chief, Aviation
Safety Management Systems
USDA Forest Service

OAS-25A
(12/12)

Interagency Aviation
SAFETY ALERT

Subject: UAS Intrusions Impacting Incident Air Operations
Area of Concern: Aviation Safety
Distribution: All Aviation Operations

Discussion: Last year, Interagency Safety Alert 14-03 highlighted emerging UAS hazards that pose significant potential to interfere with our mission. Commercial and recreational UAS operations have increased dramatically and this trend is expected to continue. This year, unauthorized UAS intrusions have already adversely affected incident flight operations. The increasing emergence of these threats makes it imperative that incident personnel anticipate these encounters and establish procedures to manage UAS intrusions.

FAA Temporary Flight Restrictions (TFRs) prohibit non-participating aircraft from entering a TFR. Unlike incident aircraft pilots, most civil UAS operators are completely unaware of the requirements for operating within or near an incident. Incident personnel should expect and plan for these types of encounters by establishing a process to manage them. Established procedures provide the greatest capability to expeditiously mitigate this threat as much as possible.

Here are a few tips to get you started:

- **Educate the public in the affected area**:
  - Forest/Unit Aviation Officers and/or Public Information Officers (PIOs) should reach out to local hobby stores/groups and the media to request their assistance in providing information on these types of issues and how the public can help.
- **Identify** the intrusion.
- **Communicate** the intrusion to aerial supervision, incoming/on-scene aircraft, ground personnel and dispatch. Be sure to follow-up with documenting it via https://www.safecom.gov.
- **Assess** the potential for a mid-air collision and the impact of the intrusion to incident operations.

- **Mitigate** the risk- consider the following:
  - Suspend air operations if the situation warrants.
  - Divert aircraft to alternate areas on the incident or another incident.
  - Hold aircraft at an alternate location and altitude.
  - Brief ground crews on any modification to air operations.
  - Request a TFR if one is not already in place.

- **Investigate** the intrusion.
  - Try to safely establish and maintain visual contact with the drone or the person operating it.
  - Coordinate with the FAA and local law enforcement to establish contact with the drone operator. See link below for FAA guidance to law enforcement: https://www.faa.gov/uas/regulations_policies/media/FAA_UAS-PO_LEA_Guidance.pdf

- **Report**.
  - Incident personnel should file a SAFECOM and any other unusual occurrence reports required by their respective organizations. Be sure to clearly identify your mitigation to share the lessons learned and provide trending/tracking information.
  - Report the occurrence to the FAA at: http://www.faa.gov/contact/safety_hotline/

Incident operations personnel make risk-based decisions on every mission. The decision to conduct any mission depends on the assessment of a variety of risk factors including (but not limited to) wind, topography, and visibility. Mitigating risks associated with a UAS intrusion is no different. Every tactical situation is unique and respective plans/procedures may require modification based on those differences. Your number one defense is to be proactive and educate the public on what they don't know. Complimentary to that is establishing procedures designed to manage it when it occurs. Implementing a TFR restricts non-participating aircraft and improves safety for flight crews and other incident personnel.

Plan, Educate, Communicate, Report

/s/ Keith C. Raley
Chief, Aviation Safety
& Program Evaluations
DOI, Office of Aviation Services

/s/ Gary Sterling
Branch Chief, Aviation
Safety Management Systems
USDA Forest Service

OAS-25A
(12/12)

Interagency Aviation
SAFETY ALERT

No. IA SA 16-01 **October 1, 2015**

Subject: AS350 Family Tail Rotor Bellcrank

Area of Concern: Flight Safety

Distribution: All Aviation Activities

Discussion: Two recent SAFECOM reports identified an issue with the Airbus 350 Series helicopter Tail Rotor Gearbox Input Bellcrank (sometimes call an input lever). This bellcrank is on all Airbus 350 Series helicopter gearboxes that have a conventional tail rotor.

SAFECOM 15-316 was submitted on June 22, 2015. The submitter identified the bellcrank bushing had slipped out of its position. The bellcrank was replaced and in less than 10 hours had failed again.

SAFECOM 15-605 was submitted on August 14, 2015. A pilot was conducting a preflight inspection of his aircraft and noticed that the bushing had slipped. The bellcrank was replaced and after 3 hours of flight time, slipped again. The pilot of this aircraft had read SAFECOM 15-316 which made him aware of this issue and focused greater attention to the bushing on the bellcrank.

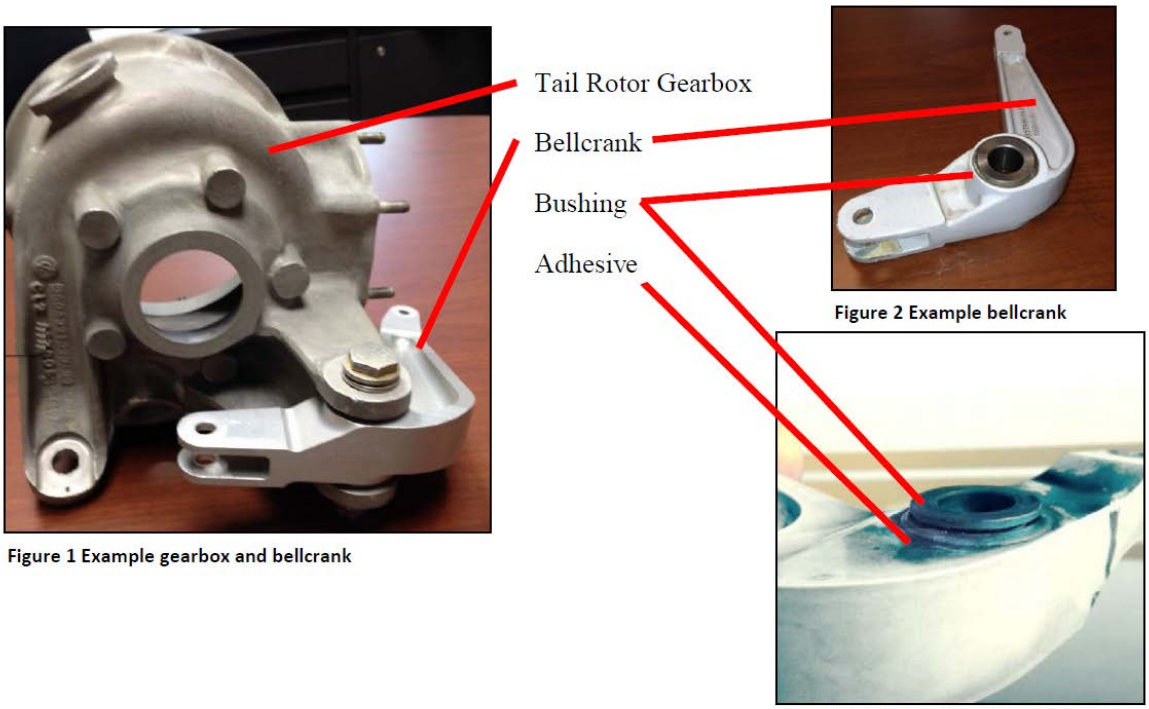


Figure 1 Example gearbox and bellcrank

Figure 2 Example bellcrank

Figure 3 Actual bushing failure showing gap

SAFECOM 15-820 was submitted on September 18, 2015. A mechanic was conducting a preflight inspection of her aircraft and identified the displaced bushing. Because of the previous SAFECOM messages, she was aware of this issue and paid specific attention on each of her preflight inspections.

OAS maintenance inspectors have reviewed these cases and are encouraging an increased focus in this area during pre-flight and post-flight inspections.

Operator Actions. Operators are encouraged to file a Service Difficulty Report (SDR) with the Federal Aviation Administration (FAA). This is the best way for operators to ensure that the manufacturer is aware of the number of part failures.

Maintenance Malfunction Information Report. The FAA and the Helicopter Association International (HAI) have joined forces to provide the aviation industry with the Maintenance Malfunction Information Report (MMIR) system. The joint MMIR program is an efficient way of producing both the SDR and optional warranty claim forms. View the MMIR system at https://www.rotor.com/Resources/MMIREventReporting.aspx

The following Federal Aviation Regulations apply for reports for the respective FAR Part:

- § 135.415 Service difficulty reports
- § 145.63 Reports of defects or unairworthy conditions

For general aviation, see Advisory Circular 20-109A "Service Difficulty Program" for guidance.

This is an excellent example of how SAFECOM reports can alert us to important information and be shared so that others can take proactive action.

/s/ Keith Raley
Keith Raley
Chief, Aviation Safety &
Program Evaluations

/s/ Gary Sterling
Gary Sterling
Branch Chief, Aviation Safety
Management Systems

Interagency Aviation TECH BULLETIN

SUBJECT: USFS & DOI Aircraft Procurement, Release vs Reassigned

DISTRIBUTION: Aviation Operations

DISCUSSION: During this busy fire season numerous questions have arisen regarding the procurement of aircraft services as it relates to using either a USFS or DOI contract aircraft; and when does the initial hiring mechanism change from one agency to another agency? **The helicopter manager and vendor are the responsible parties in determining the *initial* path to take, depending on the original resource order and contract jurisdiction.** Please reference the information **below** to assist you in determining what agency initially hired the aircraft and if and when this should change to a different agency. On the following page are web links to assigned Task Order numbers and instructions for completing the Department of Interior's (DOI) Aviation Management System (AMS) payment process.

Air Attack Fixed Wing / Type 3 Helicopters: DOI On-Call Contract or USFS Regional Call When Needed Contract.

USFS Fire - Vendor hired under the USFS contract
Form - 122
System - ABS
Stay with this system until resource is "RELEASED" (demobilized), no matter how many reassignments take place to other land ownerships.

USFS Fire - Vendor hired under the DOI contract
Form - AMD23e
System - AMS
Stay with this system until resource is "RELEASED" (demobilized), no matter how many reassignments take place to other land ownerships.

All the above is true on the reverse side if the initial fire is DOI as follows:

DOI Fire - Vendor hired under the USFS contract
Form - 122
System - ABS
Stay with this system until resource is "RELEASED" (demobilized), no matter how many reassignments take place to other land ownerships.

DOI Fire - Vendor hired under the DOI contract
Form - AMD23e
System - AMS
Stay with this system until resource is "RELEASED" (demobilized), no matter how many reassignments take place to other land ownerships.

Type 1 & 2 Helicopters: USFS National Call When Needed Contract, Type 1 & Type 2 Helicopters:

DOI Fire - Vendor hired under the USFS contract (Type 1/2 Helos)
Form - AMD23e ***using vendor assigned DOI Fire Task order numbers***
System - AMS
Stay with this system until resource is "RELEASED" (demobilized), no matter how many reassignments take place to other land ownerships.

USFS Fire - Vendor hired under the USFS contract
Form - 122
System - ABS
Stay with this system until resource is "RELEASED" (demobilized), no matter how many reassignments take place to other land ownerships.

National Call- When -Needed helicopters (T1/2) that are hired under State contract authority for non-federal incidents must be released and rehired by the National Interagency Coordination Center prior to commitment to federal incidents

Assigned Fire Task Orders and Instructions on completing DOI Aviation Management Systems (AMS) payment process are available at the following websites along with the information that you will need to complete the electronic AMD-23e:

AMD-23E-InstructionsCWN.pdf
FIRE_TASK_ORDER_NUMBERS.pdf

For additional questions for DOI please contact:

Deena Weber, DOI Contracting Officer (Lower 48 - On-Call Helicopters)
(208) 433-5035; Cell: (571) 328-9670

Janice Haener, DOI Contracting Officer (Lower 48 - On-Call Helicopters)
(208) 433-5043; Cell: (571) 318-7530

Jim Marvin, DOI Contracting Officer (On-Call Air Attack)
(208) 433-5064

Michele Waters, DOI Contracting Officer (AK On-Call Helicopters)
(907) 271-5021; Cell: (907) 903-6560

USFS Regional Type 3 Helicopters contact appropriate USFS Regional Contracting Officer:
http://www.fs.fed.us/fire/contracting/directory/directory.htm

Region 1 & 2 – Jeff McGinley - (208) 387-5350
Regions 3, 4 & 9 – Todd Novinger - (208) 387-5272
Region 5 – Robert Hoffman - (208) 387-5681
Region 6 – Ben McGrane – (541) 504-7273
Region 8 – Gloria Sanders – (404) 347-4023

USFS National Type 1 & 2 CWN Helicopters contact:
Fredrick Geijsbeek
USFS Contracting Officer
(208) 387-5682

CWN Helicopters Contract
Robert (Bob) Hoffman
USFS Contracting Officer
(208) 387-5681

USFS National Type 1 & 2 CWN COR (Invoices)
Shelia Valentine - (208) 387-5621

DEFINITIONS:
Released – Aircraft is released from the operational control of the government, demobilized - (there is a break in service, the vendor can move the aircraft at their discretion, and a final payment document for the assignment has been submitted).
Reassigned – Aircraft has not been released from the operational control of the government and there is no break in service. The payment process continues under the "initial hiring agency" process (AMD 23e or ABS 122) regardless of the number of reassignments or agency with operational control of the incident.

/s/ Ralph Getchell
Chief, Division of Technical Services
Office of Aviation Services
U.S. Department of the Interior

/s/ Walker Craig
Acting, Branch Chief
Aviation Operations
U.S. Forest Service

Interagency Aviation TECH BULLETIN

SUBJECT: Basic Weather Information on Manifests and Use of Belt Weather Kits

DISTRIBUTION: Helicopter Operations

DISCUSSION: DISCUSSION: Following the Iron 44 accident, one of the recommendations from the NTSB was to add "Basic Weather Information" to the manifest form and document weather conditions at the time for each flight. The Interagency Helicopter Passenger/Cargo Manifest form contains Pressure Altitude (PA) and Outside Air Temperature (OAT) as identified in the IHOG, Appendix A (HCM-9). Wind direction and speed is not on the Interagency Helicopter Passenger/Cargo Manifest form or the Interagency Helicopter Load Calculation form. Wind speed and direction can change so quickly that having this information on the planning forms could be misleading.

Helicopter Crewmembers should provide wind speed and direction to the pilot for all take-off and landings at staffed helibases and helispots. Helicopter Crewmember training must focus on the proper use of belt weather kits and stress the importance of giving the incoming pilots accurate wind speed and direction.

Pilot wind finding techniques are evaluated during flight evaluations but it is important to provide wind conditions and direction at landing sites by personnel on the ground.

This Technical Bulletin is a reminder to review the IHOG Load Calculation requirements and to completely fill out the information from the Load Calculation forms onto the Manifest forms. Pilots must be aware of wind conditions and helicopter crews must be vigilant in updating and continuously providing pilots with wind speed and direction.

Please direct any questions to your agency helicopter operations staff.

/s/ Ralph Getchell
Chief, Division of Technical Services
Office of Aviation Services
U.S. Department of the Interior

/s/ Walker Craig
Acting Branch Chief
Aviation Operations
U.S. Forest Service
U.S. Department of Agriculture

Interagency Aviation TECH BULLETIN

SUBJECT: Garmin VHF-AM Radio Update

DISTRIBUTION: All Aviation Operations

BACKGROUND: : Incident support aircraft must have the ability to monitor all required radios at all times. Transmit interlocks, or features that act similar to transmit interlocks, reduce receiver sensitivity when other radios are transmitting. This makes them unusable for operations which require monitoring and transmitting on multiple radios simultaneously. For this reason, transmit interlock functions are not acceptable on aircraft performing some incident support missions.

ISSUE: The Garmin VHF-AM radios listed below incorporate an automatic receiver gain feature that behaves similar to a transmit interlock. These radios contain circuitry that automatically adjusts the sensitivity (gain) of the radio's receiver in proportion to the strength of the RF signal received. This can cause this feature to impede reception of one radio when another on-board radio is transmitting. The Forest Service and Garmin have confirmed this function of the radios listed below which cannot currently be disabled.

DISCUSSION: Garmin is actively working on a solution and is aware of the possible impact of lost radio reception to our operations. Radios which incorporate a transmit interlock behavior do not meet contract or cooperator requirements for aircraft performing special missions.

Non-fire aircraft, single pilot helicopters which are not approved for passengers, and single engine air tankers may continue to operate with the affected radios.

Affected Radios:
Garmin GTN series with Mod 2 incorporated:
GTN-635, GTN-650, GTN-750
Garmin GTR-225: All current versions
Garmin GNC-255: All current versions

Update:
Revised the *Issue* and *Discussion* paragraphs and incorporated input from Garmin.
Clarified that GTN units that incorporate Mod 2 are affected.
The GTN-625 and GTN-725 were removed from the affected list.

Questions, please contact:
USFS: John Flemmer, USFS Aviation Safety Inspector (Avionics) jflemmer@fs.fed.us
DOI: Jeff McVey, DOI Aviation Safety Compliance Specialist (Avionics) jeffrey_mcvey@ios.doi.gov

/s/ Jeff McVey
National Avionics Specialist
Office of Aviation Services
U.S. Department of the Interior

/s/ John Nelson
Branch Chief, Airworthiness
and Quality Assurance
U.S.D.A Forest Service

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

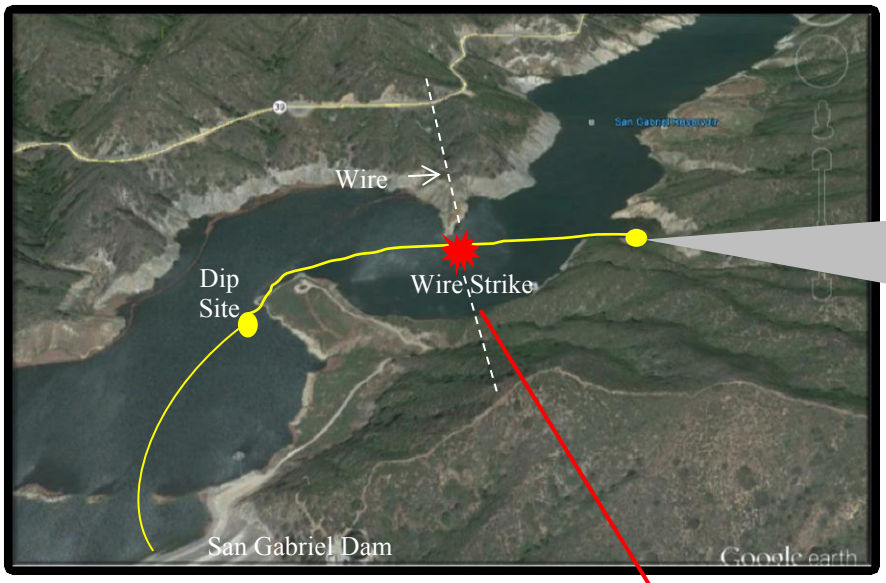
San Gabriel Reservoir, August 15, 2015

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 did not 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

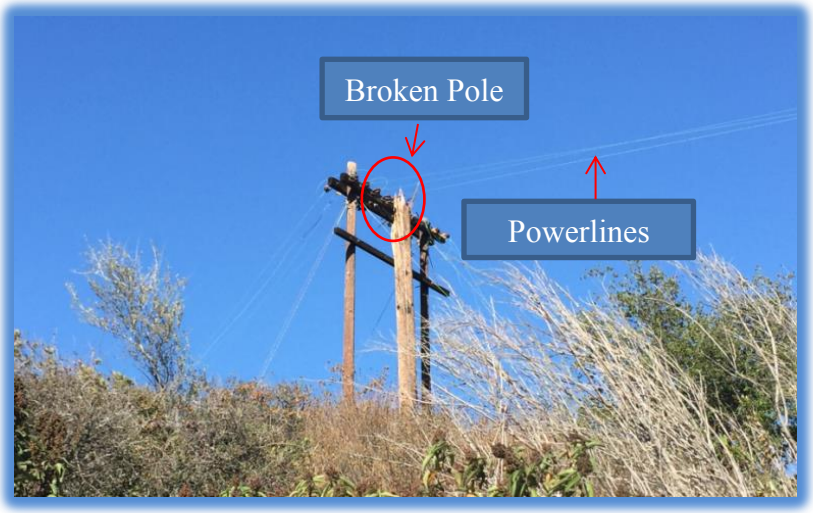
A vast majority of helicopter operations supporting fire suppression are conducted below 1000 ft. AGL, which also happens to coincide with the location of wires associated with power and communication transmission. This area below 1000 ft. AGL is referred to as the ***"wires environment"***. Familiarity 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

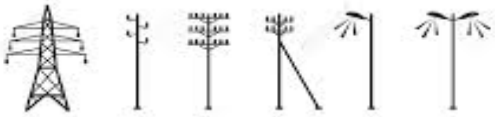
Rotor-craft average 66 wire/obstruction accidents per year;
30% of those accidents are fatal

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.

NTSB

SAFETY ALERT

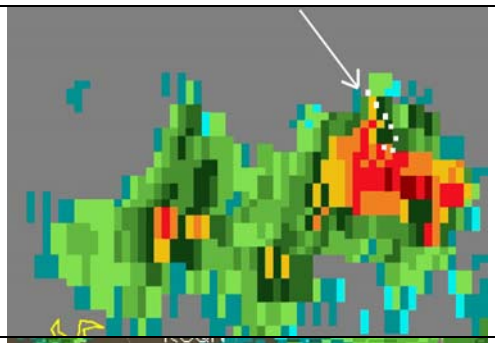
National Transportation Safety Board

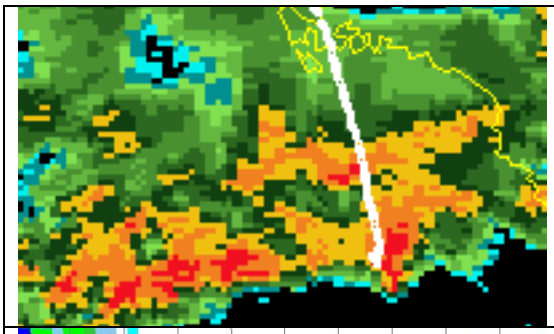
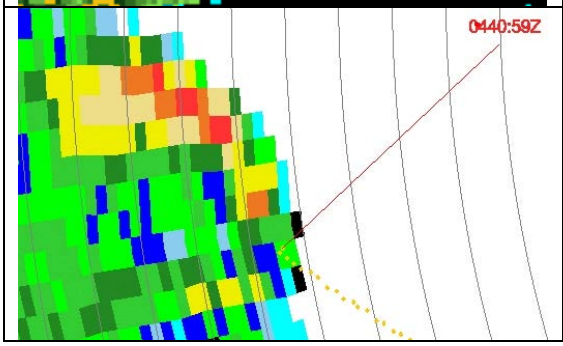
★Thunderstorm Encounters

IFR pilots need to actively maintain awareness of severe weather along their route of flight

The problem

- Recent NTSB investigations have identified several accidents that appear to be wholly or partly attributable to in-flight encounters with severe weather.
- These accidents have all involved aircraft operating under instrument flight rules and in contact with air traffic controllers.
- Investigations show that pilots were either not advised about areas of severe weather ahead or were given incomplete information.
- Each pilot had readily available alternatives that, if utilized, would have likely prevented the accident.
- ATC training and briefings to controllers have not been sufficient to ensure that pilots receive the weather advisories needed to support good in-flight weather avoidance decisions.
- Recent examples:

	A Mitsubishi MU-2 en route to Panama City, Florida, entered radar-depicted intense to extreme cell. No ATC radar weather information issued or requested. One fatality. Argyle, Florida 9-1-2006
	A Cessna 210 en route to Manassas, Virginia, encountered intense to extreme level convective weather. The pilot requested a deviation after entering the area, but lost control of the aircraft and crashed. No ATC weather information provided. One fatality. Ludville, Georgia 4-19-2006

	A Cessna 182 entered an area of severe weather over the Gulf of Mexico. Deviations discussed with ATC, but no intensity information provided by ATC or requested by the pilot. One fatality, aircraft not recovered. Naples, Florida 6-20-2005
	A Mooney M20J encountered an intense to extreme thunderstorm and broke up in flight. No ATC radar weather information provided or requested. Two fatalities. Newellton, Louisiana 7-26-2006

How can pilots avoid becoming involved in a similar accident?

- Severe weather avoidance is primarily ***your responsibility.***
- The primary job of ATC is to keep IFR aircraft separated. When their workload permits, controllers are also required to provide additional services such as weather advisories, and, upon pilot request, suggested headings to avoid radar-displayed precipitation.
- The proper use of ATC weather advisory services may be critical to your safety when operating near areas of convective activity.
- The precipitation detection and display capabilities of ATC facilities vary from poor to excellent. Some have older analog radar systems that depict precipitation as a monochrome reflective area with no associated intensity values, while others have fully digitized radar systems with color displays showing both the extent and intensity of precipitation.
- Approach control radar systems provide near-real-time weather depiction. En route centers receive weather radar information from National Weather Service NEXRAD sites that refresh the color precipitation data on ATC displays every 4 to 5 minutes. Be aware that en route weather displays may be a few minutes behind the storm and allow extra distance from reported intense precipitation, especially in front of fast-moving convective activity.
- ATC radar systems depict ***only*** precipitation. Controllers cannot use radar to warn of turbulence, icing, freezing rain, or other hazards to flight. However, the presence of substantial precipitation implies the existence of thunderstorm hazards such as severe turbulence and hail.
- ATC weather advisories should include the location, extent, and intensity of radar-observed precipitation. The descriptive words for intensity were recently changed to ensure consistency across all ATC facilities. The old level 1 is now “light”; level 2 is “moderate”; levels 3 and 4 are described as “heavy”; and levels 5 and 6 are described as “extreme.” If precipitation is described to you without any reference to intensity, ask for the information so you can make a good decision about how to proceed.

- Not all ATC radar systems can provide intensity information. In such situations, you should be told “intensity unknown.”
- Some accidents appear to have involved controller uncertainty about whether the pilot was visually avoiding severe weather areas or needed radar weather assistance. The controller thought the pilot was able to see what was ahead, and the pilot thought the controller was watching out for him. It is especially important that you advise controllers if your flight conditions change from visual to instrument, and that when operating in instrument conditions you regularly request updated information on radar-depicted weather ahead of your aircraft.
- Be especially diligent about asking for updates after being transferred from one ATC facility to another. The new controller may have better equipment or be using a different radar site and have an entirely different picture of what lies ahead.
- Ambiguous use of the term “when able” has also led to confusion. Some controllers use “Cleared direct xxx when able” to mean “when weather permits you to turn safely on course,” while pilots may understand such an instruction to mean “Go direct to xxx as soon as you can navigate there.” In some cases, this ambiguity has apparently led pilots receiving ATC weather avoidance assistance to conclude that it was safe to turn direct to the specified fix, resulting in subsequent entry into thunderstorms. If you have any uncertainty about whether a course change will keep you clear of convective weather, ***ASK!***
- Give pilot reports. Controllers use them to confirm their radar weather depiction, and to obtain details such as cloud tops or the existence of icing that may not be available through any other source. Pilot reports also help controllers advise other aircraft about what to expect and what to avoid.
- The safest plan when avoiding severe weather activity is to entirely avoid the affected area or land and wait for it to pass. However, if you find yourself in need of ATC assistance, ask specific questions. Where is it in relation to my route? What does it cover? How far away is it? What intensities do you see? What looks like the best way around it?
- Make decisions about weather deviations as far in advance as possible. Controllers will have more time to respond to your needs, perform any necessary coordination, and provide you with the information you require to conduct a safe flight.
- Pay attention to weather alerts broadcast by ATC, especially SIGMETS and Center Weather Advisories, and obtain further details from HIWAS or Flight Watch if the advisory is anywhere along or near your route. Flight Watch can also supply “big picture” weather information beyond what ATC may have time to provide to you.
- Become familiar with the various on-board weather avoidance technologies available, including data-linked onboard NEXRAD weather services, and consider whether the additional information will help you to avoid encounters with severe weather.

SA-11 October 2006

OAS
TECH BULLETIN

SUBJECT: Special Emphasis Item (SEI) — Aircraft Weight and Balance
DISTRIBUTION: Fleet Pilots and Pilot Inspectors

BACKGROUND:

During recent spot inspections, it has come to light that pilots have become complacent when it comes to calculating center of gravity. We have found that some companies were not calculating lateral CG during the weighing process. During most helicopter operations, much emphasis has been placed on performance load calculations. However, these performance calculations do not insure the aircraft is within the allowable weight and balance limitations. Many times, in both fixed and rotary wing aircraft, we have found that new equipment had been installed on the aircraft which the pilot failed to take into consideration and the pilot merely assumed the aircraft was still within limits. In those and other similar cases, the aircraft had been operated outside the established limitations.

Don't assume! Be a professional, calculate the CG, and operate within the limits. Consequences for operating outside of the limitations can be instantly catastrophic or may have cumulative effects by imposing aerodynamic loads beyond design limitations, thus creating potential for structural failure. It is imperative that we adhere to the established limitations.

Effective Date of Implementation: October 1, 2014

Pilot Responsibilities:

- Know the weight and CG limits for your aircraft. By regulation, you are required to have that data in the aircraft.
- Have a complete understanding of the effects of supplemental equipment installed on the aircraft such as cargo baskets, hoists, fuel tanks, etc. and loading limitations of all auxiliary equipment.
- Ensure your aircraft has a current weight and balance for each configuration utilized.
- Calculate your weight and balance for each flight; for both take-off and landing; for interim flight conditions to account for fuel consumption; for external load configurations; during rappel, cargo letdown, RADS, and/or STEP operations to assure the aircraft remains within CG limitations through all phases of flight.

Pilot Inspector Responsibilities:

- Confirm that the most recent weight and balance data is available to the pilot. Confirm that the weighing data (both longitudinal and lateral, if applicable) appears to be correct. (We have found large CG calculation errors at the time of last weighing or when superseded by calculation.)
- Evaluate pilot knowledge and skill regarding aircraft weight and balance including all installed auxiliary equipment.

Application: OAS Pilot Inspectors must apply this SEI to any fleet or contractor pilot evaluation.

Documentation: The OAS-69 series forms will be used to document compliance with this SEI. In the remarks block, make a note that TB 15-01 has been evaluated.

Reporting: OAS Technical Services Division is responsible for tracking application of this SEI during annual fleet flight Evaluations. OAS Technical Services will spot check OAS-69 forms on contractor helicopter pilots. This data will be discussed at the Quarterly Management Review/EBC review meetings.

Chief, Division of Technical Services
Office of Aviation Services
U.S. Department of the Interior

OAS
TECH BULLETIN

SUBJECT: Renewed Hazmat Special Permit: DOT-SP-9198 (Sixteenth Revision)

DISTRIBUTION: All Aviation Users

ISSUE: The U.S. Department of Transportation's Special Permit Authorization DOT-SP 9198 regarding carriage of hazardous materials (hazmat) aboard aircraft under the control of DOI has been renewed. The DOI permit has an expiration date of July 31, 2018. Copies of the current Special Permit Authorization and the Sixteenth Revision of the DOT-SP 9198 are attached.

DISCUSSION: As a reminder, DOT-SP-9198 requires:

1. A current copy of the *Interagency Aviation Transport of Hazardous Materials (IATHM) Handbook/ Guide*, dated January 2005, and the *Emergency Response Guide* (ERG) must be carried aboard each aircraft transporting hazardous materials.
2. A current copy of the special permit, the IATHM handbook/guide, and the ERG must be maintained at each facility where the hazardous materials are offered or reoffered for transportation. For helicopter field operations, material must be loaded or unloaded under the direct supervision of an agency employee trained in accordance with the handbook/guide.
3. All aircraft operated under this special permit must be Government owned or under a Government contract and under the exclusive direction and operational control of the DOI for the purposes of a Government function such as firefighting, search and rescue, law enforcement or biological/ geological resource management.
4. Vendors under operational control of the DOI shall operate in accordance with this special permit and the IATHM handbook/guide, in lieu of their FAA-approved Hazmat manual.
5. All personnel who perform a function subject to this special permit must receive training on the requirements and conditions of this permit.

Chief, Division of Technical Services
Office of Aviation Services
U.S. Department of the Interior

2 Attachments:
(1) Sixteenth Revision of the DOT-SP 9198
(2) Special Permit Authorization DOI DOT-SP 9198

December 7, 2011

U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety Administration**

East Building, PHH – 30
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

DOT-SP 9198
(SIXTEENTH REVISION)

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: (See individual authorization letter)

2. PURPOSE AND LIMITATION:

a. This special permit provides relief from the Hazardous Materials Regulations (HMR), in that government agencies under contract to DOI and agencies on file in Office of Hazardous Materials Special Permits and Approvals (OHMSPA), may use aircraft that are under their operational control. This special permit provides no relief from the HMR other than as specifically stated herein. The most recent revision supersedes all previous revisions.

b. The safety analyses performed in development of this special permit only considered the hazards and risks associated with transportation in commerce.

c. Unless otherwise stated herein, this special permit consists of the special permit authorization letter issued to the grantee together with this document.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 173.7(f) in that an aircraft may be under the direction and control of the government for less than 90 days under the conditions provided herein.

5. BASIS: This special permit is based on the Pipeline and Hazardous Materials Safety Administration's (PHMSA) editorial review under § 107.121 initiated on February 13, 2009.

6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Hazardous Materials Description			
Proper Shipping Name	**Hazard Class/ Division**	**Identi- fication Number**	**Packing Group**
Hazardous materials authorized by this special permit are limited to materials authorized to be transported by motor vehicle in conformance with 171-180.	As Appro- priate	As Appro- priate	As Appro- priate

Notes:

(1) All Class 1 explosives must have been properly classed and approved in accordance with 49 CFR prior to packaging and offering for transportation by aircraft.

(2) All Class 2 compressed gases must be properly filled and packaged in DOT-specification cylinders in accordance with 49 CFR.

7. SAFETY CONTROL MEASURES: All aircraft and personnel operating under the terms of this special permit must be in compliance with the requirements of the DOI/USDA-Forest Service January 2005 "Interagency Aviation Transport of Hazardous Materials Guide/Handbook" on file with the Office of Hazardous Materials Special Permits and Approvals (OHMSPA).

8. SPECIAL PROVISIONS:

a. A current copy of the Interagency Aviation Transport of Hazardous Materials Handbook described above and the Emergency Response Guide (ERG) must be carried aboard each aircraft transporting hazardous materials.

b. A current copy of this special permit, the Interagency Aviation Transport of Hazardous Materials Handbook, and the Emergency Response Guide (ERG) must be maintained at each facility where the hazardous materials are offered or reoffered for transportation. For helicopter field operations loaded or reloaded under the direct supervision of an agency employee trained in accordance with the Handbook/Guide.

c. All aircraft operated under this special permit must be under a government contract and under the exclusive direction and operational control of the DOI or FS for the purposes of a government function such as national defense, intelligence missions, firefighting, search and rescue, law enforcement or biological or geological resource management.

d. Vendors shall operate in accordance with this special permit and Interagency Aviation Transport of Hazardous Materials Handbook, in lieu of their approved manual.

9. MODES OF TRANSPORTATION AUTHORIZED: Cargo aircraft only.

10. MODAL REQUIREMENTS: See paragraph 8 above.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this special permit and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 *et seq*:

- All terms and conditions prescribed in this special permit and the Hazardous Materials Regulations, 49 CFR Parts 171-180.

- Persons operating under the terms of this special permit must comply with the security plan requirement in Subpart I of Part 172 of the HMR, when applicable.

- Registration required by § 107.601 *et seq*., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this special permit must receive training on the requirements and conditions of this special permit in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this special permit, including display of its number, when the special permit has expired or is otherwise no longer in effect.

Under Title VII of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) - 'The Hazardous Materials Safety and Security Reauthorization Act of 2005' (Pub. L. 109-59), 119 Stat. 1144 (August 10, 2005), amended the Federal hazardous materials transportation law by changing the term "exemption" to "special permit" and authorizes a special permit to be granted up to two years for new special permits and up to four years for renewals.

12. REPORTING REQUIREMENTS: Shipments or operations conducted under this special permit are subject to the Hazardous Materials Incident Reporting requirements specified in 49 CFR §§ 171.15 Immediate notice of certain hazardous materials incidents, and 171.16 Detailed hazardous materials incident reports. In addition, the grantee(s) of this special permit must notify the Associate Administrator for Hazardous Materials Safety, in writing, of any incident involving a package, shipment or operation conducted under terms of this special permit.

Issued in Washington, D.C.:

for Dr. Magdy El-Sibaie
Associate Administrator for Hazardous Materials Safety

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Pipeline and Hazardous Material Safety Administration, U.S. Department of Transportation, East Building PHH-30, 1200 New Jersey Avenue, Southeast, Washington, D.C. 20590.

Copies of this special permit may be obtained by accessing the Hazardous Materials Safety Homepage at http://hazmat.dot.gov/sp_app/special_permits/spec_perm_index.htm Photo reproductions and legible reductions of this special permit are permitted. Any alteration of this special permit is prohibited.

PO: dl

U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety Administration**

East Building, PHH – 30
1200 New Jersey Avenue, Southeast
Washington, D.C 20590

SPECIAL PERMIT AUTHORIZATION

DOT-SP 9198

EXPIRATION DATE: July 31, 2018

GRANTEE: U.S. Department of the Interior,Office of Aviation Services
Boise, ID

In response to your August 20, 2014 application for renewal of DOT-SP 9198, the grantee status to DOT-SP 9198 for U.S. Department of the Interior,Office of Aviation Services is hereby renewed in accordance with 49 CFR § 107.109.

Copies of this special permit may be obtained by accessing the Office of Hazardous Materials Safety Homepage at http://hazmat.dot.gov/sp_app/special_permits/spec_perm_index.htm. The most recent revision of the special permit supersedes all previous revisions of the special permit. Photo reproductions and legible reductions of this special permit are permitted. Any alteration of this special permit is prohibited.

If you have questions regarding this action please call the Office of Hazardous Materials Special Permits and Approvals at (202)366-4535.

Issued in Washington D.C. on **September 18, 2014**.

for Dr. Magdy El-Sibaie
Associate Administrator for Hazardous Materials Safety