



PACIFIC SOUTHWEST REGION

July 29, 2016

Rapid Lessons Sharing Water Drop on Firefighters

Water or retardant drops on firefighters, unfortunately, are not uncommon in high tempo operations, and often result in injuries. A review of past incidents shows that the majority of these events occur during Initial Attack. This RLS is intended to bring awareness to these occurrences and offer some insight and potential mitigation strategies for prevention.

On July 29, 2016 at approximately 2000 hours, ten hotshot crew members were hit by a water drop from a helicopter equipped with a fixed tank during an initial attack on the Angeles National Forest. The force of the water drop knocked two of the firefighters to the ground and down the hill, causing injuries. The firefighters were taken to a local hospital for treatment, one with possible bruising to his right eye socket, and the other for a possible loss of consciousness. Both firefighters were treated and released.

The Spunky Fire was an aggressive initial response effort with numerous fixed-wing and helicopter aviation resources being assigned from multiple agencies. This fire was managed under "Unified Command" and the aerial effort was being coordinated by an Air Attack Group Supervisor.

Photos of Spunky Fire, June 29, 2016



Hotshot Perspective:

The Hotshot crew was cutting hand line in 8-10 foot tall brush on the bottom 1/3 of the slope when the water drop incident occurred. The Hotshot Captain tried calling Air Attack on Air to Ground as well as any ships flying over so they could get some drops and only one helicopter (H-XX) responded who was returning to the lake to refill. From the time they spoke with H-XX to the time H-YY dropped on the crew approximately five seconds passed, no target description was ever given. The hotshot crew did confirm radio frequency congestion, but do not recall a radio announcement on the Air-to-Ground channel or a siren to indicate there was an inbound helicopter prior to the drop. Several witnesses indicated that the drop looked "low over Division Z" and that the "helicopter came over the ridge and released the full load in a downhill motion."



Photo of incident site, but with super-imposed water drop

The Helicopter came off the back part (knob) of the fire's edge around the slope, making a downhill drop. The drop direction was being conducted by all 5 aircraft working this section of line.

Lesson Learned from Pilot:

Due to the setting sun, reversing the pattern and dropping in an easterly direction might have aided in better ground crew identification/location.

Ground firefighters and aircraft together put the fire out. We need to give each other the space needed so we can all be free of harm.
~ **Hotshot Superintendent**

Flight Crew Perspective:

Towards the latter part of the firefighting effort, the helicopter was requested to coordinate drops with the Hotshot Crew on the center area of the left flank to aid in controlling several spot fires burning into the newly laid retardant line. The flight crew remembers the majority of the drops being conducted well outside of any ground crew locations. A couple requests were made to help crews working the lower left flank tie in the line with other crews working their way up a fairly steep spur on the upper side of the left flank. It appeared there was a gap between the crews on the lower end and upper end of the left flank, but complete identification during downhill drops was difficult due to the steepness of the terrain in that particular area, vegetation and the westerly drop angle flying into the setting sun. A *loudhailer* (Aircraft Siren) was sounded prior to each drop, as well as radio call out. The flight crew received no radio transmissions providing feedback that a load of water was dropped onto a ground crew.

Lessons learned from Pilot:

"Do a recon when in steep terrain to ensure clear identification of ground resources location".

LESSONS LEARNED

Aerial retardant and water drops are an important firefighting asset, but these missions also pose significant safety hazards to firefighters on the ground, stressing the importance of staying vigilant around aircraft operations. The force of a retardant or water drop can dislodge or snap off trees, create rolling debris, the outflow alone has literally knocked firefighters off their feet, and the shear weight of the falling liquid can create impact injuries. Most of these events occur when firefighters were surprised by a drop and are unable to take proper action to protect themselves by moving (clear the line) to a safe distance.

Common Denominators and Preventative Measures :

Communications: During high tempo operations, such as initial attack, it is not uncommon for multiple resources to respond simultaneously and for radio traffic to be heavily congested. Frequency congestion can often result in distraction, confusion and missed calls that result in operational conflicts. Aerial Supervision (ATGS or ASM) is critical to coordinating aerial resources in these demanding operational environments.

When the ATGS or ASM are no longer on scene, this should signify the need to increase situational awareness, especially with regard to aircraft still engaged in the firefighting effort. It is a good safety practice to have the assigned lookout to also watch out for incoming water/retardant drops, during fast paced initial attack responses. This helps mitigate the stark reality of radio calls that *do* get missed, target descriptions that *are* misunderstood, pilots who *do* encounter severe downdrafts that require a quick release of the water or retardant, or that there *are* inadvertent releases.

Fixation or Preoccupation: Responding resources often become fixated and preoccupied on one task during an initial attack. This condition decays the ability to detect other important information, possibly compromising safe operations. The best defense for this is self-discipline to recognize that that it does happen and to take appropriate measures to maintain the best level of situational awareness to safely engage in high tempo firefighting efforts.

Firefighter Safety: Ensure firefighters are appropriately briefed on protocols listed in the IRPG. If an individual is unable to retreat to a safe place and unable to call off the drop, the safest procedure to minimize injury from the drop is to:

- Hold on to your hand tool away from your body.
- Lie face down, with head toward oncoming aircraft and hard hat in place.
- Grasp something firm to prevent being carried or rolled about by the dropped liquid. Do not run unless escape is assured.
- Get clear of dead snags, tops, and limbs in drop area.

Aircraft: Aircraft flying through smoke or at higher speeds (airtankers) can have a difficult time locating firefighters on the ground. In the water drop on the Hotshots, the flight crew had some difficulty in identifying a couple requested drop locations resulting in a late identification of the target. The loudhailer was subsequently activated very near the time the water was actually released.

To help prevent unintentionally dropping on firefighters, aircrews should:

- Confirm drop zone is clear prior to the drop (make radio contact with forces in the area)
- Utilize loudhailer (if equipped) and activate early-on to help ground crews prepare for possible water impact
- If dropping on a new target or free-lancing (no aerial supervision), conduct fly over to confirm ground forces are clear of drop zone
- Always ask yourself, "Is this flight "drop" necessary?" (Is the fire out?)

The below video is courtesy of Erickson Air-Crane Inc., who was not involved in this incident, but provided the video to show damage that could be caused by a low drop, to high coverage level or an unexpected water drop.

[Click on this link to view the Power of a Water Drop](#)

Past Events

SAFECOM 13-0556 :

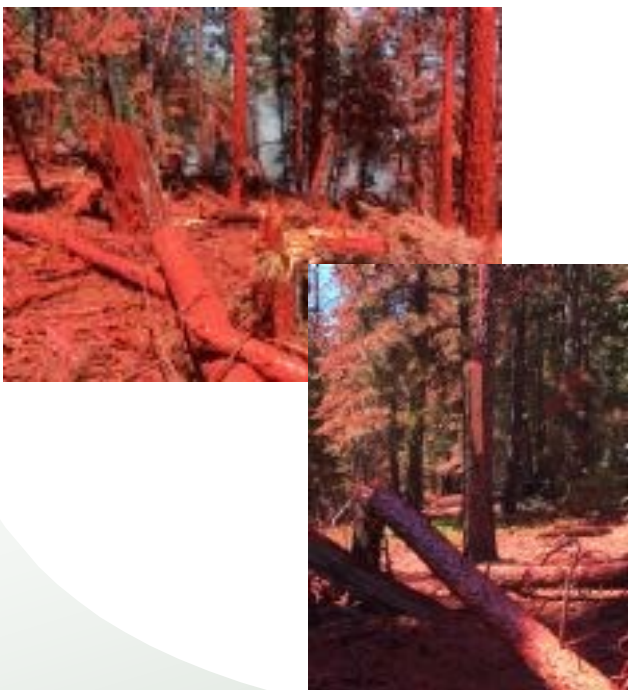
During initial attack an air tanker made a retardant drop at a height and speed that scrubbed the ground clean to bare mineral soil for a distance of ~300 ft.-400 ft., and 15 ft. wide. Brush, in some places 6 ft. high, was removed or damaged. Eyewitnesses state the plane was between 50 ft.-100 ft. high, and lower than the lead plane. The lead plane also appeared to be no more than 100 ft.-150 ft. high. Two fire fighters had time to lie down in the drop zone, but did not clear it: they were hit by the drop. Neither fire fighter was injured. Below is a picture illustrating the force of this drop:



Lessons Learned: Be extra cautious and clear the line a greater distance than normal on initial attack fires as pilots (helicopter and airtankers) are not always familiar with the terrain they will be operating in and may misjudge the drop zone or the drop height.

SAFECOM 16-0573

While conducting an initial attack one drop from an airtanker was low to the ground snapping off six green pine trees about 12-14 inches in diameter and 30-35 feet long, along with some smaller tops of other green trees. There were people in the area below the ridge line impacted from retardant and flying material. Three firefighters were knocked down by either the retardant or by branches. Luckily, only a minor injury occurred to one firefighter.



Lessons Learned:

- Utilize cardinal direction to assure all resources know aircraft direction of travel; If unsure, ask to clarify the direction
- Assure all resources have cleared the line even if they don't think they will be impacted from the drop
- Understand that new type one air tankers are bigger, faster and capable of larger drops of retardant
- Emphasize drop height minimums over entire drop area and good clearance by personnel on the ground.
- When ground personnel announce they are clear, they need to be well out of the drop area.
- Additionally, fire orientation for the air and ground should be aligned so all understand where on the line fire retardant is going to be placed
- Airtanker Pilots are reminded the minimum drop height for safety and effectiveness is 150ft AGL