

South Canyon Fire Entrapment Incident Report

Incident Summary

A lightning strike started the South Canyon Fire near Storm King Mountain on July 2nd, 1994 in the Grand Junction Forest District roughly 11 kilometres from Glenwood Springs, Colorado. The fire was 1 of 40 that started over a 2 day period. It burnt along a ridge top extending from the nearby mountain and running parallel to 2 large drainages leading to the Colorado River. Resources were not initially deployed to this incident due to higher priorities in the District allowing the fire to grow to 11 acres (4.5 ha). It was burning through pinyon, juniper and oak gamble/brush as well as cured grasses, which are highly flashy fuel types. On July 4th, the fire was sized up and assessed while fire crews stood by at the base of the slope just off of Interstate 70. The terrain in the area was steep, rocky and heavily fuel loaded so it was recommended that fire crews stand down for the evening due to safety concerns. It was noted that there were a lack of available **Escape Routes**.

The following day, a total of 7 Colorado Bureau of Land Management (BLM) firefighters hiked 3 hours through the east drainage toward the ridge with no additional resources provided. There was a single air tanker sent to the fire in the afternoon, but the pilot had limited success due to the challenging topography and wind conditions. Crews started working on control lines as well as a heli-spot for future crew moves. A group of 8 smokejumpers landed at a saddle lower on the ridge at 17:45 while the initial attack crew was leaving the fireline for the evening to complete equipment repairs for the following day. The fire backed over the BLM hand guard by the time the smokejumpers arrived at the fire perimeter, and rolling debris forced the replacement crew to end fire suppression operations for the evening. The Jumper in Charge requested 2 Interagency Hotshot Crews (IHC) through the Grand Junction Dispatch for the next operational period.

There was a severe weather warning because of a passing dry cold front forecasted for the afternoon of July 6th with winds expected to be as high as 60 km/h. This information was not adequately **Communicated** to the incoming resources that were assigned to the fire. At 04:30, the BLM crew of 11 firefighters started to hike into the fire, which was now an estimated to be over 100 acres (40 ha). The Incident Commander (IC) and Jumper in Charge discussed the strategies and tactics for the day at 08:45 quickly realizing the need for a helicopter reconnaissance. A second heli-spot was established to the north of the first landing area in the saddle where the smokejumpers accessed the fire the previous day. The initial task for the firefighters was to establish control line between the 2 heli-spots on the east flank then down into the west drainage. This involved a large amount of downhill control line construction above the fire.

Helicopter Romeo 93 lands at the fire by 09:30 to provide a reconnaissance, but was only allowed to support for 4 hours. An additional 8 smokejumpers parachuted into the jump spot at 10:30 and the Prineville IHC arrived at 11:00. There were now 49 firefighters assigned to the rapidly growing South Canyon Fire.

The Prineville IHC Superintendent was dropped off with 9 crew members at heli-spot 2 at 12:30, but the remaining hotshots did not get flown in to the fireline until 15:00. A number of flare ups around 13:00 forced the smoke jumpers to briefly retreat from the fire's edge, and numerous questions were raised about crew safety at that point. The Crew Superintendent was not able to take a recce flight of the fire perimeter and the wind increased to 30 km/h by the time the IC was able to provide the crew a briefing. Both of the heli-spots were described as possible safe areas, but there were no specific **Safety Zones** designated. The hand guard along the fire perimeter was to act as **Escape Routes** from both the east and west flanks back to the heli-spots. The east drainage was the only reasonable emergency escape route, but it had not been fully cleared of brush.

At 15:20, a dry cold front entered the fire area. The Grand Junction dispatch contacted every IC on active fires in the district to provide advanced warning with possible 50 km/h winds. Fire activity increased immediately after the wind picked up and the fire crews found the inconsistent fire's edge coupled with the varying topography to create a challenging wildfire environment. The fire was pushed across the west drainage by 49 km/h winds and blew up along the opposite ridge toward Storm King Mountain. At 16:04, all firefighters on the main ridge were instructed to pull back to heli-spot 1 where they should be safe. The South Canyon Fire was completely out of control.

The fire spotted back to the east side of the west drainage and was driven toward the firefighters by 64 km/h winds as they tried to escape. A group of 23 IHC, BLM crew members and smoke jumpers, including the IC and Prineville Crew Superintendent, were cut off from their **Safety Zone** and had to escape through the east drainage down to the interstate. There were 9 smoke jumpers forced to deploy their fire shelters and take refuge for over an hour along a spur between the heli-spot 1 and previous lunch spot. An additional 3 smoke jumpers who were working near the ridge top along the west flank were forced to scramble over the ridge and down the east drainage after trying to encourage their coworkers to hustle up the hill away from a spot fire below them.

The fire consumed fuels on the hill side ascending toward the ridgetop between heli-spot 1 and 2 at an extreme rate. There were 12 IHC members and smoke jumpers working further downhill along the west flank at the time of the blow up. These individuals were instructed to deploy fire shelters just short of the ridge top. Unfortunately, all 12 firefighters lost their lives, and 2 heli-attack crew members who attempted to flee further up the mountain also perished.

Weather Conditions - at Peak Burning

Forecasted - Cold Front with Showers

Temperature: **26 to 30 ° C**

Relative Humidity: **15 to 25 %**

Wind Speed and Direction: **25 to 40 km/h (gust to 55 km/h) and Northwest**

Actual - Cold Front with No Precipitation

Temperature: **28 to 33 ° C** - the geographic area was in a drought.

Relative Humidity: **7 to 15 %**

Wind Speed and Direction: **25 to 45 km/h (gust to 65 km/h at deployment site) and North Northwest to West**

Fire Behaviour Analysis - US Equivalents

Fuel Moistures

Dead Fuels

Shaded Fuels: 5 - 10 % moisture content

Non-Shaded Fuels: > 5 % moisture content

Drought Severity Index

- 6.2 - Extreme Drought
(based on water deficit)

Haines Index: **5 to 6 - Moderate to High** (Scale of 1 Very Low to 6 High)

This is a lower atmosphere stability index that measures air stability and dryness.

Fuel Type - contributed significantly

The shale slope vegetation consisted of fine, flashy brush including cured grass, scattered pinyon, juniper and oak gamble (shrubs). Local firefighters understood that wildfires in the area needed high winds in order to spread rapidly. There was an extreme drought at this time resulting in an early spring fire season with minimal precipitation over the winter months causing unstable conditions. There was vegetation growing on all aspects with the fine fuels concentrated on the south western and southern slopes. The fuel load in the area was high due to the lack of recent fire activity and the oak brush reached heights between 6 and 12 feet, which was very difficult to move in.

Topography - contributed significantly

The fire terrain varied between the flat ridge top bordered by steep slopes in the east and west drainages. This mountain range consisted of numerous chimneys and gullies that funnelled the fire. There were areas where the fuel load was lower due to rocky openings and outcrops, which would have made for the best safety areas. The entire fire environment was rocky and unstable due to the shale rocks.

Rate of Spread and Fire Type

The fire was wind driven at the time of the blow up, but the rate of spread was also influenced by the steep slopes along the canyon. It was initially spreading in all direction at approximately 21 m/h until the wind event on July 6th, which pushed the fire up the west drainage to the north at 5 to 17 km/h. This caused the fire to rapidly spot uphill toward the fire crew members who had little time to escape. It also produced 100 to 150 foot flame lengths by the time the fire crested the ridge that crews were initially working along.

Safety Procedures in Place - US Acronym and Standards

Lookouts - the IC wants to use a plane as an 'Eye in the Sky' on July 6th. The Prineville IHC superintendent was acting as a lookout from heli-spot 1 for a part of the day, but did not get a helicopter recce and could not see the entire west flank where downhill line construction took place.

Communications - there was a lack of communication between the District Dispatch Centre and the Incident Commander regarding the severity of the weather changes. Communication in the fire area was adequate.

Escape Routes - there was a designated escape route along the control line that was being dug along the west flank. There was also an escape route along the ridge line to the heli-spots. The east drainage was described as a possible escape route in an emergency situation back to the interstate access.

Safety Zones - the 2 heli-spots that were to be cleared out completely along the ridge top were used as 2 safety zones. The crews deployed near here. There was no good 'Black' near the west flank due to the downhill line construction.

The US wildland firefighters do not include anchor points in the LCES acronym. An anchor point is synonymous with a safety zone in this safety system based on the continuous burn out practices of the IHC firefighters. They ignite unburnt fuel while constructing a control line, which secures the line while providing a safe area for the crew to retreat to as the fuels have already been removed.

10 Standard Firefighting Orders

- 1) Keep informed on fire weather conditions and forecasts.
- 2) Know what your fire is doing at all times.
- 3) Base all actions on current and expected behavior of the fire.
- 4) Identify escape routes and safety zones and make them known.
- 5) Post lookouts when there is possible danger.
- 6) **Be alert. Keep calm. Think clearly. Act decisively.**
- 7) Maintain prompt communications with your forces, your supervisor and adjoining forces.
- 8) Give clear instructions and insure they are understood.
- 9) Maintain control of your forces at all times.
- 10) Fight fire aggressively, having provided for safety first.

18 Wildfire Watch-Out Situations

- 1) Fire not scouted and sized up.
- 2) In country not seen in daylight.
- 3) Safety zones and escape routes not identified.
- 4) Unfamiliar with weather and local factors influencing fire behavior.
- 5) Uninformed on strategy, tactics and hazards.
- 6) Instructions and assignments not clear.
- 7) No communication link with crewmembers/supervisors.
- 8) Constructing line without safe anchor point.
- 9) Building fireline downhill with fire below.
- 10) Attempting frontal assault on fire.
- 11) Unburned fuel between you and the fire.
- 12) Cannot see main fire, not in contact with anyone who can.
- 13) On a hillside where rolling material can ignite fuel below.
- 14) Weather is getting hotter and drier.
- 15) Wind increases and/or changes direction.
- 16) Getting frequent spot fires across line.
- 17) Terrain and fuels make escape to safety zones difficult.
- 18) Taking a nap near the fire line.