PACIFIC SOUTHWEST REGION

Rapid Lessons Sharing

Engine Incident-Within-an-Incident

On Wednesday, July 31, 2019, Engine 3 is reporting for work at the Monte Cristo fire station. Staffing on the engine module for this day is comprised of a Detailed Engine Captain (CAPT), an Assistant Fire Engine Operator (AFEO), two (2) second year firefighters, and one (1) first year firefighter who is a qualified EMT.

At 09:30, the beginning of shift, the crew performs their morning checks on the Type III Forest Service Engine sitting outside of the engine bay. The sound of brake checks carry throughout the station's parking lot. The station stands prominently as the only occupied building along this remote stretch of highway. There are no stop signs or overhead streetlights, just a long road winding through the center of a 2009 burn scar. The once black steep slopes now emit the golden colors of cured summertime grass with black skeletons of burnt trees peering out of the chaparral brush regrowth.

At approximately 09:50, the crew completes their morning checks and discusses their plan for physical fitness. Wednesdays are typically run days. The middle of the week hosts opportunity to have less traffic along the surrounding roadways making it good for running. Additionally, without the influx of weekend visitors, the call volume tends to be slower giving the crew time for a longer run. The crew begins to change into their running clothes in preparation for their morning workout.

Just as the crew is changing, the CAPT notices a car pull up into the station's parking lot. A man exits his vehicle and approaches the CAPT and says he is in need of assistance. The man reports that his girlfriend, a 50-year-old female, is near the Hidden Springs Picnic Area with a broken ankle and she is unable to get back up the trail. With the lack of cell service in the area, the engine crew is the man's closest/nearest public place to call for help.

Fig 1. Area Orientation Map

Hidden Springs Picnic area is a popular day use area in a remote location of the Angeles National Forest often used by hikers to access the many trails leading from the parking lot. The picnic area is located approximately 1/2 mile from the Monte Cristo Fire Station.

The CAPT immediately reports the walk-in medical emergency to Angeles dispatch and instructs his crew to change back into their boots and greens. After they are changed out, the engine module proceeds to Hidden Springs along with the Reporting Party (RP). This area poses a challenge to responders due to its remoteness, creating a lack of cell service and lack of radio coverage. The engine module is aware that it may take the jurisdictional agencies ground resources at least twenty-minutes to arrive on scene. Knowing they are the closest source of help, being only ½ mile away from the injured party's location, the module plans to provide aid and stabilize the scene until the jurisdictional agency could arrive.

"There is no other way for Forest visitors to get help."

~ Engine 3 Module

Walk-in emergencies are a common occurrence for this station. To prepare for these situations, the engine module conducts several trainings to address medical and trauma emergency responses. The engine is also equipped with a full Basic Life Support (BLS) medical kit including a trauma bag, oxygen bag, and a backboard. Although the primary purpose of this gear is to take care of each other (agency personnel), today, it is needed to serve the public until the appropriate jurisdictional agency could arrive on scene. The crew commented, "*There is no other way for Forest visitors to get help*."

Once on scene, the crew exits the engine and conducts a briefing at the trailhead parking lot. The Engine Operator will serve as a human repeater and remain at the Hidden Springs parking lot. The CAPT wants to ensure a human repeater is in a place to secure communications before proceeding down the trail to the patient. Additionally, he tasks the EMT with patient care and firefighter #2 (FFT-2) to assist. The EMT will carry the first medical bag down and FFT-2 will carry the second bag. Firefighter #3 (FFT-3) is tasked with carrying the back board . The crew is prepared for the potential to have to hike up the trail utilizing the backboard. The crew then follows the RP down the trail to the patient's location near the creek.

Meanwhile, as the crew is proceeding down the trail, a Rescue Helicopter, arrives over the scene. The pilot contacts CAPT over the assigned tactical frequency and the CAPT provides Rescue Helicopter with an update on conditions, stating "we *are headed down to the patient now*." The helicopter remains airborne as the crew continues down the trail.

The Rescue Helicopter relayed via radio to the crew that they have gained a visual of the patient injured at the creek and the crew walking down the trail. The Rescue Helicopter is Advance Life Support (ALS) and hoist capable, however, due to the terrain features; hoist is not an option for this rescue. The creek is saddled at the base of a narrow canyon surrounded by large boulder-like cliff walls. The only landing site available to the Super Puma helicopter is the tight 100' x 100' Hidden Springs trailhead parking lot.

The RP and engine crew proceed down the trail equally spaced with medical gear in hand. Due to the boulder cliffs, tall vegetation and narrow canyon, the trail keeps the view of the creek hidden. As they come to the bottom of the trail, the canyon is narrowed further by the rocky outcroppings and a tunnel of sagging vegetation before giving way to the opening of the creek. The rocks appear to rise straight up for more than 200 feet. The tight spacing of the rocks and the length of cable needed for extraction are not conducive for a hoist operation.

Fig 2. Vegetation at the rescue site

Once the crew reaches the creek bottom, spacing between them increases to 10-15 feet apart to negotiate the hazardous footing of the large slippery rocks. The RP steps aside to reveal the patient's location. He gives the right of way to the responders following behind. The female patient appears to be conscious, lying on her back in pain and gripping her injured leg. The crew cautiously proceeds over the rocks to her location.

At 10:10, the Patrol 4 (PT 4) arrives on scene and parks his vehicle to block entry into the parking lot. Out of routine, PT 4 blocked off the parking lot entry as means to secure the landing area for the Rescue Helicopter. He then proceeds to the AFEO's location. They have a quick conversation before he continues down the trail to assist the engine crew.

Fig 3. Actual tree that struck the firefighters

At 10:12, the CAPT is the first to the patient. Following shortly behind is the EMT. They introduce themselves to the patient and begin a patient assessment. The CAPT kneels on one side and the EMT kneels on the opposite side of the patient between the rock wall and the creek's edge. The CAPT provides another update to Rescue Helicopter stating that they had made contact with the patient. The CAPT stated, "*Stand by for a patient assessment*."

Shortly after, the crew hears the loud pulsing sound associated with the rotors of an approaching helicopter. The sound of the blades echo loudly against the narrow rock canyon walls. Expecting the helicopter to pass over, the CAPT leans over the patient in an attempt to shield her from the pending rotor wash. He remarks, to the patient "*this will pass shortly*." Just as he finishes his statement, a wave of rotor wash and debris begins whirling around the canyon bottom. The EMT mirrors the CAPT body position and shields the patient from the rotor wash.

FFT-2 arrives just outside of where the CAPT and EMT are conducting patient care. He turns around to set the medical bag down. As he turns back around toward the patient, he sees events unfold as though they are moving in slow-motion. He hears a "WHOOOSH", then sees a 10" diameter tree coming from the rocks above striking the EMT and CAPT on the head. The two fall back-wards face-down into the water. The momentum of the helicopter's fly-by may have dislodged the downed tree from the slope above.

Fig 4. Tree Diameter estimated to be 10 inches

"I remember thinking 'Oh S#@t!' "
~ (FF-2)

"It was like a bad joke."

~(FFT-3 standing just slightly behind FFT-2)

FFT-2 immediately reacts and runs into the water toward the body closest to him. It is the EMT. He grabs and pulls him to the side of the embankment. FFT-3 runs toward the CAPT and pulls him out of the water. They began trying to wake the injured firefighters. FFT-3 remembers, "*About 15 seconds later, he (CAPT) started coming to. He was slurring words and was not able to speak coherently for a couple of minutes.*" He attempts to keep his CAPT seated.

FFT-2 knows he has to make emergency notifications. He grabs the EMT's radio out of his Flame-resistant (FR) pants and calls "emergency traffic" over Forest Net but receives no response. After a few seconds, he realizes that the radio is fried from water damage. He then grabs his own radio, which he had staged by the medical gear. He once again tries to reach Angeles dispatch with no success. He then tries the AFEO, staged as a human repeater, on the tactical frequency. She responds and successfully relays the emergency traffic information to Angeles dispatch at 10:14. FFT-2 also re-quests the AFEO make contact with the Rescue Helicopter and tell them to pull back due to hazardous conditions. As the AFEO tries to gain a patient assessment from FFT-2, she experiences ex-tremely congested radio traffic on the tactical frequency from other resources trying to respond to the scene. This is her only communication link with the crewmembers down below.

Meanwhile, FFT-2 and FFT-3 continue patient care. The EMT is now the priority of the three patients since he is still in and out of consciousness. At times, he (EMT) is heard repeating his name and other times, he is silent.

CAPT quickly regains consciousness becomes alert, oriented, and fully aware of the emergency that his second year firefighter is managing. The CAPT is slightly combative from the head injury and is in disbelief that he had been knocked out by the tree strike. Feeling obligated to manage the scene; he grabs a radio, makes contact with the AFEO, and regains control of the scene.

Fig. 5 Rescue site in narrow canyon

FFT-2 returns to provide care to the EMT, while FFT-3 provides care to the civilian patient. Other resources begin to arrive amid the chaos to provide much needed assistance: Angeles PT 4, the ALS medics who relieve the firefighters of patient care, and Engine 4 who takes over the care of the civilian patient.

After further assessment by ALS, a quick action plan is developed to hike the EMT out by backboard to the parking lot and fly him out on the Rescue Helicopter. CAPT is going to be escorted by an ALS medic and will walk out under his own power. He will then be transported in the Rescue Helicopter with the EMT. The civilian patient is to be hiked out by backboard and transported by ground ambulance from the parking lot.

The hike out is approximately ½ of a mile to the parking lot. First up the trail is the EMT. At first, each responder grabs a corner of the backboard and begins walking. About half way up the trail, they rotate positions to manage fatigue. The CAPT follows behind. Last, is the civilian patient who is carried by the engine 4 module. Once they reach the parking lot, the two Forest Service patients are loaded into the Rescue Helicopter and the civilian patient is transported by ground ambulance as planned.

Rescue Response Timeline

10:00 Engine 3 Responded to walk-in report of a medical emergency in Hidden Creek
10:05 Los Angeles County Fire Department dispatches a response
10:10 Patrol 4 on scene
10:12 Engine 3 make contact with patient
10:14 Emergency traffic, two firefighters struck by tree
10:18 Rescue Helicopter lands at parking lot
10:19 Los Angeles County Fire department on scene
10:25 Engine 4 on scene
10:36 Crews begin packaging patients for hike out
10:39 Crew begin hiking FS patients out to parking lot for transport
10:44 Two Forest Service firefighters loaded in Air 5
10:47 Civilian patient being hiked out
10: 52 Rescue Helicopter lifts for Huntington Memorial Hospital
11:01 Civilian patient transported by ground ambulance

Total Rescue Response time: 1 hour, 1 minute

EMT Helmet Assessment

Note the impact to left rear area of the helmet. The helmet did not crack as this was a glancing impact, but notice the plastic is disturbed where the tree heavily scuffed, balling the plastic.

4 out of 6 Suspension Keys were damaged beyond repair. Once a helmet has sustained any type of damage, it shall be replaced.

Note the strap mark inside the helmet. This indicates the helmet suspension system flexed to its full motion making contact with the inside of the helmet. This area of the helmet is known as the "energy absorption zone". Firefighters have used this void to store items. Limiting the amount of suspension travel can greatly diminish this safety feature of the helmet design causing an increased risk of a head injury. This area must be kept free of any items including shrouds and bandanas.

***Energy Absorption Zone**: During an impact this area is designed to allow both the outer shell to deform and the suspension to stretch, which absorbs impact energy before it reaches the user.*

For more info on helmet inspections, please visit:
https://www.nwcg.gov/committees/equipment-technology-committee
and look for the Helmet section of the page.

Lessons Learned

- The crew had a robust training program, which included incidents within an incident (IWI) and helicopter operations
- Each engine crewmember possessed a radio and received adequate training on its use
- The value of PPE, especially the hard hat cannot be under stated. This prevented further injury to the firefighters
- Remember to use radio discipline during emerging incidents. Consider the impacts of all incident frequencies during emergency incidents
- All patients received ALS care within the Golden Hour
- It is important to stay cool, calm, and collected. This can be difficult when one of your crewmembers is involved
- Rotate different leadership roles during IWI training to simulate key players (i.e. leadership or EMT) being incapacitated
- Recognize the human element and perception of time - the rescue seemed to move slower than it actually did (refer to timeline)

Discussion Points—What would you do if this happened to you?

- What would you do if your EMT is the patient?
- Is your seasonal firefighter prepared to run the incident?
- Are there areas on your forest where communications are poor?
- How would you mitigate rotor wash during an aerial rescue?

Fig. 6—the culprit tree