

**Preliminary Summary Report of Serious or Near Serious
CAL FIRE Injuries, Illnesses and Accidents**



GREEN SHEET

Fatality Firefighter Entrapment

12/14/2017

Thomas Fire

17-CA-VNC-103156

California Southern Region

SUMMARY

On December 13, 2017, a CAL FIRE Engine Strike Team (STEN1), with a leader (STL1) from the San Diego Unit (MVU) was assigned to Branch III, Division X of the Thomas Fire above the community of Fillmore in Ventura County, California. On the morning of December 14, 2017, a Fire Apparatus Engineer (FAE1) and four Fire Fighter I's (FF1, FF2, FF3 and FF4) from STEN1 were engaged in the placement of a hoselay in support of a dozer line with fire established above the line. At approximately 9:27 AM, while attempting to suppress spot fires below the dozer line, FAE1 became entrapped and suffered fatal injuries. The four firefighters on the dozer line retreated up their escape route without injury.

CONDITIONS

Location

The entrapment site is located in the eastern portion of Ventura County, north of the town of Fillmore. The entrapment site is along the base of the eastern portion of Santa Paula Ridge, southeast, and below San Cayetano Mountain.

Fire History for the area

The entrapment site lies within the footprint of the:

Boulder Creek Fire	1957	3,734 acres
Grand Fire	1996	10,949 acres
Piru Fire	2003	63,719 acres

Weather

The Temescal RAWS unit is 11.5 miles northeast of the site at an elevation of 1,124 feet and representative of the conditions at the time of the entrapment:

Temperature: 71° Fahrenheit

Relative Humidity (RH): 7%

Winds: Northeast 10 mph with gusts to 19 mph

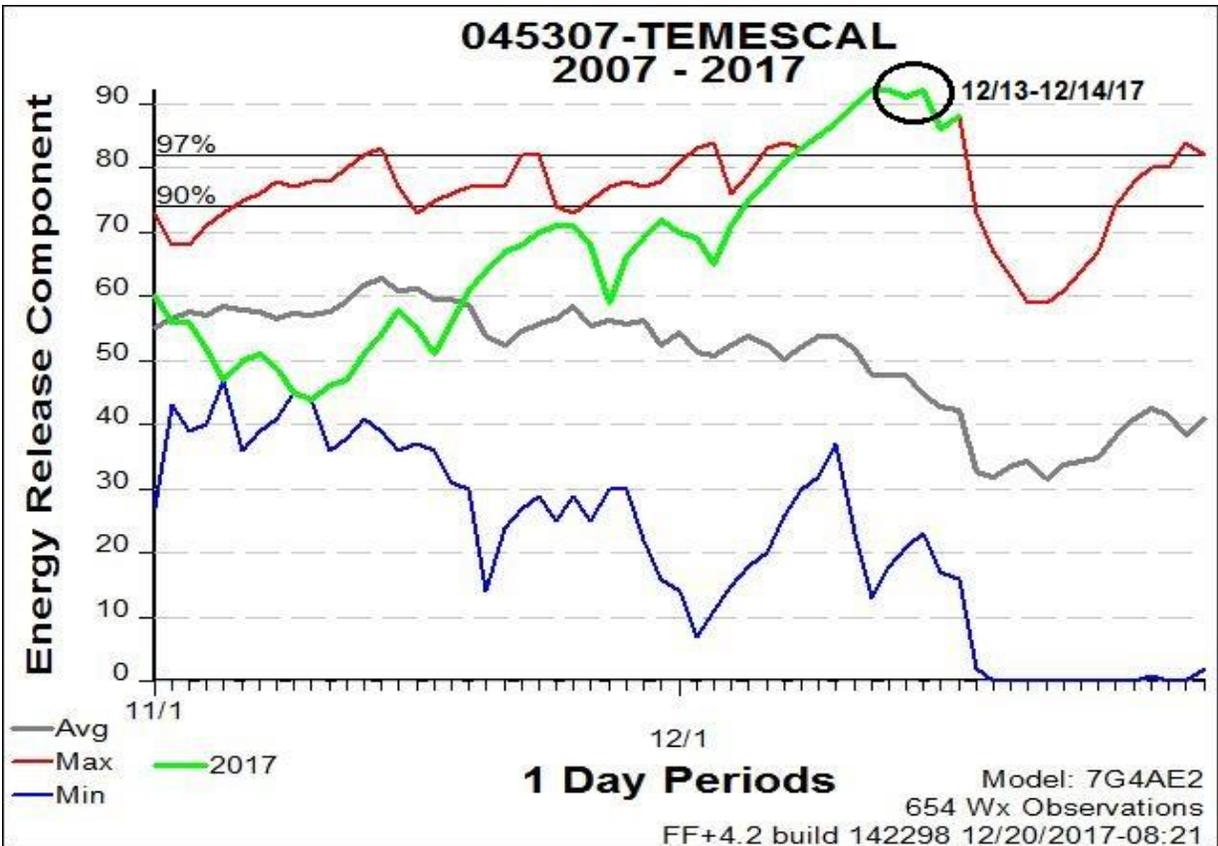
Visibility: Clear

Fuel Types and Conditions

The Thomas Fire perimeter consists of different ecological zones, within a Mediterranean climate. Fuels found at the site include: annual and perennial grasses, Arundo (four feet height), White Sage, Chamise, Laurel Leaf Sumac, and Live Oak. The area also contains multiple large avocado orchards with abundant leaf litter, and orchard slash that had been left in the drainages. Densities of fuel types varied according to elevation and aspect, with the grasses mainly above the 1,800 foot elevation, and the mixed shrub material below that level.

Fuel Model 4 made up the predominant vegetation. Live fuel moistures collected in the area between November 15, 2017 and December 15, 2017, showed a 7% drop to 53%, well below the critical stage of 60%.

The Energy Release Component was also at historical levels. On the day of the entrapment, the levels had reached a 10-year high of 92.



SEQUENCE OF EVENTS

On December 2, 2017, the Oxnard Office of the National Weather Service issued a Red Flag Warning for the Ventura County area, ending on December 15, 2017. In the days to follow, this would become the longest continuous Red Flag Warning ever issued in the State of California, lasting 13 days.

On December 4, 2017, at approximately 6:28 PM, the initial dispatch was made by the Ventura County Fire Dispatch (FCC) for the Thomas Fire, near the community of Santa Paula in Ventura County, California.

On December 5, 2017, at 2:35 AM, STEN1 (E1, E2, E3, E4 and E5), was dispatched to the Thomas Fire by the Monte Vista Emergency Command Center (ECC), located in the CAL FIRE San Diego Unit (MVU).

From December 5 to December 12, 2017, STEN1 was assigned several 24-hour Division assignments in Branch's II and III with 24-hour rest days in between. During the course of the assignment, E5 was placed out of service due to a mechanical issue and remained out of service through the date of the eventual entrapment. The crew members of E5 were assigned to the remaining four engines.

On December 13, 2017, at 7:00 AM, STL1, and all five Company Officers attended the morning briefing at the Ventura Incident Base for the Thomas Fire.

At approximately 8:30 AM, STEN1 arrived at Division X, and waited in a staging area, while STL1 and the Division X Supervisor (DIVS X) scouted the division and reviewed the assignment for the shift. While staged, STEN1 conducted a tailgate safety briefing. Upon STL1's return, a second safety briefing occurred covering their specific line assignment. At approximately 10:00 AM, STEN1 left the staging area and reported to their work location for this shift. The assignment for the day was to mop up a slop-over on a ridge to the southwest of the avocado orchard that occurred on the prior shift. STEN1 worked this section of Division X the entire day of December 13, 2017.

From 10:00 PM on December 13, 2017, to 3:30 AM of December 14, 2017, STEN1 stayed in position around their work location for that day, without any further work being found.

At approximately 3:30 AM, the wind picked up. STEN1 was alerted to the increase in winds, and a glow was observed to the north of the Santa Paula Ridge line.

At approximately 4:30 AM, STEN1 took action, on several small hot-spots, glowing in the black (an already burned area), along the ridge, where they worked the day before.

At approximately 6:07 AM, fire activity increased below the crest of the north aspect of Santa Paula Ridge, north of STEN1 engines.

At approximately 6:30 AM, STL1 ordered the engines to top off with water at the water tanks, located east of the eventual entrapment site, on the mid slope road.

At approximately 6:55 AM, the Fireline Paramedic (FEMP) for Division X heard radio traffic on the assigned tactical frequency that fire activity was increasing in Division X, and relocated to an area near the increasing fire activity.

At approximately 7:00 AM, while at the water tanks, STEN1 noted the fire had spotted on the south aspect of Santa Paula Ridge, and began burning down slope to the southwest, with increased intensity. Due to the increased fire activity, STL1 ordered the engines to meet up in the avocado orchard.

At approximately 7:15 AM, the last engine, due to fire activity, E3, crossed the mid-slope road quickly. This fire activity caused STL1 to lead a private water tender from the water tanks, east, and back around to the avocado orchard. The fire then slopped over the mid-slope road just above the drainage that would become the eventual entrapment site.

At approximately 7:45 AM, the winds calmed down and changed direction from a westerly to an easterly up-canyon wind with a corresponding reduction in fire intensity below the mid-slope road.

At 7:55 AM, the Helicopter Coordinator (HLCO), arrived over Division X.

At approximately 8:00 AM, STL1, HLCO, two private hired dozers (DZ1 and DZ2) developed a plan to construct direct dozer line below the slop over, from the water tanks, and tie into the mid-slope road, near the avocado orchard. This dozer line would then be supported with a hoselay off E1, with E2 and E3 in support. STL1 communicated with HLCO, who also agreed with the plan and could support it with two copters.

STEN1 attempted to establish an anchor point (a safe place for firefighters to start building fireline) for their hoselay off the mid-slope road at the orchard without success. Fire intensity increased in the corner between the mid slope road and orchard, causing E1 and E3 to reposition.

At 8:14 AM, DZ1 and DZ2 began constructing direct line from the water tanks to the upper corner of the avocado orchard at the mid-slope road. E1 and E3 left to refill both engines with water.

One CAL FIRE copter (Copter 1) and one Type 1 Call When Needed (CWN) copter arrived to support the dozer line. HLCO directed the CWN copter to drop retardant along the dozer line.

At 8:40 AM, DZ1 and DZ2 completed the dozer line. E1 and E2 repositioned at the top of the avocado orchard on the mid-slope road and prepared to reengage the hoselay.

The Fire Captain from E5 (FC1) identified a lookout point near E4, southwest of the eventual entrapment site, and communicated to STEN1 that he would be the lookout. STL1 met with FC1 at the lookout point and discussed starting a hoselay along dozer line. Both agreed the plan was viable.

At 8:56 AM, DZ1 and DZ2 returned to the water tanks via the mid-slope road.

Before starting the hoselay, FAE1 told the firefighters their safety zone was into the 'black'. FAE1, and all four firefighters, were wearing all their required Wildland Firefighting Protective Ensemble (WFPE). FAE1 and the four firefighters were wearing hose packs, each containing 300 feet of 1 ½ inch hose. FF2 carried additional rolls of hose on a hand tool. Additionally, FAE1 was carrying a scraping tool.

FAE1, FF1, FF2, and FF3 began their hoselay from E1, with E2 and E3 supporting the hoselay. FF4 joined the hoselay after the hoselay had started. Prior to the hoselay starting, the fire had backed to the dozer line. The fire intensity was described as low with an upslope wind pushing the smoke column in a westerly direction. In isolated areas, the fire was backing to the dozer line.

STL1 relocated to a small clearing on the edge of the lower avocado orchard, below and to the southeast of the dozer line, where he had a complete view of the operation.

FAE1 scouted out in front of the hoselay, contacted STL1 on the assigned tactical frequency and informed him they were making good progress.

As the hoselay progressed, FAE1 directed FF1 where to put water along the dozer line to cool the edge of the line.

E4's operator saw a "little flare-up in the black," near the top of a small spur ridge along the dozer line. The heat from the little flare-up "edded out and leaned over the dozer line." Immediately after the flare-up, E4's operator saw a small column of smoke from a spot fire, on the edge of the "green" (an unburned area), near the little flare-up.

E4's operator contacted FAE1 on the assigned tactical frequency, to report a small spot fire right in front of FAE1 on the edge of the dozer line. At that time, FAE1 was standing on the dozer line, near the top of the small spur ridge, east of the eventual entrapment site.

At the time of the reported spot fire, the hoselay had extended 700 feet, and was just west of the top of the spur ridge and FAE1's location.

FAE1 responded on the assigned tactical frequency, that he saw the spot fire. He engaged the spot fire that was on the edge of the dozer line with his hand tool.

Immediately after the report of the spot fire, a second spot fire was reported approximately 20 feet into the green.

At some point, before leaving the dozer line, FAE1 dropped a 100 foot length of hose from his hose pack on the dozer line. This action left 200 feet of hose still in his hose pack.

As FAE1 reached the second spot and began to take action, it erupted. At the same time, additional spot fires erupted along the dozer line west of the original spot fire. FF1 sprayed in the direction of the spot fires. The spot fires rapidly increased in size and the hose stream was ineffective. FAE1's escape route back to dozer line was cut off. FAE1 began traveling southwest, paralleling the dozer line. Due to fire intensity, FAE1 turned and headed down slope to the south. FAE1 made a request, on the assigned tactical frequency, for immediate air support. This was the last confirmed radio transmission by FAE1. STL1 contacted HLCO for immediate air support. HLCO responded, he had additional copters coming in and they too would begin to work the area.

At approximately 9:25 AM, FC1 reported to FAE1 on the assigned tactical frequency, additional spots were below him and he told FAE1 to "Get out of there."

The fire intensity increased in the green along the dozer line. FF1 and FF4 retreated along the dozer line, while FF2 and FF3 retreated along the dozer line and then up into the black, towards the mid-slope road. All four FF's dropped their hose packs on the dozer line while retreating.

At approximately 9:27 AM, FC1 declared, on the assigned tactical frequency, "Mayday, we've got a firefighter down." FC1 then clarified, "We have a firefighter trapped." STL1 confirmed with DIVS X he copied the "Mayday" of a firefighter trapped. DIVS X acknowledged the traffic with STL1 and requested, through Thomas Communications, an ALS ambulance to the address of the staging area below the avocado orchard.

At 9:28 AM, the response from Ventura County Fire Station 27 was started. Copter 1, and two CWN copters, continued working the area below the dozer line attempting to provide an escape route for FAE1. These copters saw FAE1 retreating down through the green.

At that time, two spots erupted down slope and south of FAE1, in his path, causing him to turn southwest and start down slope toward the eventual entrapment site.

FC1 saw FAE1 fall and lost sight of him. Copter 1 also saw FAE1 fall, but get back up and continue down slope toward the eventual entrapment site.

It was described by those who saw FAE1 moving through the vegetation that the height was chest to head high; and in some cases, all that could be seen was the top of his helmet.

Prior to the fire, the vegetation height and thickness masked the view of the deep gulch in the drainage, which was the location of the eventual entrapment site.

STL1 contacted HLCO, re-confirmed a firefighter was trapped, and was told by HLCO, six helicopters were enroute.

The additional CWN copters arrived and each copter began working the area where FAE1 was last seen. Those copters dropped retardant at first, and then switched to water due to a faster turnaround time.

At 9:34 AM, Ventura County Fire Department Air Squad (ALS transport helicopter) was dispatched to Division X.

At approximately 9:37 AM, STL1 directed E1, E2 and E3 to reposition to the lookout point with FC1 and E4. FC1 directed E4 crew to cool down the edge below the lookout to create an access point into the black so they could search for FAE1.

Due to a large jackpot of orchard slash below the lookout point, the access to search for FAE1 was slowed. Copters began to drop along the edge of the road to cool the large jackpot.

At approximately 9:46 AM, FF2 and FF3 completed traveling through the black. They joined FF1 and FF4 who had already made it back to E2, and all were accounted for.

At approximately 9:47 AM, STL1 completed a Personnel Accountability Report (PAR) and reported to DIVS X the accountability of all minus one.

Multiple water drops by the copters in and around the entrapment site were successful in cooling the area down.

At approximately 10:00 AM, FC1, from his lookout point, entered the black and traveled in the direction of where he last saw FAE1.

At 10:05 AM, FC1, notified STL1 that he had located FAE1, who was deceased, with no shelter deployment. FAE1 was found in a deep gulch, below his last seen position.

STL1 directed all STEN1 personnel to stage at the engines.

STL1 arrived at the entrapment site with FC1, and both remained with FAE1 until additional CAL FIRE personnel arrived and relieved them.

CAL FIRE personnel remained with FAE1; and later escorted him from the scene.

INJURIES/DAMAGES

1. FAE1 suffered fatal thermal injuries and smoke inhalation.
2. No other injuries were reported.

SAFETY ISSUES FOR REVIEW

1. Remember Common Denominators of Fire Fatalities
 - Most incidents occurred on relatively small fires or isolated sections of Large Fires.
 - Unexpected or unpredicted winds were often given as the major cause of “Erratic Behavior”.
 - Most of the fires were innocent in appearance (in some cases the mop-up stage) prior to the flare-up or blow-up.
 - Flare-ups occurred in deceptively light fuels.
 - Fires ran uphill in chimneys, gullies, or on steep slopes.
2. Adhere to the 10 Standard Fire Orders, at all times.
 - Base all actions on current and expected behavior of the fire.
 - Identify escape routes and safety zones, and make them known.
3. Be Aware of the 18 Situations that Shout “Watch Out”.
 - You are in an area where you are unfamiliar with local factors influencing Fire Behavior.
 - You are in heavy cover with unburned fuel between you and fire.
 - You notice that the wind begins to blow, increase or change directions.
 - You are getting frequent spot fires over your line.
 - You are away from a burned area where terrain and/or cover make travel slow and difficult.
 - Safety zones and escape routes have not been identified.
4. Discard hosepacks or any equipment that you are carrying that will slow you in reaching your safety zone.

INCIDENTAL ISSUES/LESSONS LEARNED

Steep terrain, hazardous weather (erratic winds, record low RH, red flag warnings) and heavy fuel loading, made access difficult and fire behavior extreme. The Fuels and Fire Behavior Advisory for the Southern California Geographic Area Coordination Center, dated December 15, 2017, states “Fire behavior that has been observed on the Thomas Fire, as well as some of the other recent fires, has been extreme”. Fires are actively backing downhill and into the wind, in both the fine dead fuels, as well as the heavier chaparral. The 100-hour dead fuel moisture is normally in the mid-teens, but values of around 2% have been commonly observed. Fires have exhibited extremely high resistance to control, and retardant in many cases has been proven to be ineffective. (This is a testament to the terrain, fuels and fire conditions FAE1 faced, on the morning of December 14, 2017.)

A regular review of the Foundations of Safety for Wildland Firefighting is warranted. The Standard Orders and Watch Out Situations were developed in 1957 after fires cost firefighter lives. The Common Denominators were published in 1978 after careful analysis of previous fatal fires.

One spot along the dozer line was safe enough to pick up. When there were spot fire(s) that prevented safe travel back to the dozer line, a re-evaluation should have taken place.

A change in the current or expected fire behavior, that changes tactics, requires a tactical pause and re-evaluation of the situation. “Is the plan still good, with viable identified escape routes?” “And what is the risk versus gain?”

Provide for Safety First, so we can “Fight Fire Aggressively”.

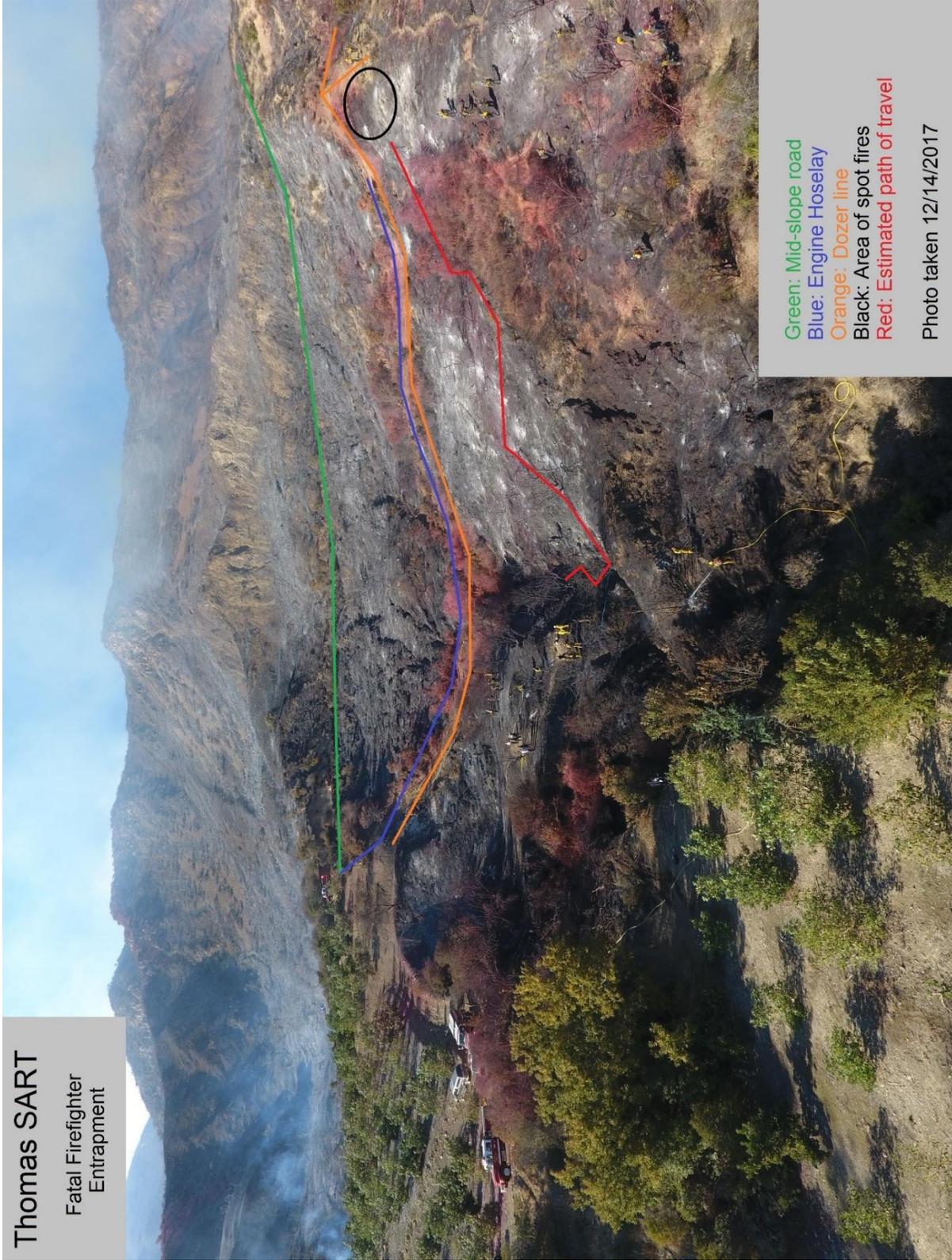
PHOTOS/SITE DIAGRAMS/MAPS



View of entrapment site looking northwest



View of entrapment site looking northeast



View of entrapment site looking northwest



View of entrapment site looking north



View of entrapment site looking south