

# **Loop Fire Angeles National Forest November 1, 1966**

## **Personal Accounts of Events by Rich Leak, El Cariso Hotshots**

I am a survivor of the Loop Fire where 12 firefighters lost their lives. I suffered third degree burns to both arms, fourth degree burns to both hands and lost two fingers on each hand. I also suffered second degree burns to both legs.

The following is my personal account and my observations on the fire line, my actions and my detailed explanation of the factors which caused the explosive fatal flare-up, and explain why this fire resulted with fatalities.

Just a real brief summary of my Fire Department background: At age 18 I joined the US Forest Service, El Cariso Hotshots, Cleveland National Forest. I spent two seasons with them in 1965 & 1966. In 1966 I was hired on as a Crewboss and in the middle of the fire season I was promoted Captain of Crew 2.

After recovery from burns suffered on the Loop Fire, I had a 30 year career with the City of Vista Fire Department and retired as their Senior Fire Inspector / Senior Fire Investigator.

My account of the Loop Fire is not my intention to make you a Wildland Firefighter expert, but it is my goal to provide you with some lessons learned and to provide you information to add to your arsenal of knowledge of Wildland Fire Behavior.

The most important advice I can give you is to learn as much as possible about Wildland Fire Behavior. Knowledge of Wildland Fire Behavior is the key to predicting what a fire will do and allow you to develop strategies and tactics in safely combating fire.

One of the biggest factors that influence Wildland Fire Behavior is the weather. The 1966 fire season was so severe because of a few factors.

1. The winter rainfall for the 1965 & 1966 seasons were well below average. The lack of rainfall contributes to the reduced vegetation fuel moisture. The fuel moisture on the Loop Fire was at 60%. Any less fuel moisture the vegetation would not survive.
2. In California we have what is called Santa Ana winds. These winds occur when there is a high pressure over the four corners of Utah, Colorado, Arizona and New Mexico. This high pressure forces very strong dry hot winds from the East across the deserts into California. These winds can reach 60-65 miles per hour, which increases temperatures and reduces relative humidity.
3. There were 6 Santa Ana wind events during September and October just prior to the Loop Fire. Santa Ana winds usually last an average of 3 days, then the normal westerly winds return. It is important to note that the Loop Fire occurred on the third day of the Santa Ana wind event.

On November 1, 1966 at 05:19 a fire started on the Angeles National Forest on the ridge line above the head of Loop Canyon. A Fire Weather Forecaster issued a warning of Santa Ana conditions in the fire area. Winds from the NE at 30-40 MPH with temperatures of 95 degrees and relative humidity of 10%.

After learning we had been dispatched to the Angeles Forest I had some real concerns. Not only because of the hot dry conditions along with Santa Winds, but after having been assigned on several fires in the Angeles I knew the topography is extremely steep with rocky terrain. Very dangerous mountains.

At 14:30 Hrs. we arrived at Contractors Point located at the top of Loop Canyon. Our Superintendent Gordon King made contact with the Line Boss. The Line Boss told Gordon that the fires progression had stopped along the West side of the ridge line that continued down to the river bottom.

Gordon was also informed that Chilao, Dalton and Del Rosa Hotshots were already on scene and had been constructing line. The Line Boss assigned Gordon to leap frog ahead of Del Rosa Hotshots and cold trail the fire's edge down the ridge line to the river bottom and tie into the County Crews working at the bottom.

Gordon was advised there were no radios available. Del Rosa was given the last radio. We had no communications with the crews we leaped frogged or with the County Crews we were to tie into below.

To my knowledge there were a few things that the Line Boss did not relay to Gordon.

1. No mention of any kind of micro climate in the area.
2. No mention of any typical wind patterns in the canyons.
3. No mention that the assignment had previously been turned down.

***That might have been valuable information why the assignment had been turned down.***

Gordon accepted the assignment and gathered the crew together. Gordon relayed to us our assignment was to cold trail the fire's edge down the ridge line and tie into the County Crews at the bottom.

We normally had 2-15 man crews, but were short handed that day and the decision was made to combine both crews into one. I was assigned to the front of the crew and John Moore, Captain on Crew 1 was assigned to the rear.

One of the first things that I noticed when we arrived at Contractors Point was that the Santa Ana winds had died down to just a breeze. I was really relieved the winds had died down but I knew they could return at anytime.

The next thing I observed (***which was a Red Flag to me***) that we were going to construct line downhill. The slope was very steep in this area around 60 degrees. Even though we were to construct line downhill I felt since the fire on the ridge line had gone out, we would be cold trailing the fire's edge and, we would have one foot in the burn which would allow us a safety zone, that it would be a reasonable risk to take.

After constructing line down the steep slope, the ridge line flattened out which lead us to a ridge point where it dropped off into a steep chimney chute. We came to an area where we had to cross over a slide area at the top of the chimney chute. Gordon observed rocks falling down from the vertical cliff at the top of the chimney. Gordon decided to have one man cross at a time and have the next man in line be the lookout for falling rocks. At this time falling rocks were our main safety concern and not the fire. The fire at this point was still over the West side of the ridge into a large canyon known as Deep Canyon. At this point I observed no fire or smoke within the chimney chute and very little smoke from Deep Canyon.

The chimney chute was approximately 2200 feet in length. Most of the chute was a 60 degree slope. The width of the chute varied from 25 feet wide at the top and 100 feet at the bottom. The depth of the chute varied from 10 to 15 feet. The bottom of the chute was shale rock 25 to 30 in wide. The chute was devoid of vegetation except for very sparse grassy vegetation on the sidewall of the chute. At one point in the chute there was some sparse small chamise and chaparral brush where the fire had sloped over into the chute. This brush was taken out to tie the line into the rocky chute.

At the bottom of the chute where it widened and flattened out, it connected to a ravine from the Deep Canyon and continued out to the river bottom. At this point we could see the County Crews along with a dozer. We were approximately 500 feet away. This ravine was approximately 30 feet across and 50 to 75 feet deep with vertical walls. ***(This ravine would play a critical role in the fire behavior.)***

At the bottom of the chute there was an increase in the amount of vegetation. There were larger bushes of chamise and sumac, but still fairly sparse. When Gordon got to the ravine he made the decision not to follow the fire's edge into the ravine because it was too steep and not a safe place to construct line. Gordon made the decision to cut an indirect line and tie into the dozer line at a different location.

It would have taken approximately 15 to 20 minutes for us to construct line and connect to the dozer line.

**Around 15:50 a spot fire started in the ravine below us and all hell broke loose.**

We heard the command, Reverse Tool Order. This meant to haul ass out to the safety zone which was up slope to the slide area. Most of the crew were in the slide area but 10 members were constructing the indirect line out of the slide area. I took approximately 10 or so steps and I heard a really loud boom. Sounded like a bomb exploding. I turned and looked over my shoulder to see what happened and all I could see was a solid wall of orange flames. I had to look straight up to see blue sky.

Then all I heard is what sounded like a jet engine coming at me then a "shock wave" hit me. The "shock wave" was so strong that it knock me down to the ground.

All of a sudden it started to get real hot. It just kept getting hotter and hotter. ***(The official investigation report concluded the temperature reached 2500 degrees)***. I thought the heat would never end. It seemed like the heat lasted a life time but in reality it only lasted 30 to 60 seconds. ***(Frankly I think it only lasted 30 seconds.)***

***(Important to note the heat lasted only for that short period of time)***

I remember thinking that I don't know how much more heat I could stand. I remember thinking to myself that this is it. I am going to die.

Suddenly I remember I was not hearing any noise, just total silence. I thought maybe I was dead. It was like I was in my own little world. Then all of a sudden it got real cool. It really felt good.

I finally realized that I was still alive, but I could not figure out what the hell had just happened.

**I want to stop at this point and take you back just before the Reverse Tool Order was given and explain what had just happened.**

According to the official fire investigation report the following factors contributed to the cause of the flare-up:

Normal fire spread into the canyon bottom under moderate Santa Ana conditions.

Localized convection currents increased the fire movement into the gully.

The helicopter in dropping water could possibly have fanned the fire.

A contributing cause to the explosiveness of the flare-up was the radiation of heat from the spot fire that started in the ravine and spread to the brush at the bottom of the chute.

**One factor that was not reported was a sudden strong shift of wind from the West.**

***(Note: At the end of a Santa Ana wind event the wind changes and blows from the West)***

I personally did not feel the wind change because I was sheltered in the chimney chute. John Moore was at the top of the chimney chute and he confirmed to me he felt the strong shift in the wind which happen suddenly.

***(It is important to note that all the above factors came together at about the same time.)***

My only question is what caused the "shock wave"?

**Let me take you back again prior to the Reverse Tool order and tell you what I observed.**

About 10-15 seconds before the reverse tool order was given, I observed something that I hope I never see again or anyone else would ever see.

**The best way to describe it is:**

What I observed was it looked like seeing heat waves from a mirage or seeing gasoline vapors coming out of a gas can on a hot day.

I knew it was not heat waves because there was no increase in temperature from the waves. I knew these waves were not from a mirage because heat waves from a mirage are off in the distance. The waves I was seeing was all around me. The waves were so close I could reach out and touch them. As a matter of fact I raised my hand up and I could still see the waves between me and my hand. Also there was no smell associated with the waves.

John Moore was the only other person I know that also observed these waves.

I did not understand what I was seeing at the time but I knew something was not right. That's when the fire blew up.

## **To understand what I had seen, it is important to understand the components of fire.**

A simple explanation of the components of fire is: Fuel, Heat and Oxygen which we call the Fire Triangle.

Actually there is another component of fire which we call a Tetrahedron. The Tetrahedron is a chemical chain reaction. When fuel is heated this chemical chain reaction generates gases. It's the gases that burn and not directly the fuel.

### **There are basically three stages of Fire:**

The "Incipient" stage where preheating takes place.

The "Smoldering" stage which begins with ignition of the fuel and includes the initial stage of combustion without flaming.

The "Flaming" stage is where the ignition temperature is reached to produce flame and continues to a fully developed fire.

All three stages of fire generate gases except that the "Incipient" and the "Smoldering" stages have not reached the ignition temperature to produce flame and burn off the gases.

After the gases have been generated they are transported away from the source by convection movements and or air movement.

***The chemical chain reaction generating these gases was exactly what was happening in this fire. Large quantities of gases were being produced.***

The explosive fire flare-up occurred when you add up all the following contributing factors:

Normal fire spread into the canyon bottom under moderate Santa Ana conditions.

Localized convection currents increased the fire movement into the ravine.

Build-up of gases in the Deep Canyon and the ravine

The helicopters rotor wash probably added instant wind forcing wind movement from the Deep Canyon pushing the gases down the ravine and adding oxygen to the area causing the spot fire.

The sudden strong shift of wind from the West forcing the wind up the ravine from the river bottom to below the chimney chute.

The radiation of heat from the spot fire in the gully.

All of the above factors came together in a sequence at the same time. The radiation of heat from the spot fire in the ravine and the sparse brush that was burning at the beginning of the chimney chute in my opinion would have burned longer than 30-60 seconds with the flare-up. The normal burning of brush up hill would not have cause a "Shock Wave".

In my opinion the cause of this explosive flare-up (which only lasted 30-60 seconds) was all the above contributing factors but the main factor was the build-up of gases which was ignited by the spot fire in the ravine below the chimney chute. The only reason the fire burned for only 30-60 seconds was because all the gases were consumed in that time period.

When the gases were ignited by the spot fire, that is what caused the explosion. Explosions cause "Shock Waves".

Visualize a charcoal barbeque and pouring charcoal lighter fluid in large quantities onto the charcoal. Then taking a match and throwing it into the charcoal. If you are standing too close you will hear the sound of "woof" and then feel the air movement.

This is what I heard and felt only on a larger scale. The "woof" sound was the loud boom I heard and the air movement was the "Shock Wave" I felt.

### **Ok. Getting back to after all hell broke loose and the area cooled down.**

I was probably in shock and my eyes were blurry and I was starting to hear noises again. I got my eyes cleared and saw several guys lying on the ground next to me and they were on fire. The only thing going through my mind was I needed to help and take care of my crew members.

With not thinking clearly I was trying to beat the fire out with my hands on the guy next to me. I had no gloves on. ***(Mistake made)***

After I put the fire out on the first guy I noticed all this skin hanging off my arms. My sleeves were rolled up past my elbows. ***(Mistake Made)*** I thought to myself, that doesn't look good. I don't think I fully understood what I was seeing. I was not feeling any pain.

I remember trying to help several other guys and putting the fire out on them. I didn't realize at the time these guys had perished.

I started to hear voices and I thought I recognized Ed Cosgrove's voice. ***(Ed has been one of my best friends since our first year together in 1965 with the El Cariso Hotshots.)*** We worked our way toward one another along with a few other guys. Ed and I talked and agreed that we were going to quit this job because it was too dangerous. This is how you think when in shock.

Wasn't too much longer we heard a helicopter. It was trying to land below us. To this day I really can't remember where I ended up in the line-up or how we got down to the helicopter. I remember the helicopter trying to land and the rotor wash blew dirt into my eyes. I thought to myself, crap now I can't even see. I finally got my eyes cleared.

The slope was so steep the helicopter pilot had to balance one skid on the rock and just hover there. I started helping guys onto the copter. I believe I was the last one off the hill.

I like to fly in helicopters and that was the best copter ride I have ever had. It was cool getting off from the heat of the mountain. It was a quiet ride down the hill, didn't even hear the rotor.

After the copter landed a County Firefighter put water on my arms. This was the first time I felt pain. It felt like they were pouring sand onto my arms. The reason was my arms were still burning and cooking like a piece of meat on a grill.

We were all transported to hospital but I won't go on about all our trial and tribulations of our recovery.

### **Out of all tragedies some good comes. Some of the Lessons Learned:**

Need specific directions on safe practices on downhill fire line operations.

Need fire line intelligence such as lookouts and aerial observations all with radio communications.

Make crystal clear in firefighting training that a "chimney", "narrow box canyon" is a hazard area even if devoid of fuel.

Need for light weight fire protective clothing including face masks and gloves and mandatory use on the fire line.

Need for light weight radios.

The Fire Service has come a long way in providing training skills to protect firefighters along with the best fire protective clothing and equipment available. All this has come from all the lessons learned over the past years from firefighters who paid the ultimate price with their lives.

I pray every day, not another firefighter will lose his life, but in reality I know it will happen again. The firefighter's duties are inherently dangerous, but fires need to be fought aggressively but must be accomplished safely.

There are so many variables we need to be aware of in Wildland Fires, but the key to minimize the risk we take in Wildland Firefighting, is the knowledge of Fire Behavior.

God Bless

Rich Leak, Captain  
El Cariso Hot Shots 1966