

# Rapid Lesson Sharing

**Event Type:** Tornado

**Date:** July 5, 2018

**Location:** Weston Pass Fire, Colorado

## Introduction

“Managing the unexpected,” “Plan for the worst case scenario,” “Managing an incident within an incident,” “Learning from incidents with potential” . . .

These are all common phrases that people in the wildland fire community frequently hear.

Wildland firefighters work in a dynamic environment where sudden changes can occur with little, or no warning.

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### *How resilient is your fire team or crew?*

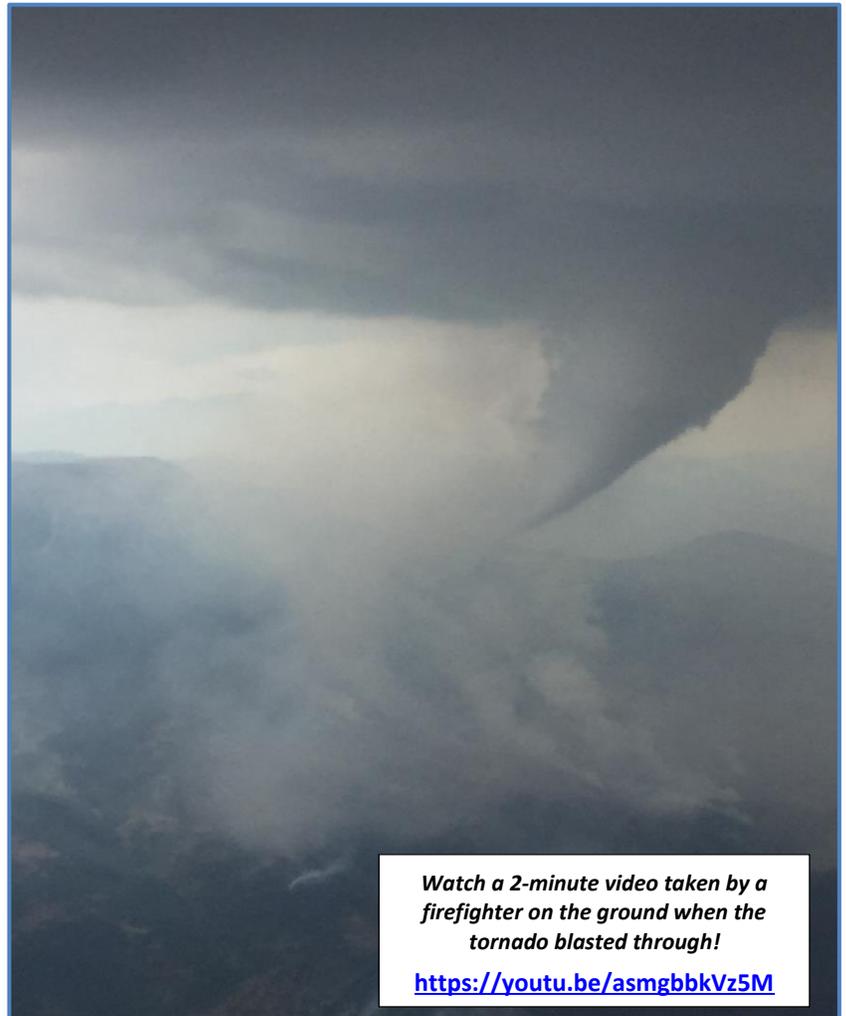
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“Resiliency” is defined as the ability to bounce back and overcome unexpected challenges.

Fire personnel who have “high resiliency” understand what it means to manage the unexpected, plan for the worst case scenario, manage an incident within and incident, and learn from an incident with potential.

## The Story

This story begins unlike most scary stories. It was a nice bluebird day with a chance of afternoon thunderstorms predicted. Crews had conducted their morning briefing that covered all of the general topics (mission, LCES, and specifically thunderstorm safety, etc.). The Weston Pass Fire had made a significant push the day before and the crews, aircraft, and dozer were busy putting in containment lines in attempt to stop additional forward spread. Progress was being made and nothing seemed out of the ordinary.



*Watch a 2-minute video taken by a firefighter on the ground when the tornado blasted through!*

<https://youtu.be/asmgbbkVz5M>

**The view from Air Attack of the tornado developing above the Weston Pass Fire.**

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### *Nothing seemed out of the ordinary.*

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The Division Trainee [DIVS (t)] was actively engaged with field resources and had good communication and accountability. There were Lookouts posted and a Line Safety Officer in the general vicinity of the operations. The dozer was constructing containment line. One of the crews was busy improving and holding the dozer line, while the other crew was patrolling the green for spot fires.

A squad from the second crew was across a small drainage improving road access for egress. Aircraft was also supporting these suppression efforts in the same location. In an area of 6-8 acres, approximately 45 ground personnel were conducting these operations.

### **Thunderstorm Activity Requires Weather Updates**

As the bluebird day started to deteriorate during the late morning, the radar began to pick up thunderstorm activity. In turn, this triggered the Incident Meteorologist (IMET) to develop frequent weather updates that were hand-delivered to the Radio Operator (RADO) to be announced over the command frequency.

Once read, the RADO would conduct a [roll call](#) to ensure that all fire personnel heard the update. Each time, this weather update and roll call took approximately seven minutes to complete. By early afternoon, these updates started to become more frequent.

### **This is Where This Story Becomes Very Scary**

The dozer along with the Heavy Equipment Boss (HEMB), [HEMB (t)] and DIVS (t) were all at a stopping point and having some lunch. That's when the RADO provided an additional weather update that talked specifically about a thunderstorm cell on the northwestern end of the fire that was moving northeast, and also indicated that a flash flood watch was in effect. This weather update did not mention anything about the storm cell that was developing just to the southeast of the fire.

This is where the story becomes scary—very scary.

Shortly after the last weather update was read, it was acknowledged that the dip site reported receiving half-inch size hail. The dip site was located just south and east of their fire suppression effort location. A Type 1 Helicopter made a drop on the fire and returned to Helibase to avoid this hail. Because they were 25-45 minutes away from their vehicles, the DIVS (t) and Crew Bosses informed fire personnel to seek shelter from the hail under trees—following the thunderstorm safety protocol (see box above).

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### *The hail was intensifying and the sounds were deafening.*

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Within 2-3 minutes of the hail report from the Helibase, the firefighters on the hill started to experience half to one-inch size hail. At this point, most people were taking cover under the trees and capturing photos and videos of the impressive hailstones.

One of the firefighters collected one of these hailstones to take a picture of it. As he was taking a picture of it he said to himself: *"This is not regular hail—this is tornado hail"*. Within a few seconds, several firefighters describe hearing a jet plane, train, or torching sound. They quickly looked around and did not observe any extreme fire behavior or trees swaying in the wind. While it was still calm, the hail was intensifying and the sounds were deafening.

### **Thunderstorm Safety**

Approaching thunderstorms may be noted by a sudden reverse in wind direction, a noticeable rise in wind speed, and a sharp drop in temperature. Rain, hail, and lightning occur only in the mature stage of a thunderstorm.

**Situation Awareness:** Sound waves move at different rates based on atmospheric conditions. Take the storm precautions below as soon as you hear thunder, not when the storm is upon you. Do not resume work in exposed areas until 30 minutes after storm activity has passed.

#### **Hazard Control:**

- Take shelter in a vehicle or building if possible.
- If outdoors, find a low spot away from tall trees, wire fences, utility lines and other elevated conductive objects. Make sure the place you pick is not subject to flooding.
- If in the woods, move to an area with shorter trees.
- If only isolated trees are nearby, keep your distance twice the tree height.
- If in open country, crouch low, with feet together, minimizing contact with the ground. You can use a pack to sit on, but never lie on the ground.
- If you feel your skin tingle or your hair stand on end, immediately crouch low to the ground. Make yourself the smallest possible target and minimize your contact with the ground.
- Don't group together.
- Don't stay on ridge tops, in wide open areas, or near ledges or rock outcroppings.
- Don't operate landline telephones, machinery, or electric motors.
- Don't handle metal hand tools or flammable materials open containers

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*“It was ripping up green trees!”*

**Crewmember**

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At this time, the other firefighters observed a dust devil. (This would later be determined to be the start of the tornado.) They then began to see the rotation of a funnel cloud starting to form out of the storm cell. Simultaneously, a Lookout from an adjacent Division reported—over the radio—seeing the funnel cloud over Division Papa.

This is when firefighters recognized that the dust devil was actually a tornado.

Within seconds to no more than a minute, the tornado was fully fledged, uprooting and snapping-off trees up to 27 inches in diameter. Several trees were snapped-off and broken, falling within 5-7 feet of three firefighters who were under the trees seeking refuge from the large hail.

**Firefighters Seek Refuge Where Ever They Can**

Fire personnel were on either side of the tornado—between 70 to 250 feet away from it—when it touched down and started its path of destruction.

Firefighters could only see about 30 feet in front of them as the trees snapped-off and fell all around them.

It was communicated over the radio and verbally for people to seek refuge where ever they could—in low areas, in vehicles, and under the dozer.

One Lookout on the hill dropped his pack and started to run. But he quickly realized that there was no good place to go and sought shelter by a nearby tree. Another firefighter was driving a UTV, abandoned it on the road, and immediately ran to a nearby vehicle.



**This image shows the destruction caused by the tornado, whose path of broken and downed trees occurred within 70 to 250 feet from the firefighters on the Weston Pass Fire.**

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*It was communicated over the radio and verbally for people to seek refuge where ever they could—in low areas, in vehicles, and under the dozer.*

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**Accountability Check-In Occurs in Tornado’s Aftermath**

As fast as the chaos started, it was over.

The entire event impacted the crews for approximately 6-8 minutes—from start to finish. Once the tornado had passed, firefighters describe the scene as calm with blue sky. The tornado continued its path of destruction for approximately another mile without impacting any other fire personnel.

Immediately afterward, the DIVS (t) started to think “*worst case scenario, mass casualties of 40-plus firefighters*”. An immediate accountability check was established. All personnel were accounted for and uninjured. Each individual crew/group of personnel took some time to have a quick check-in.

About 10-12 minutes after they had survived the tornado, a new weather update was read. It stated that a tornado warning was in effect and the funnel cloud had lifted back into the base of the storm. In the mind of some firefighters, this weather update was a day late and a dollar short.

### Wide Range of Emotions

This very serious event caused a wide range of human emotions to be expressed by fire personnel who were both directly and indirectly involved. These emotions spanned from light-hearted joking, to seriousness, to anger. These are all common responses that humans use to process traumatic events.

Some personnel believed that the incident was being downplayed by the term “funnel cloud” rather than calling it what it was: “a tornado.”



The white dots on both sides of the yellow tornado path indicate the approximate location of fire personnel during this tornado event.

### Communication Lost; Perceptions Gained

The intensity of the storm created a significant amount of chaos both during and after the event—in which communication was lost and perceptions were gained. Some fire personnel on the ground were under the perception that some members of the Incident Management Team (IMT) still believed that the event was “just a funnel cloud” that did not manifest into a tornado that touched the ground.

Some members of Operations on the IMT had broadcasted over the radio to DIVS (t) Papa and DIVS Tango: “*There’s a tornado on the ground—take cover.*” Field Operations and Branch immediately responded to the scene and reported the incident back to ICP, stating: “*There were no injuries.*”

It was not until later when fire personnel and IMT members started talking with each other that a clearer picture about the tornado was painted. This can be referred as the “Knowledge Gap”—the gap between what is perceived and what really occurred.

### AAR Becomes Venue for Candid Dialogue

It was several days after the event before all impacted personnel were able to sit down and have a formal After Action Review (AAR). During this AAR, there was candid dialogue about the tornado and how it was reported and dealt with.

The IMET highlighted that there are limitations and gaps with radar due to mountainous terrain. Limitations in internet connectivity and data processing can also impact the timeliness of identifying/reporting significant weather events. He also shared possible solutions to help mitigate these limitations.

The affected firefighters suggested that a more formal review process be implemented to help ensure that all lessons can be captured and shared with the greater wildland fire community. The IMT and Regional Office employed a Rapid Lesson Sharing (RLS) Module to conduct and document this review.

## **Conclusion**

### **How Do We Move Forward?**

Many senior firefighters with 30-plus years of experience have never seen a situation where a natural disaster developed within another natural disaster at the same time. It is difficult to plan for every single situation that may arise. This story is the perfect example of this reality.

So how do we move forward? It is a personal choice and it starts with taking the time to be humble enough to admit that we don't have—and never will have—the answers to every situation. However, we can take the time to learn from others and put their slides into our carousel. In this way, in the future when we are faced with similar events we can make rapid decisions that will yield favorable outcomes.

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## **LESSONS**

### **Radar and Weather Prediction**

Radar has limited capabilities due to topography, radar location, and time lag of processing and delivering the information. This is compounded in mountainous terrain. This tornado occurred near the 10,500-foot elevation. Mobile weather and radar applications on phones and tablets also have a 7-10 minute lag time.

- ✓ Posting a weather lookout, preferably an IMET that can relay real-time information back to the Incident Command Post (ICP), can help with weather data prediction.
- ✓ A QR Code with which field personnel can post real time weather observations that feed directly back to the IMET can also help with weather data prediction.
- ✓ Mobile radar technology exists that will help cover the gap areas of permanent radar stations. Doppler units are one example and can cover approximately 400 miles, but may cost as much as one million dollars. [EWR tactical radar systems](#) is another option that can cover an approximately 150-mile area that has a reduced cost of approximately \$30,000. These radars would allow the IMETs to track the outflow boundaries from thunderstorms.
- ✓ Identifying micro burst location—either through local knowledge, scouting mission or aerial observations—can raise awareness that there is an increased potential for strong and erratic winds. These should be documented and shared with the IMT.

### **Communication: Thunderstorm Pre-Briefing and Safety Response**

The firefighters did a good job of briefing about thunderstorm safety and as well as implementing thunderstorm safety protocols during the development of the hailstorm. As the tornado developed and touched down, several personnel communicated that people need to lie down in a low depression directly adjacent to a solid object or under the security of the dozer.

- ✓ Unfortunately, there is not a lot of good information on what to do in the event of a tornado when you are in the woods away from a secure location such as a storm cellar or sturdy building. It is the belief of this RLS Team and the incident participants that the best situation is to lie low in a depression near a solid object to prevent other trees and debris from falling on top of you.

- ✓ The DIVS (t) was mentally developing a mass trauma/casualty plan while the tornado was wreaking havoc. As soon as the chaos slowed, swift accountability was obtained for all resources.
- ✓ The Department of Homeland Security has developed [tornado safety](#) protocols to follow/practice.

### **Acknowledging the Consequences of Experiencing this Traumatic Event**

Recognition is critical that this was an ultra-low frequency, high-consequence situation that may be defined as a traumatic event for those who experienced. This type of event can have lasting effects on employees due to the seriousness of this experience. Taking time to have open, candid dialogue around this event will help raise awareness about this possibility.

- ✓ It is important to provide opportunities for the impacted firefighters to share their story, lessons, and develop a support network. This can be an AAR, RLS or others.
- ✓ Affected firefighters need to be mindful of the potential gravity of this incident and keep an eye out for each other's well-being.
- ✓ Placing information about this incident along with crew manifests in the documentation box may prove beneficial in future years.
- ✓ This area has seen very few documented tornados in the past several decades. However, in recent years there have been an increase in occurrences of tornados and funnel clouds.
- ✓ IMT members should check back with affected firefighters for a couple of days as they slowly process the events.



Rocky Mountain Area  
Coordination Center

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