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*Cedar Fire Entrapment/Fire Shelter  
Deployment  
Final Accident Investigation  
Factual Report*

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*June 28, 2016*

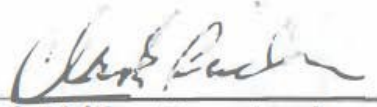


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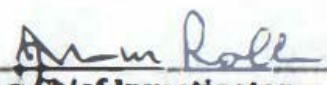
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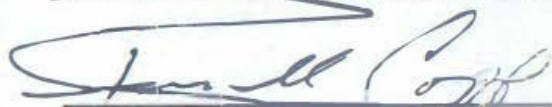
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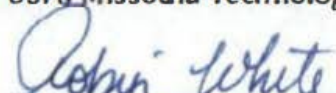
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# Executive Summary

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The Cedar Fire started June 15th, 2016 on the White Mountain Apache Reservation in Arizona. It grew rapidly, necessitating the activation of a Type 1 Incident Management Team (IMT). As containment increased and the fire activity diminished, the Ft. Apache Agency (Agency) made the decision to release the Type 1 IMT and replace it with an Agency Type 4 Incident Commander (ICT4), who took command of the fire June 28th.

The Navajo Interagency Hotshot Crew (NIHC) was assigned to the fire June 20th, and was released on the 27th to coincide with the T1 IMT transition at 0600 hours on the 28th. On the morning of the 28th, fire managers from the Agency decided to use the NIHC for their final available shift to support the Agency ICT4. The 28th was the 14th day of the NIHC's current tour and their 9th day assigned to the fire.

On the morning of the 28th, NIHC reported to the Cottonwood staging area and rendezvoused with the ICT4 for the morning briefing. NIHC's assignment was to send half the crew to rehabilitate fireline on the southeast flank of the fire, and half the crew to monitor and check the southwest flank where an active piece of fireline remained. After the briefing, the NIHC crew assigned to the southwest flank left Cottonwood staging area, drove up the Junction Tank Road and staged their vehicles at the end of the road. They hiked to the fireline arriving mid-morning. Three of the NIHC crewmembers were functioning as lookouts, one was scouting the fireline, and six members were monitoring and checking the fireline.

In early afternoon a large fire whirl developed in the vicinity of the six-member squad working on the southwest flank. They recognized the hazard and considered their options. They quickly determined their primary escape route was compromised because of unburned fuel and the direction of the prevailing flaming front. The Squad Boss assessed the situation and directed the squad to alter course and move into a previously burned area approximately one-half acre in size.

As the squad entered into the blackened area, the Squad Boss determined they were entrapped and directed all firefighters to deploy their fire shelters. Within seconds conditions deteriorated. Heat, smoke and embers increased. All firefighters entered their fire shelters. The Squad Boss entered last insuring all firefighters were successfully deployed.

After the fire whirl subsided, the squad members were able to hike to staged vehicles. They were transported in three ambulances, medically evaluated, and transported to Summit Hospital in Show Low, Arizona. The firefighters received medical examinations. Two were treated for smoke inhalation and all were released by 2200 hours that evening.

# Investigative Process

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June 28, 2016 – An entrapment/fire shelter deployment incident was reported to the National Interagency Coordination Center (NICC) located at the National Interagency Fire Center (NIFC) in Boise, Idaho. A Bureau of Indian Affairs (BIA) Serious Accident Investigation Team (SAIT), consisting of the following personnel was mobilized:

- Team Leader
- Chief Investigator
- Safety Officer Type 1
- Personal Protection Equipment Specialist
- Long Term Fire Analyst
- IHC Representative
- Writer/Editor
- Site Coordinator
- Public Information Officer
- Western Region Representative

June 30, 2016 – The SAIT received a Delegation of Authority at the 0800 in-brief conducted by the Agency Superintendent, Regional Fire Management Officer (FMO) and Agency FMO. The SAIT convened at the Rick Lupe Fire Center in Whiteriver, AZ to begin collecting evidence and information related to the incident.

The process to gather information and evidence involved the following:

- Meet as a team and determine the investigation plan
- Interview individuals with knowledge of the incident
- Conduct a site visit to collect evidence
- Review Agency fire management plans and policies
- Collect and study weather data
- Establish the chronology of events of the incident
- Develop direct causes and contributing factors
- Provide recommendations to prevent recurrence
- Close out with Agency Superintendent after the investigation
- Out-brief with the delegating authority when the report is completed

# Narrative

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*In some situations, time estimations were necessary because personal observations and radio transmissions were made without a time record/reference, or source time references conflicted. When a specific time could not be determined, a best estimate of time was provided.*

## Background

The fire began June 15th, 2016, the cause is undetermined. It quickly grew to over 5,000 acres the first day. The encroaching fire initially threatened the communities of Forestdale, Amos Ranch, Pinetop/Lakeside, Show Low, and Hon-Dah.

Initial attack resources were promptly dispatched from the Ft. Apache Agency (Agency). It was rapidly determined by responding resources that the fire behavior was very active and the decision was made to order a Type 1 IMT to manage the incident.

A Type 1 IMT was assigned to the fire for 12 days, beginning at 1800 hours on June 16th and ending at 0600 hours on June 28th. Prior to transition back to the Agency, the Type 1 IMT wrote a 5 Day Incident Action Plan (IAP) and provided it to the Agency for their use. The IAP lists all resources assigned to the Fire on the day of the entrapment/deployment (see Appendix C).

The southwestern monsoon was developing in Arizona that week and the airmass over the fire was forecast to become fairly moist from a southeasterly flow aloft. The forecast from the Type 1 IMT's June 27th 5 Day IAP called for high temperatures in the upper 80's, minimum relative humidity of 25%, and a 70% chance of wetting rain.

June 28th began with cloudless skies. The minimum temperature of 60° and maximum relative humidity of 69% were recorded at 0530 hours by IRAWs 5, 4.5 miles northwest of the entrapment/deployment site. Clouds began passing over the fire in the late morning, while temperature steadily increased to the day's maximum of 95°. Winds were moderate, with IRAWs 5 measuring maximum gusts in the low- mid teens, generally from the southwest but at times quite variable

In comparison to the values at risk early on in the fire, the values at risk on the southwest flank of the fire on June 28th were low. Additionally, an FSPro run done for the period of June 23rd – 29th indicated low probability of any significant fire spread on the active southwest flank of the fire.

As a result of the predicted weather and values at risk, the Type 1 IMT had made a deliberate decision not to actively engage any personnel on the six-mile uncontained southwest flank. The Agency used this information to make the decision to transition from a Type 1 to a Type 4 incident command organization. An ICT4 from the Agency was assigned as the Incident Commander beginning at 0600 hours on the 28th.

## Sequence

The entrapment/deployment occurred Tuesday, June 28th, 2016, at 1445<sup>1</sup> hours Mountain

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<sup>1</sup> Estimated from timeline. The Squad Boss's radio call (while he was in his shelter) to Lookout 1 advising of the Deployment has a timestamp of 14:46.



Standard Time (MST) on the southwest flank on an approximate six-mile portion of uncontrolled fireline. The day the entrapment/deployment occurred, fire size was approximately 46,000 acres.

The NIHC was released from the fire on the 27th as the T1 IMT was transferring command of the fire back to the Agency. On the morning of the 28th, fire managers from the Agency made the decision to use the NIHC on the fire for their final available shift to support the Agency ICT4. The 28th was the 14th day of the NIHC's current tour, and the 9th day assigned to the Fire.

On the morning of the 28th, NIHC reported to the Cottonwood staging area and rendezvoused with the Agency ICT4 for the morning briefing. NIHC's assignment was to send half the crew to rehabilitate fireline on the southeast flank of the fire, and half the crew to monitor and check the southwest flank of the active piece of fireline. After the briefing, the NIHC assigned to the southwest flank left Cottonwood staging area and drove up the Junction Tank Road and staged their vehicles at the end of the road. They hiked to the fireline arriving mid-morning. Three of the NIHC were functioning as lookouts, one was scouting the fireline, and six members were monitoring and checking the fireline.

During conversations with the ICT4, and as corroborated from interviews with the crew members of the NIHC, standard briefings on the morning of the 28th discussed Lookouts, Communications, Escape Routes, and Safety Zones (LCES). Also verified during interviews with NIHC, their understanding of the day's mission for the half of the crew assigned to the southwest flank was to hike in and check and monitor the uncontained fireline. As their shift progressed on June 28th, they witnessed single tree torching which reflected an increase in fire activity.

At 1240 hours, the NIHC requested helicopter bucket support on the southwest flank of the Fire which coincided with reports of increasing fire behavior. At 1300 hours, as fire activity continued to increase, the NIHC had three lookouts stationed in two different locations - one northwest and two southeast of the entrapment/deployment site. In addition, they had one crew member scouting the fireline. The remaining six firefighters (the squad) were working along the active edge of the fire.

Prior to 1430 hours, one of the lookouts observed several vertical vortices (dust devils) in the fire area. Between 1430 and 1445 hours, conditions existed that resulted in the formation of a large fire whirl. As the fire whirl developed, the squad recognized the hazard and considered their options. Given the direction of the fire's push, the Squad Boss quickly determined their primary escape route back to the road and vehicles was compromised because of unburned fuel. Based on his assessment, the squad altered course and moved into a previously burned area approximately a half acre in size where all of the surface fuels had been consumed yet many tree crowns remained.

As the squad entered into the blackened area, nearby trees were torching and calls of concern from their lookouts were heard on the radio. Because of the strong circulation of the nearby whirl which intensified fire behavior in a wide area, the squad experienced the fire pushing on their position from various directions. With heavy smoke, ash, and heat increasing, the Squad Boss concluded that they were entrapped. He directed all squad members to deploy their fire shelters.

One firefighter described the situation like "watching a movie" and yet he made no move for his shelter. The Squad Boss noticed the firefighter frozen which triggered him to give the firefighter more emphatic direction. The firefighter snapped back and quickly deployed his shelter. As conditions deteriorated, smoke and embers increased, and it became darker and hotter. All firefighters entered their fire shelters. The Squad Boss entered last to ensure all firefighters were

fully deployed. One squad member described the experience as “closing the oven door.” During the approximate 30 minute deployment period, the Squad Boss maintained radio communication with the lookouts and verbal communication with the rest of the squad.

Shortly after the entrapment/deployment of the fire shelters and as fire activity subsided, Lookout 1 began hiking downslope to the deployment site. Simultaneously, after a discussion between Lookout 2 and the Incident Commander Trainee (ICT4-T), it was decided to relocate the crew vehicle from Junction Tank Road to the junction of Hwy 73 and Road 35B.

As the Agency and Show Low Interagency Dispatch Center became aware of the situation, several actions were initiated:

Ft. Apache Agency:

- \* Directed all fire resources to disengage from the fire and all units to clear radio traffic from the command frequency.
- \* Contacted the Show Low Interagency Dispatch Center and informed them of the situation.
- \* Notified the outgoing Type 1 IMT personnel that were attending the Closeout Meeting in Show Low of the entrapment/deployment.

Type 1 IMT Members:

- \* Assisted with the emergency response including mobilization of first responders and hospital notifications.

Show Low Interagency Dispatch Center:

- \* Received the request for emergency responders and initiated the mobilization to include three medivac helicopters, three EMT units and three ground ambulances.
- \* Rerouted several aircraft and ordered additional aircraft to support the potential rescue operation.

At 1513 hours, Lookout 1 arrived at the entrapment/deployment site and verified all firefighters appeared to not have life threatening injuries. It was relayed to ICT4-T to begin driving all 4-wheel drive vehicles staged at the junction of Hwy 73 and Road 35B north to a rendezvous point. The 4-wheel drive vehicles rendezvoused with the squad at the location of Lookout's 1 & 2 on the 35B Road (see *Maps and Photos* section).

The vehicles arrived at the rendezvous location at 1615 hours and transported the firefighters back to Hwy 73 where three ambulances were staged. The firefighters were medically evaluated and transported in three ambulances to the Show Low Summit Hospital arriving at approximately 1800 hours. The Assistant Fire Management Officer (AFMO) was at the hospital to support the firefighters and represent the Agency. The firefighters received medical examinations, and two were treated for smoke inhalation. All firefighters were released by 2200 hours that evening.

# Timeline

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This timeline was developed using multiple sources including: interviews, dispatch logs, photos, and Agency logs.

## **June 28, 2016 – All times are listed as Mountain Standard Time**

### **0700**

- Incoming Cedar IC and IC trainee brief Type 2 Initial Attack Crew, Apache 1.
- Rick Lupe Fire Center designated as Incident Command Post.

### **0805**

- Cedar IC and Cedar IC trainee depart for Cottonwood staging to brief NIHC.

### **1000**

- Cedar IC and Cedar IC trainee brief NIHC.
- NIHC conduct their additional crew briefings.

### **Midmorning**

- Cedar IC and Cedar IC trainee brief Apache 1 Type 2 IA Crew at Cottonwood.
- Cedar IC and Cedar IC trainee brief two Agency Type 6 engines, E-5263 and E-5267.
- Engine 5267 departs for Junction Tank Road to support NIHC.
- Cedar IC and Cedar IC trainee depart to contact Burned Area Emergency Response (BAER) crew in Pinetop.

### **Latemorning**

- NIHC reach the fireline and begin their operational shift.

### **1236**

- NIHC requests Helicopter N118MB (H-8MB) for bucket support from Cedar IC trainee.

### **1242**

- Cedar IC trainee advises NIHC H-8MB is hooking up bucket, will contact NIHC.

### **1255**

- Cedar IC and Cedar IC trainee on Hwy 73 enroute to Helispot 2; they monitor increasing radio traffic about fire activity picking up.

### **1312**

- H-8MB approaches Hagen Hill to set up bucket to support NIHC.

### **1320**

- H-8MB lifts to support NIHC with bucket drops.

### **1342**

- Cedar IC trainee requests hourly fireline weather observations from Apache 1 hand crew.

### **1345**

- Show Low dispatch advises Cedar IC trainee that McKay Lookout reports smoke near the Long Tom Canyon area. Cedar IC trainee confirms smoke is from Cedar fire.

### **1349**

- Air Attack N9175N (75N) confirms increased smoke from fire “for the last hour or so” to Show Low Dispatch.

- 1400**
- Type 1 IMT closeout briefing in Show Low begins.
- 1424**
- Cedar IC trainee query to NIHC on effectiveness of bucket drops.
- 1425**
- Apache 1 1400 weather from Faught Ridge area, 85°, 23% RH, calm winds 0-1 mph SW.
- 1426**
- NIHC relays E-5267 1400 weather, 95°, 21% RH, winds 7-10 mph from the South.
- 1435**
- H-8MB back up for bucket work.
  - Lookout 1 relays easterly wind shift to Cedar IC trainee and that squad is holding off for now.
- 1441**
- Lookout 1 to Cedar IC trainee: wind shift, Fire increasing in size, moving in a southerly direction. Crew has stopped direct suppression efforts, in the black, going to work the heel with H-8MB.
- 1442**
- Smoke plume appears on Flagstaff NWS radar.
- 1445**
- Estimated time of deployment of fire shelters.
- 1446**
- Squad Boss radio call to Lookout 1 advising of entrapment/shelter deployment.
- 1449**
- Lookout 1 radio call to Cedar IC advising of wind shifts, that fire increased in size, created its own funnel, shelters deployed, talking to people in the shelters.
- 1450**
- Cedar IC pulls over on Hwy 73 to inform Duty Officer via cell phone of entrapment/shelter deployment.
  - Cedar IC calls dispatch with request to clear zone command radio frequencies.
  - Cedar IC takes charge of all incident communication responsibilities.
- 1452**
- Lookout 1 hiking towards entrapment site from lookout, advises Cedar IC that fire has slowed down, heavy smoke.
- 1455**
- Show Low Dispatch directs Air Attack N690TR (OTR) to return to fire immediately and divert all aircraft to the Cedar Fire.
- 1456**
- Report of a burnover/deployment. (Wildcad)
- 1457**
- Lookout 1 hiking towards entrapment site, advises Cedar IC that squad is ok, Cedar IC advises Lookout 1 that aircraft are enroute if needed.
- 1500**
- Notifications of multiple individuals including Agency FMO, Agency AFMO, Regional FMO, and others attending Type 1 closeout briefing.
  - Additional air support ordered including Single Engine Air Tankers (SEAT), heavy air tankers, Type 1 helicopter.

**1505**

- Junction Tank Road drainage 1500 Wx broadcast over radio: Dry bulb 91° Wet bulb 61° RH 18% windspeed 2-5 SW DP 41° cloud cover 80% PIG 90% shaded and unshaded, wx taken at 5600'.

**1513**

- Lookout 2 advises Cedar IC that Lookout 1 arrived at entrapment site, will lead them out, squad is ok.

**1518**

- Cedar IC orders all resources on Cedar Fire to disengage.

**1530-1550**

- HECM relays to Cedar IC via radio that Type 1 Ops Chief arrived at Helibase 2 offering support, Cedar IC requests Type 1 Ops Chief shadow him.
- Cedar IC initially begins hiking from the end of Junction Tank Road on the same route the NIHC used to access the fireline, is advised from radio communication that firefighters are hiking out to a different location, returns to his vehicle and drives to Road 35B.
- Cedar IC trainee drives the crew carrier to junction 73 & 35B.
- Three EMTs, three ground ambulances and three air ambulances arrive and stage at junction of 73 & 35B.

**1538**

- Lookout 2 advises Cedar IC that squad and Lookout 1 are still hiking out.

**1552**

- Lookout 2 advises Cedar IC that squad and Lookout 1 have almost arrived at Road 35B.

**1559**

- Cedar IC advises Lookout 2 that small convoy is enroute on Road 35B road to provide transportation.

**1610**

- Cedar Air Attack advises Show Low Dispatch that Cedar IC orders hold on all retardant that hasn't launched yet. Cedar IC and convoy approaching NIHC location.

**1612**

- Cedar IC directs Air Attack Group Supervisor to clear airspace of all aircraft in case an air medivac is needed.

**1630**

- Cedar IC transporting two firefighters, Type I Ops Chief transporting two firefighters, and EMT transporting two firefighters.

**1715**

- Pickup trucks arrive at junction Hwy 73 and Road 35B with firefighters.
- Six firefighters leave in three ambulances enroute to Summit Hospital, Show Low.

**1800**

- NIHC firefighters arrive at Summit Hospital, Show Low.
- All six firefighters are evaluated for injury.
- Two firefighters are treated for smoke inhalation.

**2200**

- All six firefighters released from Summit Hospital, Show Low.

# Findings and Recommendations

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## **Finding 1 (Human)**

After interviews with some members of the outgoing Type 1 IMT it was learned that based on a risk analysis that included considerations of the values at risk and probability of fire progression, they opted not to engage personnel on the southwest flank of the fire (in the area of the entrapment/fire shelter deployment). On the day of the entrapment/deployment, suppression tactics were used by the Agency that included assigning personnel to the southwest flank of the fire.

### Cause 1

Had personnel been monitoring the fire from areas off the fire line the need to deploy shelters would have been negated.

## **Finding 2 (Human)**

When the fire transitioned from the Type 1 organization to the Type 4, most personnel, engines, and aviation assets were released, necessitating a nearly complete re-mobilization of resources by the incoming ICT4.

### Cause 2

When the Agency made the decision to transition to a Type 4 incident management structure instead of a Type 3, they made the decision to de-mobilize all resources assigned to the incident except for two T6 engines, folda-tanks and the Incident Remote Automated Weather Stations (IRAWS).

### Discussion 2

In interviews with several members of the T1 IMT as well as fire management personnel from the Agency, it was revealed that several discussions occurred regarding what type of assets would remain assigned to the fire to support a smaller organization. The initial plan was to assign a "zone" Type 3 IMT; however, because of predicted monsoonal moisture and an FSPro run indicating low probability of fire spread, the Agency opted for an ICT4 management structure.

Although the Agency opted for the ICT4 management structure, this did not preclude them from retaining assets that were currently assigned to the incident. The T1 Planning Section Chief drafted a 5 Day IAP that would have retained several assets totaling to around 400 personnel. The Agency wanted to assign fewer assets to the incident. As a result the decision was made to demobilize almost all assets. The incoming Agency ICT4 was not part of this decision. The incident retained two T6 engines, two folda-tanks and IRAWs units.

The incoming ICT4 had to devote a portion of his first shift on the incident negotiating for Agency resources to staff the incident.

### **Finding 3 (Human)**

From witness interviews, there seemed to be different perspectives between the NIHC and the incoming ICT4 regarding the intent of the NIHC mission assignment on the day of the entrapment/deployment.

#### Cause 3

There is no clearly understood definition of what the term “monitor” means when crews are given this as a tactical mission assignment.

#### Discussion 3

“Monitor” is one of four Fire Suppression Strategies codified in National Fire Management Policy. While it is used to describe how all or part of a wildfire will be managed, when issuing tactical mission assignments that include the task of “monitoring”, the direction may not clearly articulate the intended task.

For example, a fire can be monitored electronically via remote cameras, from an aircraft, from a visible vantage point, or from a fireline. All these methods impart differing degrees of risk. When using the verb “monitor” in a tactical sense, additional direction is often needed to specify what on-the-ground actions are desired.

#### Recommendation 3

Identify the tactics used when executing a monitor strategy and communicate it throughout the fire community, including incorporating definitions in all National Wildfire Coordinating Group (NWCG) training material.

Issue an NWCG memo clarifying\defining how to tactically implement a monitoring strategy.

### **Finding 4 (Human)**

Based on the IAP for the period June 28<sup>th</sup> 0600 hours, through July 2<sup>nd</sup>, 1800 hours, and the direction received by the crew from the ICT4, “Leader’s Intent” was missing from the Incident Objectives (ICS 202). In addition, Incident Objectives were in conflict with the Task and Purpose on the Assignment List (ICS 204).

#### Cause 4

The absence of “Leader’s Intent” seems to be a more global issue pervasive throughout the wildland fire community. On the day of the entrapment/deployment, for the 2016 fire season, only one of the five wildland fire agencies had issued “Leader’s Intent” from a national perspective. Further, many Regional and zone fire organizations do not clearly articulate “Leader’s Intent” in any fashion.

#### Discussion 4

Clearly articulated “Leader’s Intent” appears to be lacking for the vast majority of wildland fire organizations. When a “Leader’s Intent” statement is issued, it is often times very broad and national in scope.

According to the January 2014 Incident Response Pocket Guide (IRPG), the purpose of “Leader’s Intent” is to ensure subordinates have a clear understanding of Task, Purpose and End State. In this case, the NIHC had followed the Incident Objectives and Purpose, yet were in conflict with the Task identified in the IAP; a section of fireline cannot be suppressed and monitored simultaneously.

- The Incident Objectives included - *minimize fire footprint while utilizing strategies and tactics with highest probability for success.*
- The Task was to *monitor fire perimeter and identify any additional rehabilitation needs.*
- The Purpose was to *keep the fire within current fire perimeter to eliminate fires growth and protect identified values at risk.*

#### Recommendation 4

A prescriptive “Leader’s Intent” statement should be in every Agency’s operating plan, and annual Readiness Reviews should verify compliance with this recommendation. Leader’s intent statements should then be incorporated into any Delegations of Authority, WFDSS, and other legal documents provided to any organization that works on behalf of the Agency.

#### **Finding 5 (Human)**

The Agency’s Fire Management Plan is in draft form, and has been since 2015. The last completed plan was signed in 2004.

#### Cause 5

The Agency went five years with the FMO position vacant until filling the position in early 2015. As a result, the Agency has some required documents either incomplete or non-existent. In addition, the AFMO position was filled by a series of “actings” until the spring of 2016, further exacerbating the issue.

#### Recommendation 5

Conduct a review of the Fort Apache Agency’s fire management program to identify strategies for improvement.

#### **Finding 6 (Human)**

The Agency had an incomplete Critical Incident Response Plan even though there have been multiple incidents in the last several years.

#### Cause 6

See Cause 5

#### Recommendation 6

See Recommendation 5



### **Finding 7 (Environmental)**

Although numerous witnesses observed dust devils and fire whirls form prior to the large fire whirl, there was no discussion by anybody as to whether or not fire suppression tactics should have been modified.

#### Cause 7

The occurrence of dust devils as an indicator of the potential for extreme fire behavior is not routinely communicated in weather synopses, fire behavior forecasts, or briefings.

#### Discussion 7

Indicators of lower atmospheric instability, fire whirls, dust devils etc., are discussed in both S- 290 (Intermediate Fire Behavior) and S-390 (Intermediate Fire Behavior Calculations). Fire whirls and vortices are emphasized in S-490 (Advanced Wildland Fire Behavior Calculations). Wildland fire Single Resource positions require S-290, while the upper level fire behavior coursework is generally aimed at prescribed fire specialists and future Fire Behavior Analysts (FBANs) and Long Term Fire Analysts (LTANs). The dangers of fire whirls and rotating plumes have been documented regularly (Battlement Creek Fire 1976; Eagle Fire 1989; Fish Fire 2001; Scorpio Fire and New York Peak Fire 2006, Indians Fire 2008; Powell Fire and Holloway Fire 2012; Montana Fire Lab's Deadly Beauty fire whirl video 2013).

#### Recommendation 7

The NWCG Fire Environment Committee should be tasked with developing standards and indicators as a way to communicate the atmospheric and topographic conditions that are favorable for dust devil and fire whirl development. IAP weather synopses and fire behavior forecasts should include that language when warranted.

# Conclusions and Observations

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The Fire started June 15th, 2016 on the White Mountain Apache Reservation, and grew rapidly necessitating the activation of a Type 1 IMT. The NIHC was assigned to the Fire beginning June 20th, and was released on the 27th to coincide with the T1 IMT transition which occurred at 0600 hours on the 28th. On the morning of the 28th, fire managers from the Agency made the decision to use the NIHC on the fire for their final available shift to support the Agency ICT4.

The following information was determined through interviews:

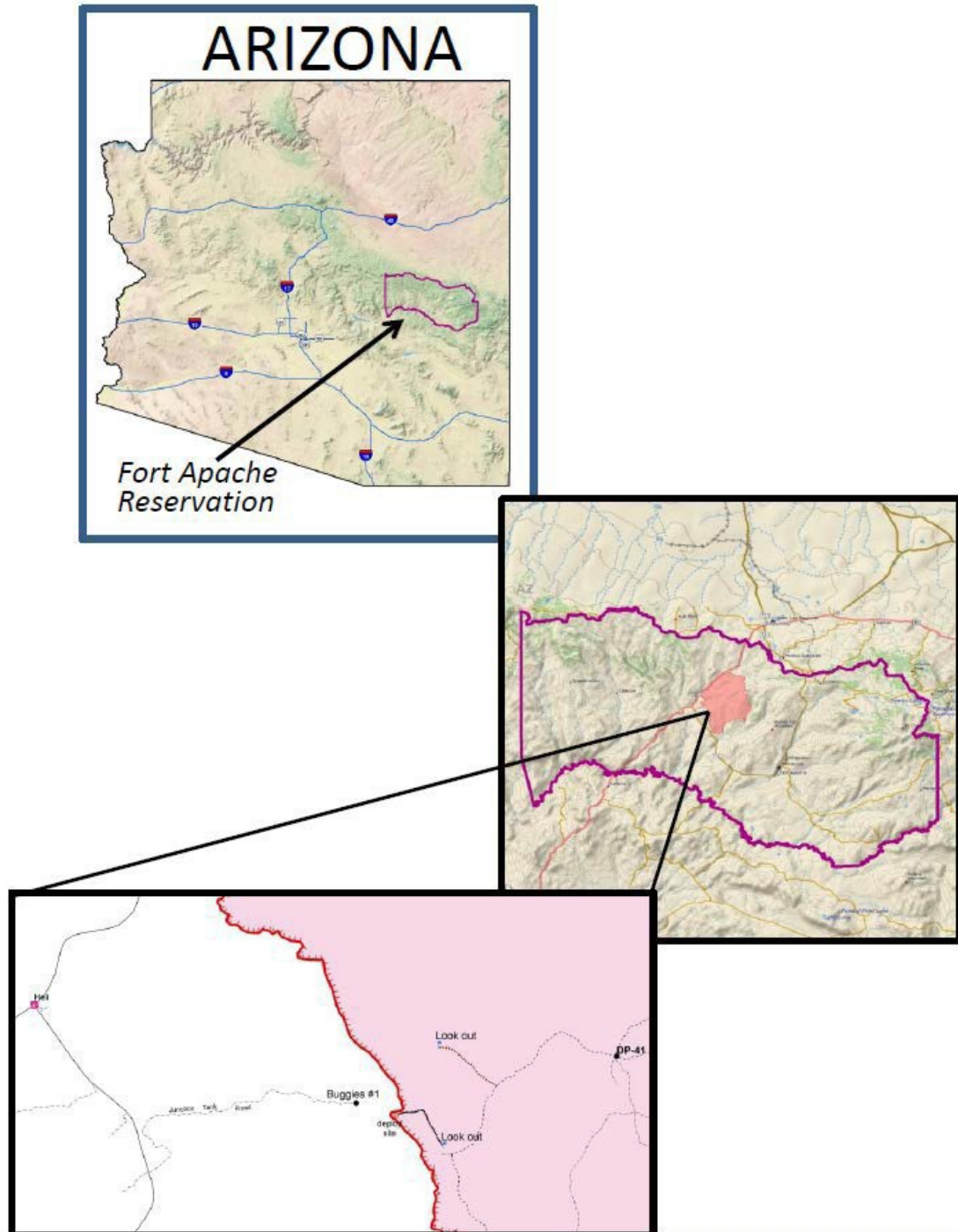
- The 28th was the 14th day of the NIHC's current tour.
- On the day of the entrapment/deployment, it was the 9th shift that the NIHC was assigned to the fire.
- Although it was the 14th day of their current tour, the NIHC followed all required protocols, including:
  - Obtaining a thorough briefing from the incoming ICT4.
  - Conducting an intra-crew briefing prior to hiking to the fire.
  - Posting three lookouts with different vantage points of the active fire.
  - Assigning a fire line scout.
  - Insuring positive communication existed.
- When the fire whirl developed, the squad quickly diagnosed the event, and the Squad Boss quickly determined their escape route was compromised.
- The squad remained calm, and within minutes had made their way to a previously burned area with no surface fuel and some remaining tree crowns.
- The squad was decisive in their actions once entrapped, and flawlessly executed their training.

The fire whirl hazard on June 28th could have had a much more dire outcome had the squad not taken the immediate actions they did. Even though the crew was on the 14th day of their tour, no complacency existed, greatly contributing to the positive outcome of this event.

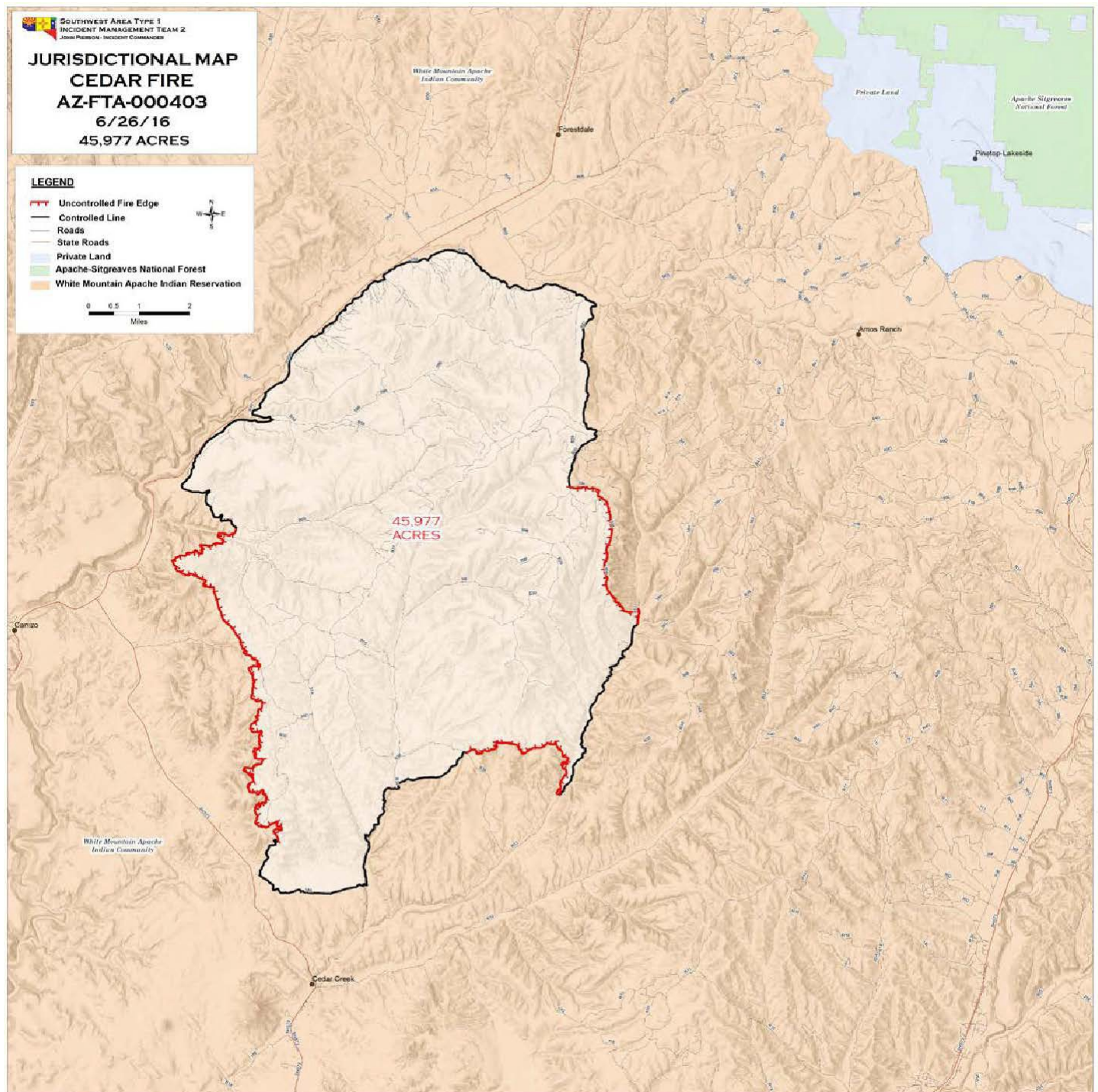
# Maps and Photos

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## Cedar Fire Location Maps



# Cedar Fire – June 28, 2016





**Cedar Fire**  
**AZ-FTA-000403**  
**45,915 ACRES**  
 Burned Area Emergency Response Area

**DIV B**

**DIV C**

**DIV Q**

DP-2  
 H-2  
 Heli  
 Crew Vehicle #1  
 Deploy Site  
 Lookout #3  
 Lookout #1 & #2  
 Crew Vehicle #2  
 Ambulance

0 1 mile

Legend:

- Ambulance
- Crew Vehicles
- Heli
- Lookout
- Deployment
- JWD
- Hill Out
- Lookout Walk Out
- GIS
- USR
- US
- JWD
- Camp
- Drop Point
- Wellbase
- Wellhead
- Incident Command Post
- Mobile Weather Unit
- Repeater
- Standby/Mud Pit
- Safety Zone
- Water Source
- Uncontrolled Fire Edge
- Controlled Line
- Cedar Fire

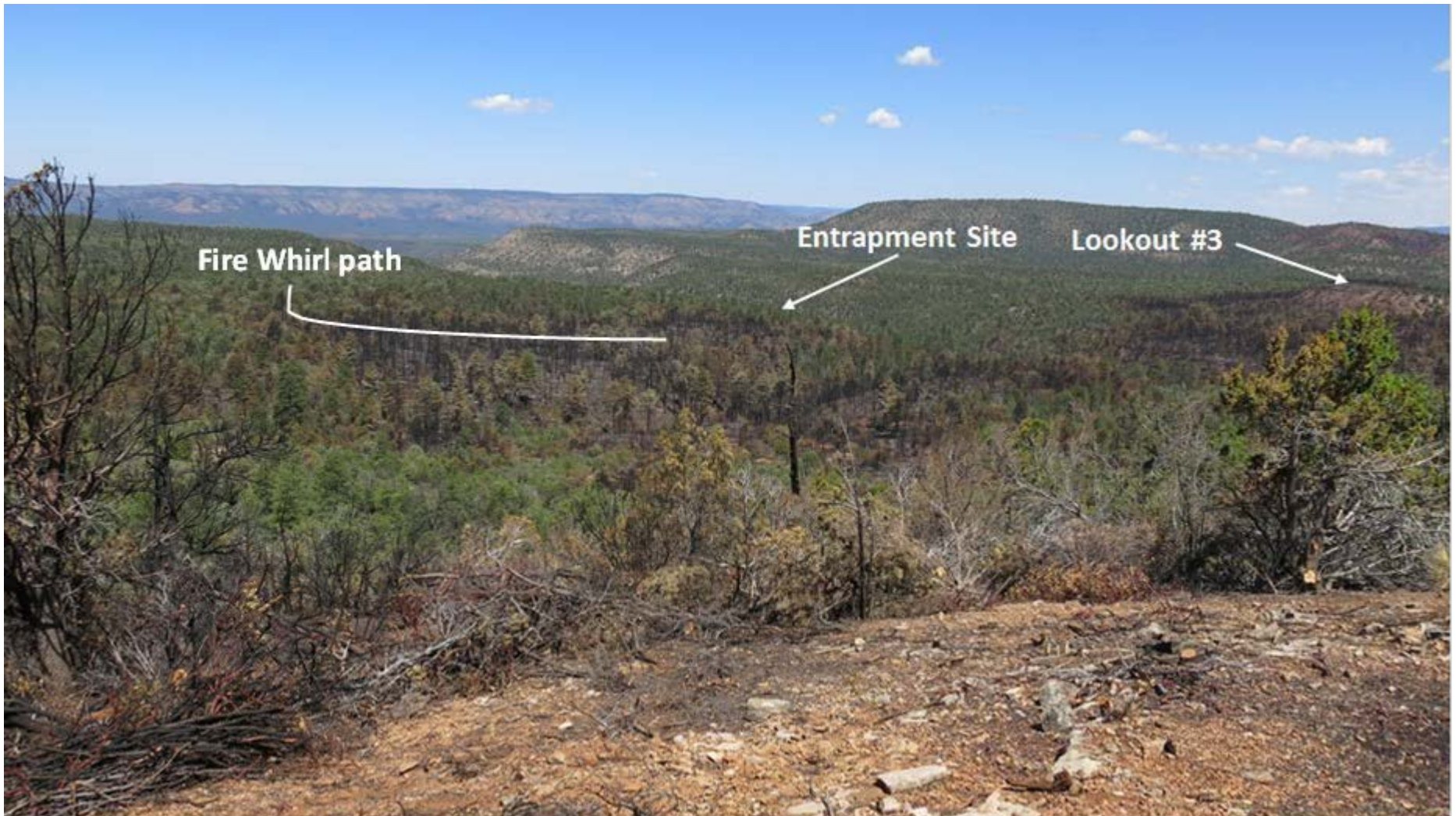
Photo taken by William Sims with BAER Team

5  $\frac{3}{4}$  miles NE of Fire Whirl at 1446





## View from Lookouts 1 & 2 Vantage



# Fire Whirl – NIHC Video

June 28, 2016





# Fire Whirl – NIHC Video

June 28, 2016



## Approximate Location of Entrapment View from Lookout #3



## Aerial Photo of Deployment Site





## Photo of Deployment Site



## Fire Shelters 1-3 on Deployment Site



## Fire Shelters 4 – 6 on Deployment Site





View of High Severity Fire Effects from the Large Fire Whirl, Looking North (Photo by William Grauel)



# Appendix A - Fire Behavior and Weather Summary

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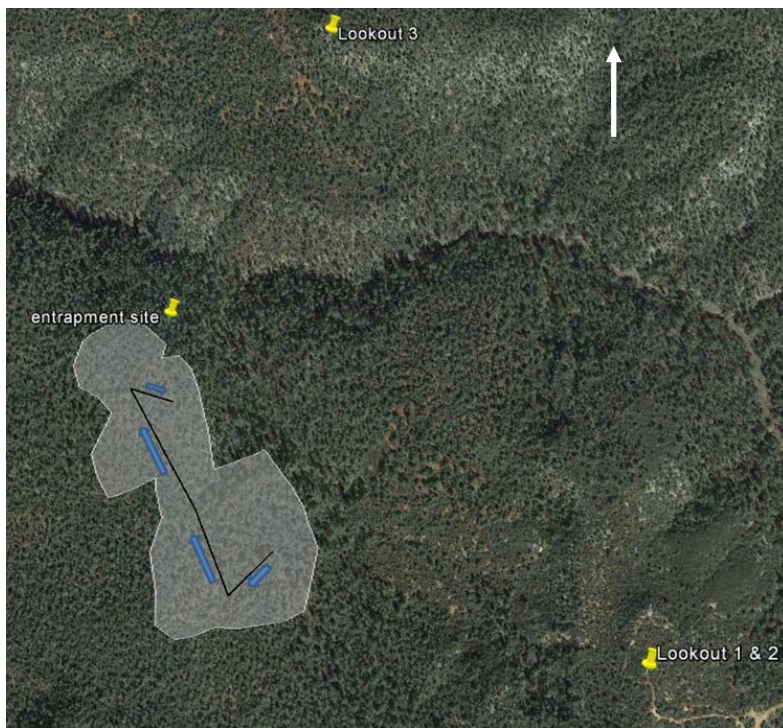
A Fire Weather Forecast was issued on Monday, June 27 by the Incident Meteorologists for the 5-day Incident Action Plan. It covered the period June 28 to July 2 and noted the arrival of monsoonal moisture that week with increasingly wet thunderstorms through midweek as a southeasterly flow aloft continued to moisten the airmass.

The morning of June 28 was clear, sunny, and hot. By midday, the temperature on the SW side of the Cedar Fire where NIHC was working was in the low 90's with relative humidity around 20%. By the time of the entrapment relative humidity was in the mid to upper teens. There was significant solar radiation until around 1330 when cloud cover began to increase, and wind speeds were light to moderate most of the day. Wind direction followed a typical pattern with early NE winds swinging around to the South and Southwest as the day heated up. Wind direction became more variable at around 1400 with wind shifts, "battling winds", and sudden calm winds observed by the NIHC lookouts shortly before the development of the fire whirl. At the time of the event, there was only moderate buildup of cumulus clouds and a lack of strong downdraft/outflow boundary development.

An Incident RAWS, designated IRAWS 5, was located 4.5 miles NNW of the entrapment site at an elevation of 5600', similar to the area where the NIHC squad was working that day (5825'). All 15-minute observations for June 28 are found at the end of this appendix.

The NIHC firefighters involved in the event had observed low to moderate fire behavior in the late morning until early afternoon, with 1-2 foot flame lengths and little fire movement. Between 1300 and 1400 fire behavior slowly started picking up, and by 1400 single tree torching was observed. By 1430 fire behavior had intensified to the extent that the squad had decided to suspend their direct suppression tactics. The NIHC Superintendent advised the IC trainee that the fire was heading south with "a good crown on it" around 1440-1441. Immediately after that radio communication, the NIHC Superintendent's video shows the developing whirl. As the circulation strengthened and became more defined, the whirl began leaning and moving northwards on a relatively flat bench, towards the main east-west drainage where the squad was located (Figure 1). Firefighters estimated the whirl was 3-4 chains wide (~200-260 feet) and 600 feet tall (Figure 2). Air was being pulled into the developing whirl from several hundred yards away, and midflame wind speeds affecting fire behavior near the whirl are estimated on the order of 25-40 mph. The whirl caused high intensity crown fire while it lasted, which appears to have been around five minutes. Burning continued during and after the slow dissipation of the fire whirl, with active flame and smoking spot fires observed by Cedar Air Attack two hours after the entrapment.





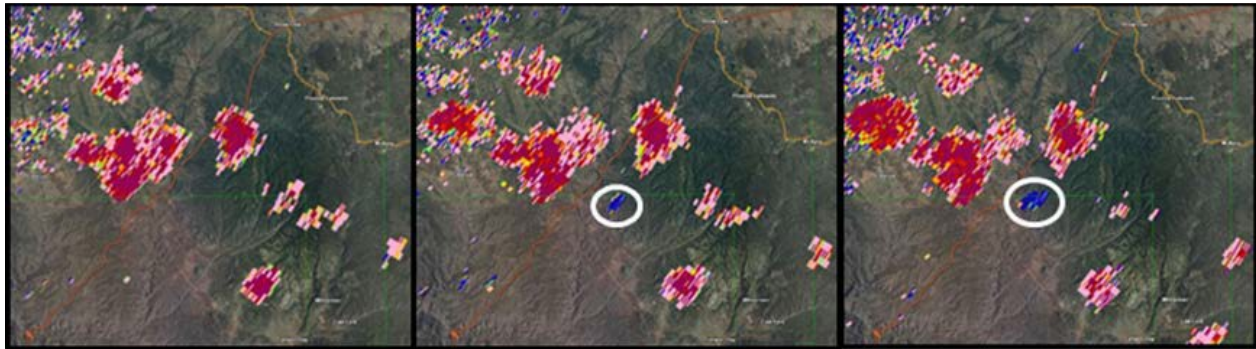
**Figure 1. Approximate path of the large fire whirl and area of high severity fire effects, along with proximity to the two Lookout points and the entrapment site. Lookout 3 was 0.25 miles NNE of the entrapment site, Lookouts 1 & 2 were 0.45 miles SE.**



**Figure 2. Photo sequence showing the fire whirl moving left to right, towards the NIHC squad, over the course of three minutes, 1441-1443. The NIHC squad's position is behind the whirl, obscured by smoke.**



Dust devils and fire whirls are both common and unpredictable. Although individual whirls can't be predicted accurately, certain environmental conditions favor their development and were present on June 28. One ingredient that does not seem to have played a major role is a downdraft or downburst from thunder cells in the area. Although buildup continued later in the day, before and during the event there was no single "towering" cumulus. The NWS Flagstaff Doppler radar, located 60 miles from the entrapment site, detected a few weak showers or echoes in the immediate fire area. A cluster of cells was located 4-7 miles north and northwest of the entrapment site while another weak cell was about 10 miles to the southeast. The cell tops were detected to be no more than 15,000 feet above ground level (AGL) and moving towards the west around 12 mph. No lightning was detected over the greater fire area prior and during the entrapment period. One of the NIHC firefighters reported there was no real single buildup, no virga, and that the dominant winds came from the 'vortex'. A series of NWS radar images from Flagstaff shows both the developing cells as well as the smoke plume from the increased fire activity (Figure 3).



**Figure 3.** National Weather Service Flagstaff correlation coefficient (CC) dual polarization radar images show a rapidly developing smoke plume indicated by the blue coloring or low values. Low values represent non-uniform or highly variable targets such as smoke. The higher values or red colors indicate water droplets within the developed cumulus clouds. The scans were taken at 1437, 1442, and 1447 from left to right.

A highly sheared atmosphere existed, with different wind directions found at different levels of the atmosphere. An atmospheric boundary, separating higher moisture to the east and drier air to the west, moved across New Mexico and eastern portions of the Mogollon rim the previous 24 to 48 hours. As a result of the boundary, a thermal low set up over eastern Arizona. Regional NWS surface observations show the approximate boundary location (dashed line in Figure 4 map) at 1400 MST, June 28<sup>th</sup>. The NWS Doppler radar in Phoenix detected a highly sheared layer between 7000 and 11,000 feet mean sea level (MSL) leading up to the entrapment time. The Phoenix radar is located a little over 100 miles to the southwest of the entrapment location. The atmosphere was also highly mixed; the NWS Phoenix and Flagstaff balloon soundings released during the afternoon indicated mixing height values between 17,000 to 19,000 feet MSL. Peak wind direction from IRAW 5 changed from generally SW, S and SE, to NW over the course of the two hours before and after the fire whirl.

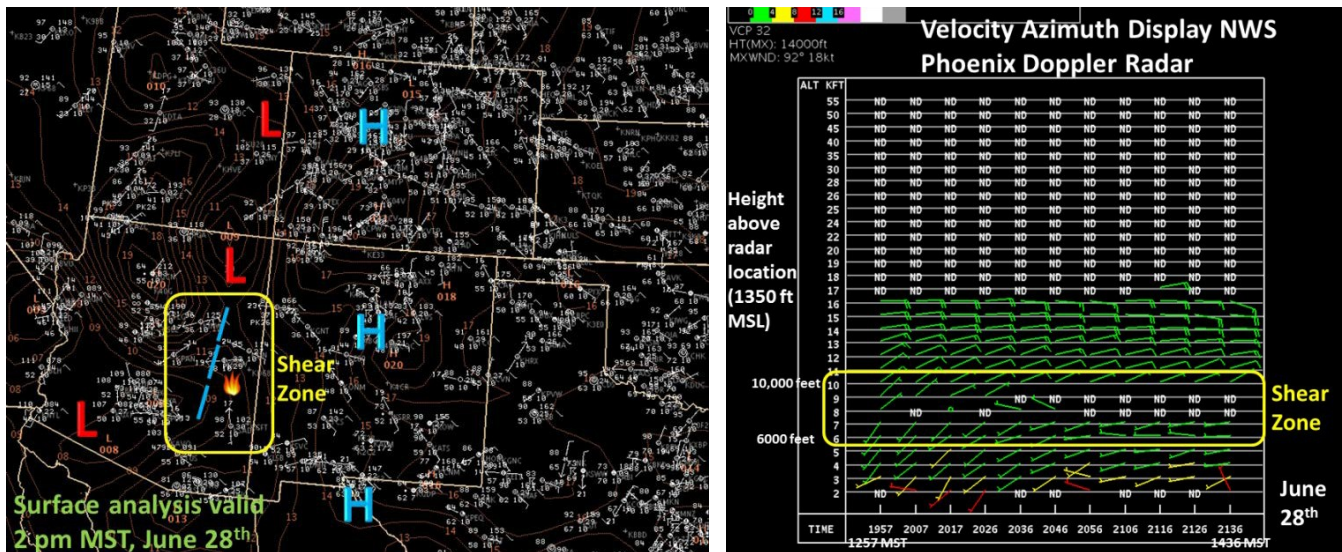


Figure 4. Phoenix National Weather Service map of shear zone and VAD Display showing sheared atmosphere.

Although not notably rugged in the sense of steepness, the local terrain may also have contributed to the fire whirl's development. Given the observed South winds preceding the event, the area where the fire whirl developed is on the lee side of slightly higher terrain to the south. This higher terrain would have served as an obstruction for the south wind and vorticity may have been generated in the wake region. A WindNinja model using the observed wind speed and direction illustrates this dynamic well (Figure 5).

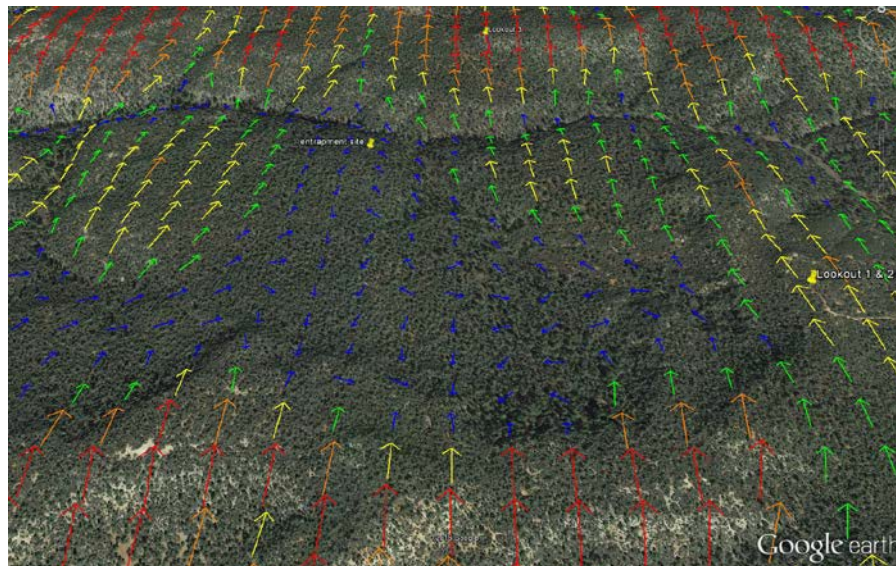


Figure 5. WindNinja model results using the southerly wind observed before the whirl developed. Lower wind speeds (blue arrows) where the whirl developed, on the lee side of the higher terrain on the south, display highly variable wind direction including complete reversal in some places.

Several ingredients favorable for the development of dust devils and fire whirls were present on June 28: the light to moderate wind speeds near the surface; intense morning to early afternoon surface heating from the morning solar radiation and the nearby extensive black from the large June 19 fire run; a highly sheared and mixed afternoon atmospheric profile; and the lee position on the terrain where the whirl formed. Recognition of environmental conditions favorable for dust devil and fire whirl development, as well as understanding and awareness of the sudden extreme fire behavior they can produce is necessary given the inability to forecast individual events such as this one.

## IRAWS 5 15-minute Observations for June 28, 2016

| Time  | Air Temp<br>°F | Relative Humidity<br>% | Wind Speed<br>mph | Gust Speed<br>mph | Wind Direction<br>° | Solar Radiation<br>W/m <sup>2</sup> | Fuel Temp<br>°F | Fuel Moisture<br>% | Peak Wind Speed<br>mph | Peak Wind Direction<br>° | Dew Point Temp<br>°F |
|-------|----------------|------------------------|-------------------|-------------------|---------------------|-------------------------------------|-----------------|--------------------|------------------------|--------------------------|----------------------|
| 0:00  | 66             | 55                     | 3                 | 5                 | 68                  | 0                                   | 64              | 6                  | 5                      | 55                       | 49.4                 |
| 0:15  | 66             | 55                     | 4                 | 6                 | 58                  | 0                                   | 64              | 6                  | 6                      | 67                       | 49.4                 |
| 0:30  | 66             | 56                     | 5                 | 7                 | 60                  | 0                                   | 64              | 6                  | 7                      | 57                       | 49.8                 |
| 0:45  | 65             | 59                     | 4                 | 9                 | 79                  | 0                                   | 63              | 6                  | 9                      | 64                       | 50.3                 |
| 1:00  | 64             | 59                     | 4                 | 6                 | 55                  | 0                                   | 62              | 6                  | 6                      | 56                       | 49.4                 |
| 1:15  | 64             | 60                     | 4                 | 7                 | 46                  | 0                                   | 62              | 6                  | 7                      | 49                       | 49.8                 |
| 1:30  | 64             | 61                     | 3                 | 6                 | 63                  | 0                                   | 62              | 7                  | 6                      | 70                       | 50.3                 |
| 1:45  | 63             | 61                     | 5                 | 7                 | 54                  | 0                                   | 62              | 7                  | 7                      | 57                       | 49.3                 |
| 2:00  | 63             | 63                     | 4                 | 7                 | 66                  | 0                                   | 62              | 7                  | 7                      | 66                       | 50.2                 |
| 2:15  | 63             | 62                     | 4                 | 6                 | 65                  | 0                                   | 62              | 7                  | 6                      | 59                       | 49.8                 |
| 2:30  | 63             | 63                     | 5                 | 7                 | 56                  | 0                                   | 62              | 7                  | 7                      | 54                       | 50.2                 |
| 2:45  | 63             | 63                     | 5                 | 6                 | 57                  | 0                                   | 62              | 7                  | 6                      | 68                       | 50.2                 |
| 3:00  | 63             | 64                     | 6                 | 9                 | 62                  | 0                                   | 62              | 7                  | 9                      | 56                       | 50.6                 |
| 3:15  | 63             | 64                     | 5                 | 8                 | 64                  | 0                                   | 62              | 7                  | 8                      | 63                       | 50.6                 |
| 3:30  | 63             | 63                     | 4                 | 8                 | 57                  | 0                                   | 62              | 7                  | 8                      | 84                       | 50.2                 |
| 3:45  | 63             | 63                     | 4                 | 7                 | 72                  | 0                                   | 62              | 7                  | 7                      | 82                       | 50.2                 |
| 4:00  | 63             | 63                     | 5                 | 6                 | 60                  | 0                                   | 62              | 7                  | 6                      | 70                       | 50.2                 |
| 4:15  | 63             | 63                     | 5                 | 8                 | 66                  | 0                                   | 61              | 7                  | 8                      | 64                       | 50.2                 |
| 4:30  | 62             | 63                     | 3                 | 7                 | 44                  | 0                                   | 61              | 7                  | 7                      | 70                       | 49.3                 |
| 4:45  | 62             | 64                     | 5                 | 7                 | 52                  | 0                                   | 60              | 8                  | 7                      | 54                       | 49.7                 |
| 5:00  | 61             | 66                     | 4                 | 9                 | 64                  | 0                                   | 59              | 8                  | 9                      | 56                       | 49.6                 |
| 5:15  | 61             | 68                     | 7                 | 9                 | 65                  | 2                                   | 59              | 8                  | 9                      | 79                       | 50.4                 |
| 5:30  | 60             | 69                     | 6                 | 9                 | 66                  | 8                                   | 59              | 8                  | 9                      | 58                       | 49.8                 |
| 5:45  | 61             | 67                     | 5                 | 9                 | 60                  | 30                                  | 59              | 8                  | 9                      | 49                       | 50.0                 |
| 6:00  | 61             | 65                     | 6                 | 8                 | 63                  | 77                                  | 61              | 8                  | 8                      | 51                       | 49.1                 |
| 6:15  | 63             | 62                     | 4                 | 7                 | 45                  | 129                                 | 64              | 8                  | 7                      | 63                       | 49.8                 |
| 6:30  | 64             | <del>60</del>          | 5                 | 7                 | 67                  | 174                                 | 66              | 8                  | 7                      | 62                       | 49.8                 |
| 6:45  | 65             | 58                     | 4                 | 7                 | 71                  | 221                                 | 69              | 8                  | 7                      | 58                       | 49.9                 |
| 7:00  | 68             | 54                     | 4                 | 7                 | 61                  | 271                                 | 72              | 8                  | 7                      | 44                       | 50.7                 |
| 7:15  | 70             | 50                     | 3                 | 6                 | 52                  | 322                                 | 76              | 9                  | 6                      | 63                       | 50.5                 |
| 7:30  | 73             | 45                     | 3                 | 5                 | 97                  | 375                                 | 79              | 9                  | 5                      | 16                       | 50.4                 |
| 7:45  | 75             | 42                     | 2                 | 5                 | 159                 | 426                                 | 83              | 9                  | 5                      | 55                       | 50.3                 |
| 8:00  | 77             | 39                     | 4                 | 7                 | 219                 | 478                                 | 86              | 8                  | 7                      | 209                      | 50.1                 |
| 8:15  | 78             | 37                     | 4                 | 7                 | 216                 | 527                                 | 89              | 8                  | 7                      | 245                      | 49.6                 |
| 8:30  | 80             | 36                     | 4                 | 6                 | 207                 | 576                                 | 91              | 8                  | 6                      | 226                      | 50.6                 |
| 8:45  | 81             | 35                     | 4                 | 8                 | 208                 | 623                                 | 93              | 8                  | 8                      | 198                      | 50.7                 |
| 9:00  | 83             | 33                     | 4                 | 8                 | 249                 | 669                                 | 95              | 8                  | 8                      | 189                      | 50.9                 |
| 9:15  | 84             | 32                     | 5                 | 8                 | 231                 | 708                                 | 96              | 8                  | 8                      | 251                      | 50.9                 |
| 9:30  | 84             | 32                     | 4                 | 8                 | 265                 | 747                                 | 98              | 7                  | 8                      | 268                      | 50.9                 |
| 9:45  | 85             | 30                     | 5                 | 8                 | 264                 | 786                                 | 99              | 7                  | 8                      | 239                      | 50.1                 |
| 10:00 | 86             | 29                     | 4                 | 8                 | 246                 | 826                                 | 100             | 7                  | 8                      | 274                      | 50.0                 |
| 10:15 | 88             | 28                     | 4                 | 8                 | 206                 | 866                                 | 103             | 7                  | 8                      | 194                      | 50.8                 |
| 10:30 | 88             | 27                     | 6                 | 11                | 189                 | 889                                 | 104             | 7                  | 11                     | 169                      | 49.8                 |
| 10:45 | 88             | 26                     | 5                 | 10                | 231                 | 915                                 | 105             | 7                  | 10                     | 142                      | 48.8                 |
| 11:00 | 90             | 24                     | 6                 | 10                | 213                 | 948                                 | 106             | 7                  | 10                     | 193                      | 48.3                 |
| 11:15 | 90             | 23                     | 3                 | 9                 | 61                  | 969                                 | 107             | 7                  | 9                      | 187                      | 47.2                 |
| 11:30 | 91             | 22                     | 2                 | 10                | 252                 | 1011                                | 109             | 7                  | 10                     | 268                      | 46.8                 |
| 11:45 | 91             | 22                     | 8                 | 13                | 273                 | 854                                 | 107             | 6                  | 13                     | 183                      | 46.8                 |

## IRAWS 5 15-minute Observations for June 28, 2016

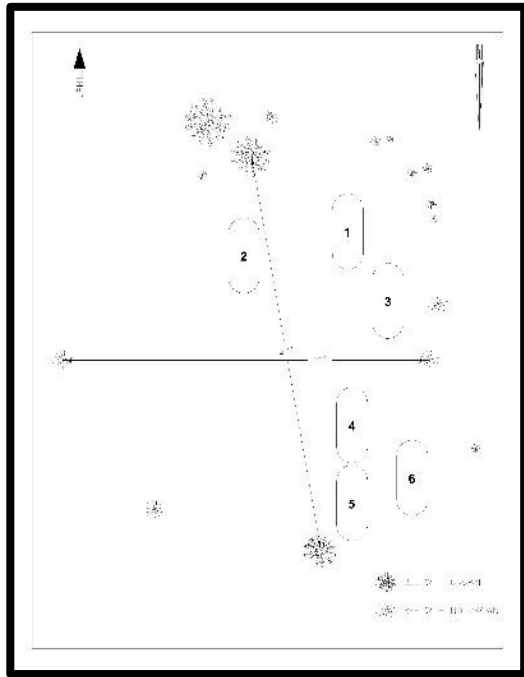
| Time  | Air Temp<br>°F | Relative Humidity<br>% | Wind Speed<br>mph | Gust Speed<br>mph | Wind Direction<br>° | Solar Radiation<br>W/m <sup>2</sup> | Fuel Temp<br>°F | Fuel Moisture<br>% | Peak Wind Speed<br>mph | Peak Wind Direction<br>° | Dew Point Temp<br>°F |
|-------|----------------|------------------------|-------------------|-------------------|---------------------|-------------------------------------|-----------------|--------------------|------------------------|--------------------------|----------------------|
| 12:00 | 92             | 21                     | 5                 | 13                | 249                 | 1024                                | 107             | 6                  | 13                     | 298                      | 46.4                 |
| 12:15 | 92             | 21                     | 4                 | 12                | 243                 | 1045                                | 110             | 6                  | 12                     | 245                      | 46.4                 |
| 12:30 | 94             | 20                     | 7                 | 15                | 215                 | 987                                 | 110             | 6                  | 15                     | 188                      | 46.8                 |
| 12:45 | 93             | 20                     | 5                 | 15                | 189                 | 852                                 | 109             | 6                  | 15                     | 182                      | 46.0                 |
| 13:00 | 92             | 20                     | 6                 | 10                | 221                 | 632                                 | 104             | 6                  | 10                     | 247                      | 45.1                 |
| 13:15 | 93             | 18                     | 4                 | 15                | 296                 | 897                                 | 107             | 6                  | 15                     | 232                      | 43.2                 |
| 13:30 | 95             | 17                     | 6                 | 10                | 257                 | 894                                 | 110             | 6                  | 10                     | 271                      | 43.3                 |
| 13:45 | 93             | 18                     | 5                 | 14                | 244                 | 643                                 | 105             | 5                  | 14                     | 251                      | 43.2                 |
| 14:00 | 91             | 18                     | 1                 | 6                 | 104                 | 163                                 | 98              | 6                  | 6                      | 253                      | 41.6                 |
| 14:15 | 91             | 19                     | 5                 | 10                | 173                 | 121                                 | 94              | 6                  | 10                     | 198                      | 43.0                 |
| 14:30 | 90             | 19                     | 2                 | 10                | 160                 | 155                                 | 92              | 6                  | 10                     | 177                      | 42.2                 |
| 14:45 | 91             | 18                     | 4                 | 7                 | 242                 | 229                                 | 94              | 6                  | 7                      | 165                      | 41.6                 |
| 15:00 | 91             | 18                     | 4                 | 8                 | 325                 | 327                                 | 95              | 6                  | 8                      | 305                      | 41.6                 |
| 15:15 | 92             | 18                     | 5                 | 9                 | 278                 | 502                                 | 99              | 5                  | 9                      | 308                      | 42.4                 |
| 15:30 | 91             | 18                     | 3                 | 9                 | 313                 | 248                                 | 96              | 6                  | 9                      | 315                      | 41.6                 |
| 15:45 | 92             | 18                     | 2                 | 8                 | 25                  | 368                                 | 98              | 5                  | 8                      | 349                      | 42.4                 |
| 16:00 | 92             | 18                     | 4                 | 7                 | 239                 | 248                                 | 96              | 6                  | 7                      | 252                      | 42.4                 |
| 16:15 | 91             | 18                     | 5                 | 10                | 242                 | 164                                 | 93              | 5                  | 10                     | 250                      | 41.6                 |
| 16:30 | 90             | 18                     | 5                 | 8                 | 280                 | 144                                 | 91              | 5                  | 8                      | 284                      | 40.8                 |
| 16:45 | 89             | 18                     | 3                 | 6                 | 238                 | 74                                  | 89              | 5                  | 6                      | 227                      | 40.0                 |
| 17:00 | 88             | 21                     | 5                 | 9                 | 228                 | 37                                  | 87              | 5                  | 9                      | 256                      | 43.1                 |
| 17:15 | 86             | 24                     | 5                 | 15                | 226                 | 28                                  | 85              | 5                  | 15                     | 240                      | 45.0                 |
| 17:30 | 84             | 26                     | 4                 | 11                | 198                 | 23                                  | 84              | 5                  | 11                     | 191                      | 45.4                 |
| 17:45 | 84             | 28                     | 5                 | 9                 | 243                 | 20                                  | 83              | 5                  | 9                      | 185                      | 47.4                 |
| 18:00 | 83             | 30                     | 3                 | 10                | 224                 | 19                                  | 82              | 5                  | 10                     | 238                      | 48.3                 |
| 18:15 | 82             | 32                     | 2                 | 6                 | 211                 | 21                                  | 80              | 5                  | 6                      | 209                      | 49.2                 |
| 18:30 | 81             | 31                     | 5                 | 8                 | 183                 | 27                                  | 80              | 5                  | 8                      | 190                      | 47.5                 |
| 18:45 | 81             | 33                     | 3                 | 8                 | 179                 | 24                                  | 80              | 5                  | 8                      | 193                      | 49.2                 |
| 19:00 | 80             | 33                     | 2                 | 4                 | 167                 | 17                                  | 79              | 5                  | 4                      | 246                      | 48.3                 |
| 19:15 | 79             | 34                     | 0                 | 3                 |                     | 8                                   | 77              | 5                  | 3                      | 128                      | 48.2                 |
| 19:30 | 79             | 34                     | 1                 | 3                 | 321                 | 4                                   | 76              | 5                  | 3                      | 51                       | 48.2                 |
| 19:45 | 79             | 35                     | 0                 | 4                 |                     | 2                                   | 76              | 5                  | 4                      | 185                      | 49.0                 |
| 20:00 | 78             | 36                     | 2                 | 2                 | 271                 | 0                                   | 75              | 5                  | 2                      | 231                      | 48.9                 |
| 20:15 | 78             | 37                     | 2                 | 4                 | 164                 | 0                                   | 75              | 5                  | 4                      | 167                      | 49.6                 |
| 20:30 | 79             | 35                     | 7                 | 12                | 186                 | 0                                   | 76              | 5                  | 12                     | 136                      | 49.0                 |
| 20:45 | 79             | 34                     | 5                 | 9                 | 202                 | 0                                   | 76              | 5                  | 9                      | 171                      | 48.2                 |
| 21:00 | 78             | 39                     | 4                 | 14                | 185                 | 0                                   | 76              | 5                  | 14                     | 134                      | 51.0                 |
| 21:15 | 77             | 40                     | 4                 | 10                | 239                 | 0                                   | 75              | 5                  | 10                     | 237                      | 50.8                 |
| 21:30 | 76             | 41                     | 3                 | 7                 | 202                 | 0                                   | 73              | 5                  | 7                      | 225                      | 50.6                 |
| 21:45 | 75             | 44                     | 3                 | 6                 | 214                 | 0                                   | 72              | 5                  | 6                      | 183                      | 51.6                 |
| 22:00 | 74             | 45                     | 3                 | 6                 | 218                 | 0                                   | 71              | 5                  | 6                      | 238                      | 51.3                 |
| 22:15 | 73             | 46                     | 3                 | 6                 | 197                 | 0                                   | 71              | 6                  | 6                      | 212                      | 51.0                 |
| 22:30 | 73             | 45                     | 3                 | 11                | 196                 | 0                                   | 72              | 6                  | 11                     | 186                      | 50.4                 |
| 22:45 | 74             | 44                     | 7                 | 9                 | 235                 | 0                                   | 72              | 6                  | 9                      | 220                      | 50.7                 |
| 23:00 | 73             | 46                     | 5                 | 13                | 222                 | 0                                   | 72              | 6                  | 13                     | 247                      | 51.0                 |
| 23:15 | 73             | 51                     | 6                 | 11                | 218                 | 0                                   | 72              | 6                  | 11                     | 199                      | 53.8                 |
| 23:30 | 72             | 53                     | 5                 | 10                | 236                 | 0                                   | 71              | 6                  | 10                     | 206                      | 53.9                 |
| 23:45 | 72             | 54                     | 5                 | 9                 | 218                 | 0                                   | 70              | 6                  | 9                      | 246                      | 54.4                 |



# Appendix B - Personal Protection Equipment Report

---

Entrapment Date: Tuesday, June 28, 2016



**Entrapment Site:** The entrapment site was described as a one-half acre area that was previously burned; most of the surface fuels were already consumed. Many of the tree crowns were still intact.

## Shelter Experience:

Two of the firefighters deployed their shelters while kneeling on the ground due to the windy conditions. The other firefighters were very cognizant of the wind, but deployed their shelters while standing. There were no reports of any unexpected difficulty in opening the shelter PVC bags or deploying shelters.

All the firefighters reported hot and sweaty conditions inside the shelter with air temperatures feeling like a sauna. While the wind was whipping all around, the noise was great as the shelter was pushed down upon them. To ensure the largest volume of air in the shelters, they frequently pushed the shelter back up. They described an additional burden of not only holding down the shelter edges and pushing its walls up. Also, they were swatting many biting Black Fire Beetles that had entered their shelters to escape the fire. The bugs were biting them on the neck, wrists and lower legs.



**All shelters were left on site. Later that evening and the following day, the area received rain. The shelters were recovered on Thursday, June 30. All the shelters were wet.**

The shelters were inspected on Friday, July 1st. All the shelters were wet and mud covered, and showed no signs of preexisting excessive wear and no signs of extreme heat except for a few spots where hot embers contacted the shelter. The shelters did show signs of delamination. The delamination was caused by being wet for more than three days.



**PVC Bags – Firefighters reported no difficulty with the shelter PVC bags, tear strips performed as designed. Two bags showed signs of softening and one had a melt hole (1 X 1/2 inch).**

#### Fire Shelter 1

Manufacture Date and Size: 11/2003, regular size, recalled and retrofitted in 2004

Condition: No visual indications of exposure to high temperatures

Outer Shell: Nothing to note

Inner Shell: Nothing to note

Floor: 5-inch tear in corner seam, two areas (3 X 3 and 12 X 12 inch) of abrasion delamination



#### Fire Shelter 2

Manufacture Date and Size: 11/2003, regular size, recalled and retrofitted in 2004

Condition: No visual indications of exposure to high temperatures

Outer Shell: 3 X 3 inch abrasion delamination on end cap

Inner Shell: 7 X 7 inch abrasion delamination on corresponding area of end cap

Floor: 2 spots of 2 X 3 inch abrasion delamination and one attachment point for a hold down strap broke free.

#### Fire Shelter 3

Manufacture Date and Size: 11/2004, regular size, revision C

Condition: No visual indications of exposure to high temperatures

Outer Shell: Nothing to note

Inner Shell: Nothing to note

Floor: Nothing to note

#### Fire Shelter 4

Manufacture Date and Size: Not legible, large size

Condition: No visual indications of exposure to high temperatures

Outer Shell: Nothing to note

Inner Shell: Nothing to note

Floor: Nothing to note

#### Fire Shelter 5

Manufacture Date and Size: 11/2003, regular size, recalled and retrofitted in 2004

Condition: No visual indications of exposure to high temperatures

Outer Shell: Nothing to note

Inner Shell: Nothing to note

Floor: Nothing to note

#### Fire Shelter 6

Manufacture Date and Size: 09/2004, regular size, revision C

Condition: No visual indications of exposure to high temperatures

Outer Shell: Nothing to note

Inner Shell: Nothing to note

Floor: 2 X 3 inch delamination due to abrasion

Shake Handle: Left hand shake handle attachment stitching had a 1 inch tear

#### Fireline Packs

All firefighters tossed their packs and tools clear of their shelters. Some of the packs had melted and burned spots due to hot embers. The back pad of one pack had a melted area of 7 X 5 inches.

#### Firefighter Clothing

Firefighters reported no char or dye sublimation spots on their flame-resistant clothing.

#### Reminders:

Water bottles and Radios – The need for radios and drinking water are secondary to fully deploying a shelter. If time is of the essence, don't worry about getting water and a radio out of your pack.

Shelter Deployment Site Selection - The squad boss selected an area where the surface fuels had previously burned. Even though many tree crowns remained, there was a low likelihood fire was going to carry through the site and directly impact the shelters.

Radio Communication:

Fire shelters can block radio signals into and out of a shelter. Do not expect to have clear radio communication capabilities.

Training:

The members of the NIHC performed practice shelter deployments three or four times earlier this year. Most notably, they practiced in windy conditions and always practice while wearing gloves. They reported no difficulty deploying shelters while wearing gloves and the wind had little effect on their ability to deploy.

# Appendix C - 5 Day Incident Action Plan

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## **CEDAR FIRE**

**AZ-FTA-000403**

**PA KAX5 (1502)**

**Fort Apache Agency**



### **5 DAY INCIDENT ACTION PLAN**

#### **Day Operations**

**Tuesday June 28<sup>th</sup>, 2016**

**to**

**Saturday July 2<sup>nd</sup>, 2016**

**0600 to 1800**

UTM 11 NAD83 DD.MMM

| ORGANIZATION ASSIGNMENT LIST                       |  |                  |  |
|--|--|------------------|--|
| 1. Incident Name <b>CEDAR FIRE</b>                 |  |                  |  |
| 2. Date Prepared                                   |  | 3. Time Prepared |  |
| 6-27-2016  |  | 1200 hrs         |  |
| 4. Operational Period                              |  |                  |  |
| Tuesday June 28 to July 2, 2016 0600 to 1800 hours |  |                  |  |
| Position   |  | Name             |  |
| <b>Incident Commander and Staff</b>                |  |                  |  |
| ICT4   |  | [REDACTED]       |  |
| ICT4(t)  |  | [REDACTED]       |  |
| Safety Officer                                     |  |                  |  |
| Information Officer                                |  |                  |  |
| Liaison Officer                                    |  |                  |  |
| <b>Agency Representative</b>                       |  |                  |  |
| BIA Superintendent                                 |  | [REDACTED]       |  |
| Fort Apache Agency                                 |  | [REDACTED]       |  |
| White Mountain Apache Tribe                        |  | [REDACTED]       |  |
| <b>Planning Section</b>                            |  |                  |  |
| Section Chief                                      |  |                  |  |
| Resource Unit                                      |  |                  |  |
| Situation Unit                                     |  |                  |  |
| Documentation Unit                                 |  |                  |  |
| Demobilization Unit                                |  |                  |  |
| Fire Behavior Analyst                              |  |                  |  |
| Status Check-in                                    |  |                  |  |
| Training Specialist                                |  |                  |  |
| GIS Specialist                                     |  |                  |  |
| Computer Specialist                                |  |                  |  |
| Meteorologist                                      |  |                  |  |
| Human Resource                                     |  |                  |  |
| <b>Logistics Section</b>                           |  |                  |  |
| Section Chief                                      |  |                  |  |
| Deputy   |  |                  |  |
| Supply Unit  |  |                  |  |
| Facilities Unit                                    |  |                  |  |
| Base Camp  |  |                  |  |
| Ground Support Unit                                |  |                  |  |
| Communications Unit                                |  |                  |  |
| INCM   |  |                  |  |
| Medical Unit                                       |  |                  |  |
| Security Manager                                   |  |                  |  |
| Communications Tech                                |  |                  |  |
| Food Unit  |  |                  |  |
| Equipment Manager                                  |  |                  |  |
| Ordering   |  |                  |  |
| <b>Operations Section</b>                          |  |                  |  |
| Operations Section Chief                           |  |                  |  |
| <b>Divisions / Groups</b>                          |  |                  |  |
|  |  |                  |  |
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|  |  |                  |  |
| <b>Air Operations Branch</b>                       |  |                  |  |
| Air Operations Branch Director                     |  |                  |  |
| Helibase Manager                                   |  |                  |  |
| Air Attack Supervisor                              |  |                  |  |
| <b>Finance Section</b>                             |  |                  |  |
| Chief  |  |                  |  |
| Time Unit  |  |                  |  |
| Equipment Time                                     |  |                  |  |
| Personnel Time                                     |  |                  |  |
| Cost Unit  |  |                  |  |
| Compensation/Claims Unit                           |  |                  |  |
| Prepared by:                                       |  |                  |  |

| FIRE BEHAVIOR FORECAST  |   |
|---|---|
| FORECAST NUMBER: 19   | TYPE OF FIRE: Wildfire                      |
| FIRE NAME: Cedar Fire   | OPERATIONAL PERIODS: 28 June – 02 July 2016 |
| DATE ISSUED: 27 June 2016   | TIME ISSUED: 1200                           |
| UNIT: AZ-FTA  | SIGNED: [REDACTED]                          |
| <b>INPUTS</b>   |   |
| <b>WEATHER SUMMARY:</b><br><b>Tuesday</b> Mostly cloudy, thunderstorms, upper 80s, 25% RH, up-valley winds 7-10 mph, LAL-4, H-3, POP-70%<br><b>Wednesday</b> Mostly cloudy, thunderstorms, upper 80s, 30% RH, SW 5-10 mph<br><b>Thursday</b> Mostly cloudy, thunderstorms likely, mid to upper 80s, 25-30% RH, SW 5-10 mph<br><b>Friday</b> Mostly cloudy, thunderstorms likely, mid to upper 80s, 25-30% RH, SW 5-10 mph<br><b>Saturday</b> Mostly cloudy, thunderstorms likely, mid to upper 80s, 25-30% RH, SW 5-10 mph<br><br><b>See attached Fire Weather Forecast for more details.</b> |   |
| <b>FIRE BEHAVIOR</b>  |   |
| <b>GENERAL:</b><br><br>Greatest potential for fire behavior which could result in additional growth beyond the current perimeter will likely be in the first major drainage south of Long Tom Canyon. Fire is established in a pine stringer located in the bottom of the drainage and is slowly backing downslope to the west. As the fire backs down the drainage, it can make short duration runs up the north aspect of the drainage during the heat of the day but these runs are very unlikely to result in sustained fire activity and not threaten containment lines.                 |   |
| <b>FUELS:</b><br><br><b>Ponderosa Pine (TL3) in drainages on DIV C, Q, R</b><br><br><b>Tuesday</b> Smoldering, creeping/backing fire in DIV C within pine drainages<br><b>Wednesday</b> Smoldering, creeping/backing fire in DIV C within pine drainages<br><b>Thursday</b> Smoldering<br><b>Friday</b> Smoldering<br><b>Saturday</b> Smoldering<br><br><b>Flame Length (head fire):</b> < 1'<br><b>Rate of Spread (head fire):</b> 0-1 ch/hr<br><b>Spotting Distance:</b> 0.2 miles (15 chains)<br><b>Probability of Ignition:</b> 60%   |   |
| <b>AIR OPERATIONS:</b><br><br><b>Smoke impacts and overnight pooling in lower elevations is anticipated to decrease each day.</b>   |   |
| <b>SAFETY</b>   |   |
| <b>Do not be lulled into a sense of complacency. Monsoons have not set up in earnest yet so fuels remain very dry. The likelihood of lightning is increasing and outflow winds from Thunderstorms can strongly influence new starts. Ensure you have a solid plan of anticipated weather and fire behavior before engaging.</b>   |   |

|   |   |   |                              |   |  |   |   |  |                                |   |                                       |                                |
|---|---|---|------------------------------|---|--|---|---|--|--------------------------------|---|---------------------------------------|--------------------------------|
| <b>INCIDENT OBJECTIVES</b>  | 1. Incident Name<br><b>CEDAR FIRE</b>   | 2. Date Prepared<br>6/27/2016               | 3. Time Prepared<br>1200 hrs |   |  |   |   |  |                                |   |                                       |                                |
|   | <b>4. Operational Period</b><br>Tuesday June 28 <sup>th</sup> to Saturday July 2 <sup>nd</sup> 2016 <span style="float: right;">Day Shift 0600 to 1800 hours</span> |   |                              |   |  |   |   |  |                                |   |                                       |                                |
| <b>5. Objectives</b> <ul style="list-style-type: none"> <li>• Provide for emergency responders and public safety.</li> <li>• Protect the communities of Cedar Creek, Carrizo, Forestdale, Amos Ranch, Pinetop/Lakeside, Show Low, and Hon-Dah.</li> <li>• Minimize fire footprint while utilizing strategies and tactics with highest probability for success.</li> <li>• Minimize impacts to the South Fought Ridge timber sale, water, vegetation, wildlife, and soils.</li> <li>• Maintain and develop partnerships and relationships through timely and accurate information.</li> <li>• Protect sensitive sites</li> </ul>   |   |   |                              |   |  |   |   |  |                                |   |                                       |                                |
| <b>6. Leaders Intent</b>  |   |   |                              |   |  |   |   |  |                                |   |                                       |                                |
| <b>7. Weather Forecast For Period</b><br>Monsoonal moisture will pass through area during operational period. Thunderstorms will become increasingly wet through midweek. Slower moving storms have potential to produce an inch or more of rainfall. Be aware of the potential for flash flooding in lower area's.   |   |   |                              |   |  |   |   |  |                                |   |                                       |                                |
| <b>8. General Safety Message</b><br>Be aware of possible heavy thunderstorms with lightning. Flash flooding could be possible in drainages around fire area. Use proper PPE at all times in fire area.  |   |   |                              |   |  |   |   |  |                                |   |                                       |                                |
| <b>9. ATTACHEMENTS (X IF ATTACHED)</b> <table border="0" style="width: 100%;"> <tr> <td><input checked="" type="checkbox"/> Organization List - ICS 203</td> <td><input checked="" type="checkbox"/> Medical Plan - ICS 206</td> <td><input checked="" type="checkbox"/> _____</td> </tr> <tr> <td><input checked="" type="checkbox"/> Division Assignment Lists - ICS 204</td> <td><input checked="" type="checkbox"/> Incident Map</td> <td><input type="checkbox"/> _____</td> </tr> <tr> <td><input checked="" type="checkbox"/> Communications Plan - ICS 205</td> <td><input type="checkbox"/> Traffic Plan</td> <td><input type="checkbox"/> _____</td> </tr> </table> |   |   |                              | <input checked="" type="checkbox"/> Organization List - ICS 203 | <input checked="" type="checkbox"/> Medical Plan - ICS 206 | <input checked="" type="checkbox"/> _____ | <input checked="" type="checkbox"/> Division Assignment Lists - ICS 204 | <input checked="" type="checkbox"/> Incident Map | <input type="checkbox"/> _____ | <input checked="" type="checkbox"/> Communications Plan - ICS 205 | <input type="checkbox"/> Traffic Plan | <input type="checkbox"/> _____ |
| <input checked="" type="checkbox"/> Organization List - ICS 203   | <input checked="" type="checkbox"/> Medical Plan - ICS 206  | <input checked="" type="checkbox"/> _____   |                              |   |  |   |   |  |                                |   |                                       |                                |
| <input checked="" type="checkbox"/> Division Assignment Lists - ICS 204   | <input checked="" type="checkbox"/> Incident Map  | <input type="checkbox"/> _____              |                              |   |  |   |   |  |                                |   |                                       |                                |
| <input checked="" type="checkbox"/> Communications Plan - ICS 205   | <input type="checkbox"/> Traffic Plan   | <input type="checkbox"/> _____              |                              |   |  |   |   |  |                                |   |                                       |                                |
| <b>10. Prepared By (Planning Section Chief)</b>   |   | <b>11. Approved By (Incident Commander)</b> |                              |   |  |   |   |  |                                |   |                                       |                                |
|   |   |   |                              |   |  |   |   |  |                                |   |                                       |                                |

ICS 202

NFES 1326



## FIRE WEATHER FORECAST

FORECAST NO. 19

NAME OF FIRE: Cedar

PREDICTION FOR: Tuesday June 28 to Saturday July 2, 2016

UNIT: Fort Apache Agency

TIME AND DATE

FORECAST ISSUED: 1200 Monday 6/27/16

SIGNED: \_\_\_\_\_

Incident Meteorologists

**WEATHER DISCUSSION:** Monsoonal moisture will push north across Arizona this week bringing abundant showers and thunderstorms to the area. Showers and thunderstorms will become increasingly wet through midweek as southeasterly flow aloft continues to moisten the air mass. Initially Tuesday, average storms will produce between 0.10 and 0.20 of an inch of rain but moisten to between 0.25 and 0.5 inches by late Tuesday afternoon. Stronger and slower moving storms have the potential to produce an inch or more of rainfall...making flash flooding and debris flow a very significant potential hazard. Storms will continue to be rather wet through the week with strong outflow winds an additional hazard.

**TUESDAY: \*\*\* Watch for gusty outflow winds near any showers or thunderstorms\*\*\***

**WEATHER:** Mostly cloudy. Numerous showers and thunderstorms.

**MAXIMUM TEMPERATURE:** Upper 80s valleys to lower 80s ridges.

**MINIMUM RELATIVE HUMIDITY:** Around 25% valleys and 30% ridges.

**20 FOOT WINDS:** Upslope winds 3 to 5 mph becoming up-valley 7 to 10 mph after 1300. Along ridges...ESE 10 to 15 mph shifting to S late afternoon.

**STABILITY:** Unstable.

**HAINES INDEX:** 3

**CHANCE OF WETTING RAIN:** 70%

**LAL:** 4

**TUESDAY NIGHT:**

**WEATHER:** Mostly cloudy. Numerous showers and thunderstorms.

**MINIMUM TEMPERATURE:** Upper 50s valleys to mid 60s ridges.

**MAXIMUM RELATIVE HUMIDITY:** 80 to 90% valleys and around 60% ridges.

**20 FOOT WINDS:** S wind 10 mph becoming SE 5 mph after midnight.

**STABILITY:** Shallow inversions form in areas with cloud breaks.

**HAINES INDEX:** 3

**CHANCE OF WETTING RAIN:** 70%

**LAL:** 4

**WEDNESDAY:** Showers or thunderstorms likely. Some storms may produce heavy downpours and frequent lightning. Highs in the mid 80s. Min RHs around 30%. SE wind 4 to 6 mph in the morning shifting to SW around 10 mph in the afternoon.

**THURSDAY THROUGH SATURDAY:** Scattered wet showers and thunderstorms with heavy downpours possible at times. Highs in the upper 80s. Lows in the 60s. Minimum RHs 25% to 30%. Nighttime humidity recovers 70 to 80%. Winds generally out of the SW 5 to 10 mph.

- For fire weather information and warnings online, visit the Flagstaff NWS website at <http://www.wrh.noaa.gov/firewx/?wfo=fgz>
- Spot Forecasts for this incident can be requested via the following website: <http://spot.nws.noaa.gov/cgi-bin/spot/spotmon?site=fgz>
- A NWS Flagstaff fire weather forecaster can also be reached directly at 928-774-4414

Current RAWs data can be accessed using the QR Code to the right.



## Cedar Fire - General Weather Outlook

For Planning Purposes Only, see the IAP for the Official Forecast

Forecast made Monday, June 27 - IMETs Julia Ruthford and Mary Wister

|                      | MON    | TUE    | WED    | THU    | FRI   | SAT   |
|----------------------|--------|--------|--------|--------|-------|-------|
|                      | 27-Jun | 28-Jun | 29-Jun | 30-Jun | 1-Jul | 2-Jul |
| Clouds @ 1500 (%)    | 70     | 70     | 60     | 50     | 50    | 30    |
| 6200 ft Max Temp (F) | 86     | 86     | 88     | 87     | 88    | 90    |
| Precip Chance (%)    | 70     | 70     | 50     | 40     | 40    | 20    |
| LAL                  | 4      | 4      | 3      | 3      | 3     | 2     |
| Ridge Wind (mph)     | 11     | 11     | 7      | 7      | 7     | 8     |
| Wind Direction*      | S      | SSW    | SW-W   | W      | W     | W-NW  |
| Min Humidity (%)     | 29     | 29     | 28     | 28     | 26    | 21    |
| Haines Index         | 3      | 3      | 3      | 3      | 3     | 4     |

### KEY:

|                 | Moderate Burning<br>Conditions   | Take Caution - Critical<br>Burning Conditions | Extreme Burning<br>Conditions |
|-----------------|--|---|-------------------------------|
| Clouds          | > 31 %   | 15 to 30 %                                    | < 15 %                        |
| Avg Max Temp    | < 75 F   | 75 to 85 F                                    | > 85 F                        |
| Precip Chance   | > 49 %   | 15 to 49 %                                    | < 15 %                        |
| LAL             | < 5  | 5   | > 5                           |
| Ridge Wind      | < 10 mph   | 10 to 20 mph                                  | > 20 mph                      |
| *Wind Direction | Criticality of wind direction highly dependent on burn operations and/or structures threatened |   |                               |
| Min Humidity    | > 22 %   | 16 to 22 %                                    | < 16 %                        |
| Haines Index    | 2, 3, 4  | 5   | 6                             |

**5 or more EXTREME blocks in a day equals  
the potential for a Critical Weather Day**





[illegible]

NFES 1328

49



|                                   |  |   |                            |                          |                          |                        |
|-----------------------------------|--|---|----------------------------|--------------------------|--------------------------|------------------------|
| <b>AIR OPERATIONS SUMMARY 220</b> |  | Prepared By: Mark Pater                                 | Prepared: 06/27/2016       |                          | Prepared Time: 2000 hrs. |                        |
| <b>1. INCIDENT NAME: CEDAR</b>    |  | <b>2. OPERATIONAL PERIOD</b><br>06/28/2016 – 07/02/2016 | <b>START TIME:</b><br>0600 | <b>END TIME:</b><br>2000 | <b>SUNRISE:</b><br>0512  | <b>SUNSET:</b><br>1936 |

|  |  |  |   |
|--|--|--|---|
| <b>3. REMARKS</b> (Safety Notes, Hazards, Air Operations Special Equipment, etc.).<br><br><p style="text-align: center;"><b><u>AVIATION SAFETY IS A TEAM EFFORT</u></b></p> <p style="text-align: center;"><b><u>AIR OPERATIONS INTENT</u></b></p> <p>ALL MISSIONS WILL BE ANALYZED IN TERMS OF HAZARDS AND RISKS</p> <ul style="list-style-type: none"> <li>• THE RISK ASSESSMENT IS AN OPEN PROCESS WELCOMING INPUT.</li> <li>• HAZARDS WILL BE MITIGATED, RISK WILL BE REDUCED.</li> <li>• RISK MANAGEMENT PROCESS WILL BE DOCUMENTED AND DISPLAYED.</li> </ul> <p><b>IF A MISSION FEELS UNSAFE, IDENTIFY SAFE ALTERNATIVES!</b></p> <p><b>***Possible Thunderstorm Cells &amp; Outflow Winds: HEADS UP!!!***</b></p> |  | <b>4. READY ALERT AIRCRAFT:</b><br><br>See Medical Plan (ICS 206) in the IAP | <b>5. TFR: 6/4966</b><br><br>34° 02' 40"N, 110° 07' 50"W<br>12,000' MSL<br>10 nm radius<br>1200 to 0500 UTC Daily |
|--|--|--|---|

| 6. PERSONNEL | NAME | PHONE # | 7. FREQUENCIES | AM       | FM                     | 8. FIXED-WING Avail/ Type/ Make-Model/ N#/ Base |
|--------------|------|---------|----------------|----------|------------------------|---|
| AOBD         |      |         | A/A (Fixed)    | 119.1750 |                        | AIRTANKERS: Order thru ATGS                     |
| ASGS         |      |         | A/A (Rotor)    | 118.4250 |                        | ATGS Platforms:                                 |
| ATGS         |      |         | A/G Primary    |          | 169.1500               |   |
| ATGS         |      |         | A/G Secondary  |          | 166.9000               |   |
| HEB2         |      |         |                |          |                        |   |
|              |      |         | Deck           |          | 163.1000               |   |
|              |      |         | V-Med 28       |          | 155.3400<br>(156.7 TX) |   |
|              |      |         | V-Med 29       |          | 155.3475<br>(156.7 TX) | Whiteriver Helibase: 928-338-5408               |
|              |      |         | Air Guard      |          | 168.6250<br>(110.9 TX) | Show Low Dispatch - Aviation: 928-532-2706      |

| 9. HELICOPTERS (Use Additional Sheets as Necessary) |    |             |            |       |       |           |        |    |             |      |       |       |         |
|---|----|-------------|------------|-------|-------|-----------|--------|----|-------------|------|-------|-------|---------|
| FAA N#  | TY | MAKE/ MODEL | BASE       | AVAIL | START | REMARKS   | FAA N# | TY | MAKE/ MODEL | BASE | AVAIL | START | REMARKS |
| 8MB   | 3  | AS 350 B3   | Cottonwood | 0700  | 0800  | Recon/PSD |        |    |             |      |       |       |         |
|   |    |             |            |       |       |           |        |    |             |      |       |       |         |
|   |    |             |            |       |       |           |        |    |             |      |       |       |         |
|   |    |             |            |       |       |           |        |    |             |      |       |       |         |
|   |    |             |            |       |       |           |        |    |             |      |       |       |         |
|   |    |             |            |       |       |           |        |    |             |      |       |       |         |





## ICS 220 - Continued

| 10. TASK/ MISSION/ ASSIGNMENT (Type/ function includes: Air Tactical, Retardant, Recon, Personnel Transport, Bucket Operations, SAR, etc.) |          |   |                  |          |        |
|--|----------|---|------------------|----------|--------|
| TYPE/FUNCTION  | PRIORITY | NAME OF PERSONNEL OR CARGO (If applicable)<br>or instructions for tactical aircraft | MISSION<br>START | FLY FROM | FLY TO |
| ATGS   | 1        | Provide recons as weather permits if needed.  | TBD              | SOW      | Fire   |
| Initial Attack   | 1        | Support Initial Attack actions as requested.  | TBD              | SOW      |        |
|  |          |   |                  |          |        |
|  |          |   |                  |          |        |
|  |          |   |                  |          |        |
|  |          |   |                  |          |        |
|  |          |   |                  |          |        |

| Helibase, Dip Sites, Pick Up Sites, etc.                              | Helibase, Dip Sites, Pick Up Sites, etc.                         |
|---|--|
| Show Low Airport: N34° 15.928' x W110° 0.34' 6,415' elevation         | Rainbow Lake: N34° 9.161' W109° 59.048' 6,700' elevation         |
| Whiteriver Helibase: N33° 48.762' W109° 59.122' 5,112' elevation      | Show Low Lake: N34° 11.38' W109° 59.96' 6,542' elevation         |
| Cottonwood Staging: N34° 06.744' W110° 09.022' 5,896' elevation       | Bootleg Lake: N34° 4.54' W109° 55.75' 6,900' elevation           |
| H-1: N34° 2.672' W110° 7.841' 6,871' elevation                        | Tank Dip: N34° 03.743' W110° 12.235' 5,640' elevation            |
| H-2: N34° 2.20' W110° 13.97' 5,536' elevation                         | Cottonwood Heliwell: N34° 06.744' W110° 09.022' 5,896' elevation |
| H-3: 33°53.22' W110° 10.97' 4,900' elevation                          |  |
| H-4: 33°55.651' W110° 07.146' 5,250' elevation                        |  |
| H-5: 34° 4.16' W110° 01.36' 6,800' elevation                          |  |
| H-6: 34° 3.39' W110° 3.72' 6,900' elevation                           |  |
| H-7: N34° 0.583' W110° 4.6' 6,563' elevation -- Dust Abatement Needed |  |
| H-8: N34° 2.56' W110° 5.5' 6,982' elevation -- Dust Abatement Needed  |  |

## Wind Restrictions

| Flights above ground level | Flight Permitted in Winds<br>Less than / Maximum Gust Spread |                                  |                                 |
|----------------------------|--|----------------------------------|---------------------------------|
|                            | Type 1 Helicopters   | Type 2 Helicopters               | Type 3 Helicopters              |
| More than 500' AGL         | <50kts / Gusts: N/A  | <50kts / Gusts: N/A              | <50kts / Gusts: N/A             |
| Less than 500' AGL         | <40kts / Max Gust Spread: 15kts                              | <40 kts / Max Gust Spread: 15kts | <30kts / Max Gust Spread: 15kts |

"Chuck Norris once scared a baby. To this day that baby is still screaming in fear.....his name is Justin Bieber." Anonymous Quote

Approved by: /s/ Pete Schwab, AOB

## **HEALTH AND SAFETY MESSAGE**

***SAFETY*** starts with ***YOU***

We are **ALL** accountable for **SAFE** behaviors

**INCIDENT: Cedar Fire**

**DATE: 6/28-7/2-2016    TIME: Day Ops**

### **Major Hazards and Risks:**

**Driving:** Drive Defensively, Use Headlights, Abide by Speed Limits, Use a Backer

**Weather:** Watch for changing conditions and thunderstorm activity

**Walking:** Watch your Footing. You will be working on steep slopes and broken terrain.

**Post Fire Effects:** Assess potential for flooding before entering work areas. Watch for fire weakened trees.

**PPE:** Proper Personal Protective Equipment (PPE) will be worn at all times during field operations.

**Medical Extraction:** Calculate and assess extraction times from all activity locations

### **MAINTAIN SITUATIONAL AWARENESS / COMBAT COMPLACENCY**

#### **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 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.

***"Always leave yourself a way out"***

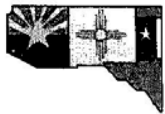
Chuck Yeager

#### **18 Watchout 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 fireline.

***THANKS!***

**Incident Safety Officer: /s/ Don Muise and Mike Gillespie**



**SOUTHWEST AREA TYPE 1  
INCIDENT MANAGEMENT TEAM 2**

| Incident Radio Communications Plan (ICS 205) |                 |   |            |   |
|--|-----------------|---|------------|---|
| <b>Incident Name:</b><br>Cedar Fire          |                 | <b>Date/Time Prepared:</b><br>06/27/16                        |            | <b>Operational Period:</b><br>6/28/2016- Open ended |
| Channel                                      | Function        | Frequency   | Narrowband | Assignment & Remarks                                |
| 1  | FIRE C/C        | 172.675<br>rx&tx tone: 151.4                                  | Narrow     |   |
| 2  | FIRE Mckay      | RX:172.675<br>rx tone: 151.4<br>TX:166.3625<br>tx tone: 162.2 | Narrow     |   |
| 3  | FIRE Chediski   | RX:172.675<br>rx tone: 151.4<br>TX:166.3625<br>tx tone: 186.2 | Narrow     |   |
| 4  | forest Net C/C  | 170.075<br>rx&tx tone: 151.4                                  | Narrow     |   |
| 5  | WMAT Forestry   | 153.2300  | Narrow     |   |
| 6  | WMAT Fire Dept. | 158.7450  | Narrow     |   |
| 7  | Fire Dept Tac   | 155.205   | Narrow     |   |
| 8  | WMAT Police     | 154.055   | Narrow     |   |
| 9  | Tac 1           | 167.5500  | Narrow     |   |
| 10   | Tac 2           | 168.6750  | Narrow     |   |
| 11   | Tac 3           | 168.775   | Narrow     |   |
| 12   | WMAT G&F        | 151.175   | Narrow     |   |
| 13   | Mutual Aid      | 154.280   | Narrow     |   |
| 14   | A/G-34          | 167.1750  | Narrow     |   |
| 15*  | A/G-47          | 167.7250  | Narrow     |   |
| 16*  | Air Guard       | TX/RX: 168.625  | Narrow     |   |
| Prepared by: [REDACTED]                      |                 |   |            |   |

## MEDICAL PLAN (ICS 206 WF)

|  |  |   |   |  |                                       |  |  |  |  |  |  |
|--|--|---|---|--|---------------------------------------|--|--|--|--|--|--|
| <b>1. Incident/Project Name</b>  |  | <b>2. Operational Period</b>  |   |  |                                       |  |  |  |  |  |  |
| <b>Cedar Fire</b>  |  | Date/Time <b>June 28 – July 2, 2016</b>                                     |   |  |                                       |  |  |  |  |  |  |
| <b>3. Ambulance Services</b>   |  |   |   |  |                                       |  |  |  |  |  |  |
| <b>Name</b>  | <b>Complete Address</b>  | <b>Phone &amp; EMS Frequency</b>  | <b>Advanced Life Support (ALS)</b><br>Yes      No |  |                                       |  |  |  |  |  |  |
| Show Low EMS   | 1000 E Mills, Show Low, AZ 85901   | 911   | X   |  |                                       |  |  |  |  |  |  |
| White Mountain Apache Tribe EMS  | 1210 W Rainbow St, Whiteriver, AZ 85941  | 928-338-3095/3096   | X   |  |                                       |  |  |  |  |  |  |
| <b>4. Air Ambulance Services</b>   |  |   |   |  |                                       |  |  |  |  |  |  |
| <b>Name</b>  | <b>Phone</b>   | <b>Type of Aircraft &amp; Capability</b>                                    |   |  |                                       |  |  |  |  |  |  |
| Air Evac<br>(Show Low, Payson, Miami)  | Dispatch: 800-321-9522   | A-Star B3, Nurse & Paramedic, NVG Capable                                   |   |  |                                       |  |  |  |  |  |  |
| Native Air<br>(Show Low, Springerville, Globe)   | Dispatch: 800-806-7106   | A-Star B3, Nurse & Paramedic, NVG Capable                                   |   |  |                                       |  |  |  |  |  |  |
| Davis-Monthan Air Force Base<br>Para-rescue (Hoist) (Tucson)   | Air Force Rescue<br>Coordination Ctr<br>800-851-3051   | Pavehawk (Paramedic) Night Vision (NVG)<br>Tucson (1-2 hour+ response time) |   |  |                                       |  |  |  |  |  |  |
| DPS Ranger (Short Haul-day only)<br>(Flagstaff, Tucson, Phoenix)   | Dispatch – 602-223-2208  | Bell Jet Ranger 407, Paramedic, Night Vision (NVG)                          |   |  |                                       |  |  |  |  |  |  |
| <b>5. Hospitals</b>  |  |   |   |  |                                       |  |  |  |  |  |  |
| <b>Name<br/>Complete Address</b>   | <b>GPS Datum – WGS 84<br/>Coordinate Standard<br/>Degrees Decimal Minutes<br/>DD° MM.MMM' N - Lat<br/>DD° MM.MMM' W - Long</b> | <b>Travel Time<br/>to Hospital<br/>Air      Gnd</b>                         | <b>Phone</b>                                      | <b>Helipad<br/>Yes      No</b>                               | <b>Level<br/>of Care<br/>Facility</b> |  |  |  |  |  |  |
| Summit Healthcare<br>Regional Hospital<br>2200 E Show Low Lake Rd<br>Show Low, AZ 85901  | Lat: N 34 12.171<br>Long: W 110 01.072<br>VHF:   | 15 min      30 min  | 928-537-4375                                      | <input checked="" type="checkbox"/> <input type="checkbox"/> | Level 4 Trauma                        |  |  |  |  |  |  |
| Whiteriver Indian Hospital<br>200 W Hospital Dr<br>Whiteriver, AZ 85941  | Lat: N 33 52.668<br>Long: W 109 57.479<br>VHF:   | 15 min      40 min  | 928-338-4911                                      | <input checked="" type="checkbox"/> <input type="checkbox"/> | Level 4 Trauma                        |  |  |  |  |  |  |
| Scottsdale Osborne<br>Medical Center<br>7400 E Scottsdale Rd<br>Scottsdale, AZ 85251   | Lat: N 33 29.347<br>Long: W 111 55.325<br>VHF:   | 60 min      3 hrs   | 480-882-4000                                      | <input checked="" type="checkbox"/> <input type="checkbox"/> | Level 1 Trauma                        |  |  |  |  |  |  |
| Maricopa Medical Center<br>2601 E Roosevelt St<br>Phoenix, AZ 85008  | Lat: N 33 27.470<br>Long: W 112 01.569<br>VHF:   | 60 min      3 hrs   | 602-344-5011                                      | <input checked="" type="checkbox"/> <input type="checkbox"/> | Level 1 Trauma<br>& Burn Center       |  |  |  |  |  |  |
| <b>6. Division   Branch   Group      Area Location Capability</b>  |  |   |   |  |                                       |  |  |  |  |  |  |
| <div style="display: flex;"> <div style="width: 30%; padding-right: 10px;"> <b>Emergency medical service will be provided by local 911 EMS and Fire Services.</b> </div> <table border="1" style="width: 70%; border-collapse: collapse;"> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> </table> </div> |  |   |   |  |                                       |  |  |  |  |  |  |
|  |  |   |   |  |                                       |  |  |  |  |  |  |
|  |  |   |   |  |                                       |  |  |  |  |  |  |
|  |  |   |   |  |                                       |  |  |  |  |  |  |
|  |  |   |   |  |                                       |  |  |  |  |  |  |
|  |  |   |   |  |                                       |  |  |  |  |  |  |
|  |  |   |   |  |                                       |  |  |  |  |  |  |
| <b>7. Prepared By (Medical Unit Leader)</b>  |  | <b>8. Date/Time</b>   | <b>9. Reviewed By (Safety Officer)</b>            |  | <b>10. Date/Time</b>                  |  |  |  |  |  |  |
| [Redacted Signature]   |  | 6-26-16 @ 2030  | [Redacted Signature]                              |  | 6-26-16                               |  |  |  |  |  |  |





## MEDICAL PLAN (ICS 206 WF)

| Medical Incident Report   |                     |   |   |  |            |
|---|---------------------|---|---|--|------------|
| FOR ALL MEDICAL EMERGENCIES: IDENTIFY ON SCENE INCIDENT COMMANDER BY NAME AND POSITION AND ANNOUNCE "MEDICAL EMERGENCY" TO INITIATE RESPONSE FROM IMT COMMUNICATIONS/DISPATCH.  |                     |   |   |  |            |
| Use items one through nine to communicate situation to communications/dispatch.   |                     |   |   |  |            |
| <b>1. CONTACT COMMUNICATIONS/DISPATCH</b><br><i>Ex: "Communications, Div. Alpha, Stand-by for Priority Medical Incident Report." (If life threatening request designated frequency be cleared for emergency traffic.)</i> |                     |   |   |  |            |
| <b>2. INCIDENT STATUS:</b> Provide incident summary and command structure.  |                     |   |   |  |            |
| Nature of Injury/Illness  |                     |   | Describe the injury<br>(Ex: Broken leg with bleeding)   |  |            |
| Incident Name   |                     |   | Geographic Name + "Medical"<br>(Ex: Trout Meadow Medical)   |  |            |
| Incident Commander  |                     |   | Name of IC  |  |            |
| Patient Care  |                     |   | Name of Care Provider<br>(Ex: EMT Smith)  |  |            |
| <b>3. INITIAL PATIENT ASSESSMENT:</b> Complete this section for each patient. This is only a brief, initial assessment. Provide additional patient info after completing this 9 Line Report.                              |                     |   |   |  |            |
| Number of Patients:   | Male / Female       | Age:                                      | Weight:   |  |            |
| Conscious? <input type="checkbox"/> YES <input type="checkbox"/> NO = MEDEVAC!  |                     |   |   |  |            |
| Breathing? <input type="checkbox"/> YES <input type="checkbox"/> NO = MEDEVAC!  |                     |   |   |  |            |
| Mechanism of Injury:<br>What caused the injury?   |                     |   |   |  |            |
| Lat/Long (Datum WGS84)<br>Ex: N 40° 42.45' x W 123° 03.24'  |                     |   |   |  |            |
| <b>4. SEVERITY OF EMERGENCY, TRANSPORT PRIORITY</b>   |                     |   |   |  |            |
| SEVERITY  |                     |   | TRANSPORT PRIORITY  |  |            |
| <input type="checkbox"/> <b>URGENT-RED</b> Life threatening injury or illness.<br><i>Ex: Unconscious, difficulty breathing, bleeding severely, 2° - 3° burns more than 4 palm sizes, heat stroke, disoriented.</i>        |                     |   | Ambulance or MEDEVAC helicopter. Evacuation need is <b>IMMEDIATE</b> .  |  |            |
| <input type="checkbox"/> <b>PRIORITY-YELLOW</b> Serious injury or illness.<br><i>Ex: Significant trauma, not able to walk, 2° - 3° burns not more than 1-2 palm sizes.</i>  |                     |   | Ambulance or consider air transport if at remote location. Evacuation may be <b>DELAYED</b> .   |  |            |
| <input type="checkbox"/> <b>ROUTINE-GREEN</b><br>Not a life threatening injury or illness.<br><i>Ex: Sprains, strains, minor heat-related illness.</i>  |                     |   | Non-Emergency. Evacuation considered <b>Routine of Convenience</b> .  |  |            |
| <b>5. TRANSPORT PLAN:</b>   |                     |   |   |  |            |
| Air Transport (Agency Aircraft Preferred)   |                     |   |   |  |            |
| <input type="checkbox"/> Helispot   |                     | <input type="checkbox"/> Short-haul/Hoist |   | <input type="checkbox"/> Life Flight             |            |
| <input type="checkbox"/> Self-Extract   |                     | <input type="checkbox"/> Carry-Out        |   | <input type="checkbox"/> Ambulance               |            |
| <input type="checkbox"/> Other  |                     | <input type="checkbox"/> Other            |   | <input type="checkbox"/> Other                   |            |
| <b>6. ADDITIONAL RESOURCE/EQUIPMENT NEEDS:</b>  |                     |   |   |  |            |
| <input type="checkbox"/> Paramedic/EMT(s)   |                     | <input type="checkbox"/> Crew(s)          |   | <input type="checkbox"/> SKED/Backboard/C-Collar |            |
| <input type="checkbox"/> Burn Sheet(s)  |                     | <input type="checkbox"/> Oxygen           |   | <input type="checkbox"/> Trauma Bag              |            |
| <input type="checkbox"/> Medication(s)  |                     | <input type="checkbox"/> IV/Fluid(s)      |   | <input type="checkbox"/> Cardiac Monitor/AED     |            |
| <input type="checkbox"/> Other (i.e. splints, rope rescue, wheeled litter)  |                     |   |   |  |            |
| <b>7. COMMUNICATIONS:</b>   |                     |   |   |  |            |
| Function  | Channel Name/Number | Receive (Rx)                              | Tone/NAC *  | Transmit (Tx)                                    | Tone/NAC * |
| Ex: Command   | Forest Rpt, Ch. 2   | 168.3250                                  | 110.9   | 171.4325   | 110.9      |
| COMMAND   |                     |   |   |  |            |
| AIR-TO-GRND   |                     |   |   |  |            |
| TACTICAL  |                     |   |   |  |            |
| *(NAC for digital radio system)   |                     |   |   |  |            |
| <b>8. EVACUATION LOCATION:</b>  |                     |   |   |  |            |
| Lat/Long (Datum WGS84)<br>Ex: N 40 42.45' x W 123 03.24'  |                     |   |   |  |            |
| Patient's ETA to Evacuation Location:   |                     |   |   |  |            |
| <b>Considerations:</b> If primary options fail, what actions can be implemented in conjunction with primary evacuation method? Be thinking ahead...   |                     |   | <b>REMEMBER:</b> Confirm ETA's of resources ordered<br>Act according to your level of training<br>Be Alert. Keep Calm. Think Clearly. Act Decisively. |  |            |

# Appendix D - Acronym/Definition List

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| <b>Acronym/Word</b> | <b>Definition</b>   |
|---------------------|---|
| BAER                | Burned Area Emergency Response  |
| BIA                 | Bureau of Indian Affairs  |
| EMT                 | Emergency Medical Technician  |
| FBAN                | Fire Behavior Analyst   |
| Fire Whirl          | Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame. Fire whirls range in size from less than one foot to over 500 feet in diameter. Large fire whirls have the intensity of a small tornado |
| FMO                 | Fire Manager Officer  |
| Folda-tanks         | Portable, collapsible water tank with a tubular frame. Tank capacities vary in size from 500-1500 gallons.  |
| FSPRO               | Fire Spread Probability   |
| IAP                 | Incident Action Plan  |
| ICT4-T              | Incident Commander Trainee  |
| IHC                 | Interagency Hotshot Crew  |
| IMET                | Incident Meteorologist  |
| IMT                 | Incident Management Team  |
| IRAWS               | Incident Remote Automatic Weather Station   |
| LCES                | Lookouts, Communication, Escape Routes and Safety Zones   |
| LTAN                | Long Term Fire Analyst  |
| SEAT                | Single Engine Air Tankers   |
| SAIT                | Serious Accident Investigation Team   |
| NICC                | National Interagency Coordination Center  |
| NIFC                | National Interagency Fire Center  |
| NIHC                | Navajo Interagency Hotshot Crew   |
| NWCG                | National Wildfire Coordinating Group  |
| T1                  | Type 1  |