Perdida Fire Burn Injury
Accident Investigation Report
Farmington District – Bureau of Land Management
Taos, New Mexico

December 15, 2015
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Date: 12/15/15
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Executive Summary

At approximately 1630 hours on September 9, 2015, an accident occurred on the Perdida Fire, a multi-jurisdictional wildfire north, northwest of Taos, New Mexico. The Perdida Fire was started by lightning on June 23 at approximately 1900. It was managed for multiple objectives utilizing the full range of fire management practices to help achieve ecosystem sustainability, including its interrelated ecological, economic, and social components. On the day of the accident, firefighters were igniting fuels to reduce fuel loadings and encourage sprouting in oak brush. A firefighter received severe burns to both legs, back, and left arm while utilizing a drip torch. Basic medical care was provided on site and the firefighter was transported to Albuquerque Airport by an air ambulance before being taken to the University of New Mexico Burn Center by ground ambulance.

Narrative

Timeline – September 9, 2015

1005 – Crew of eight en route to Perdida Fire, 1.5 hours estimated time en route (ETE)

1215 – Crew arrives on scene, begins ignitions

1635 – Approximate time incident occurs

1712 – Perdida Lookout calls dispatch and orders ground ambulance after consulting with the Incident Commander (IC)

1713 – Perdida Lookout upgrades medical transport to helicopter but keeps ground ambulance en route per IC

1715 – Farmington District Fire Management Officer (FMO) calls New Mexico State Office (NMSO) BLM Duty Officer

1720 – Helicopter launches, 15 min ETE; CareFlight requests lat/long, passenger weight, and any known hazards

1721 – Perdida IC calls in weight of 198, no hazards, and use Air to Ground (A/G) 56

1722 – CareFlight asks for A/G frequency and ground contact. Dispatch conveys Perdida IC as contact, frequency of 168.6625, and lat/long in progress

1723 – IC confirms A/G frequency and is working on a lat/long in a moment

1732 – CareFlight to Taos Dispatch: “Helicopter is 3 min out and still need lat/long”

1736 – Lat/long is called into dispatch

1738 – Dispatch Floor Supervisor relays lat/long to CareFlight

1739 – Ground crew unable to make contact to CareFlight

1740 – Approximate time of landing at the Perdida Fire extraction point

1741 – Ambulance is standing by at the access road to Pot Mountain
1748 – Initial Attack Dispatcher (IADP) to Central Dispatch: “Stand down the ground ambulance,” after consulting with the IC

1753 – Lookout to IADP2: “Patient is onboard, ETE 1 hour, stop first in Taos for refueling of aircraft”

1754 – Dispatch Floor Supervisor to CareFlight: “The status of the helicopter is lifting off and en route to Taos”

1850 – CareFlight to IADP2: “Helicopter is 14 min to Albuquerque International Airport and will be transported to the University of New Mexico Hospital by ground ambulance”

1909 – IADP requests status of helicopter from CareFlight and is advised that the helicopter is landing at this time

1912 – After Action Review (AAR) is conducted on scene of the incident

2007 – All personnel leave the fire for vehicles

2034 – All personnel arrive at vehicles, ETE to Taos is 1.5 hours

2145 – Back in quarters, out of service

Participants

On September 9, 2015, a total of nine personnel were working on the Perdida Fire:

- Incident Commander
- Lookout
- Igniters 1, 2, 3, 4, 5, 6, and 7

Incident

Ignitions began at approximately 1215 hours utilizing seven personnel staggered 10 – 15 feet apart from one another burning across slope. The decision to stagger igniters was determined primarily by wind direction due to the low angle of the slope. Igniter #1 was the furthest downslope, leading the group in sequential order uphill. The group had completed one pass conducting ignitions from generally north to south. The group shuttled back to the original starting point and began a second pass of ignitions.

As they made the second pass, Igniter #2 ignited his left pant cuff and boot. He noticed the flames and attempted to pat them out. At the same time he saw his leg on fire, he threw the drip torch in his left hand away from him. Being surrounded by brush, he attempted to get to a clear area.

As he moved through the gamble oak, he yelled out. At this point, Igniter #1 heard the injured firefighter and ran to him. Igniter #1 saw that the victim’s line gear and back of his legs were on fire so he tried to put the fire out with dirt and by patting at the flame with his gloved hand. Igniter #1 told the victim to get on the ground and they both fell together. The victim got back up and ran while trying to get his glove off and then his pack, successfully. The victim then stumbled but regained his footing briefly before falling back to the ground. At this point, Igniters #1 and #3 converged and patted out the fire on the victim’s pants.
At that point, Igniter #1 called on the radio, “We have a severe burn and we need a medevac. It looks like a third degree burn.”

Igniter #2 remained on the ground. The Lookout arrived on scene and took command of the injury scene. The Lookout began to ask for mustard, and Igniter #2 said that he had mustard packets in his line gear.

Attending Igniters #1 and #3 began to cut the pants off #2. When the IC and the rest of the igniters arrived on scene, the Lookout ordered everyone to get away from the scene except for him, the IC, and Igniter #1. Igniter #1 commanded the others to extinguish fire which had spread from firing operations as well as Igniter #2’s discarded pack. The Lookout asked for the mustard from Igniter #2’s pack which he then applied to the injured firefighter’s burns.

Igniter #5 took a first aid kit from his pack and handed it off to the group rendering first aid. The three responding determined that it would be best to call for a medevac helicopter and get the injured crewmember out of the fire area.

Igniter #4 then retrieved the burn kit from one of the UTVs and brought it to the scene. Once administered, the burn kit provided immediate relief.

Igniter #2 was able to get to his feet before being placed in a UTV and driven to the medevac spot as the helicopter arrived on scene.

**Investigation Process**

In accordance with the *Interagency Standards for Fire and Aviation Operations*, a Wildfire Accident Investigation Team was assembled and delegated authority to investigate the accident. The investigation included analysis of human, material, and environmental factors. The process consisted of interviews, verification of documentation, accident site visit, photographic and video documentation, Personal Protection Equipment (PPE) and drip torch analysis, and establishment of the timeline of events for the day of the accident. The team consisted of the following individuals:

- Joel Gosswiller, Team Lead, Fire Management Officer, Idaho Falls District BLM
- Marty Adell, Chief Investigator, Acting Assistant Fire Management Officer, Nevada BLM
- Ernie Lopez, Team Member, District Forester, New Mexico EMNRD, Forestry Division
- Brian Filip, Team Member, Fire Staff, New Mexico EMNRD, Forestry Division

Gosswiller received the delegation of authority from the Farmington District Manager on September 12th at 0900 at an in-briefing at the Taos Field Office. The investigation team reviewed witness statements and documentation of the fire and events prior to interviewing those involved in the incident.

On September 13th, the team, the Perdida Fire Incident Commander, and local fire personnel traveled to the accident site. Evidence collected at the location included GPS data, videos, and photographs which were used to explain the sequence of events.
On September 14th, the team continued interviews and traveled to the University of New Mexico Burn Center to visit the injured firefighter.

On September 15th, the team compiled documentation and analyzed the Personal Protective Equipment worn by the injured firefighter at the time of the accident.

On September 16th, the team carried out follow-up interviews and completed a draft report.

And on September 17th, the team closed out with Farmington District, BLM State Office, and State of New Mexico personnel.

**Findings and Recommendations**

**Finding 1**
All agreements, approvals, and delegations were in place for the management of the Perdida Fire.

**Finding 2**
All firefighting personnel were fully qualified for positions performed on the incident and used required personal protective equipment (PPE).

**Discussion**
The Nomex clothing involved in the incident received extensive heat damage but reduced burn severity. This reaffirms the importance of wearing appropriate PPE and maintaining it in good working condition.

**Finding 3**
A drip torch was strapped sideways to the firefighter’s pack with the cap facing to the firefighter’s left side. This resulted in residual fuel on the injured firefighter’s pack and clothing which then ignited during the firing operations.

**Discussion**
Firefighters were igniting strips over rough terrain and a large area that required more than one drip torch. Therefore, some firefighters had extra drip torches strapped on their packs or on their waist straps and others carried one in each hand. From witness accounts and the observed burn damage to clothing and gear, it is likely fuel leaked from the drip torch being carried sideways on the firefighter’s pack.

**Recommendation**
Firefighters should avoid carrying extra drip torches on their packs during ignition operations.

**Recommendation**
All PPE should be kept clean and free of fuel.

**Finding 4**
The decision to medevac was delayed.

**Discussion**
Approximately 40 minutes passed between the time of the incident and the request for medevac. Following burn injury protocol, a medevac should have been initiated upon the determination of 2\(^{nd}\) and 3\(^{rd}\) degree burns and due to the remoteness of the incident.

Finding 5  Mustard was applied to the burns to relieve pain before the burn kit was brought to the scene.

Discussion  One of the firefighters had heard that mustard could be used to relieve pain on burn injuries so those administering first aid applied it to the burn area. Once the burn kit was retrieved, they applied burn gel which the injured firefighter stated provided immediate relief.


Recommendation  The New Mexico BLM fire program should make every effort to provide a mechanism to train personnel for medical care at the Emergency Medical Responder or Emergency Medical Technician level.

Finding 6  Communications were never established between CareFlight and the firefighters.

Discussion  The incident utilized the air-to-ground frequency established in the Incident Action Plan (IAP). This frequency was given to the air ambulance service, but the pilot was unable to program the helicopter’s radio. This has been an ongoing problem nationally. The fire had a pre-identified medevac location, but following the incident, a closer location was identified with a GPS.

Recommendation  The New Mexico BLM State Office should work with all regional air ambulance providers to come up with an established frequency for any air ambulance response in the region for federal employees.

Recommendation  Fire personnel should conduct pre-season meetings with local air ambulance providers to confirm frequencies, conduct communications checks, and cover ordering and operational procedures.

Recommendation  Multiple medevac sites should be identified when working on long term projects or as personnel move into new areas. A preferred location should be identified daily and communicated to all incident personnel and dispatch.

Finding 7  The air ambulance landed at the Albuquerque airport instead of the University of New Mexico Hospital (UNMH) helipad, necessitating an additional ten minutes of ground transport.
Discussion  The investigation team tried to speak with several individuals from the air ambulance service but could not get a concrete answer as to why the provider was unable to land at the UNMH helipad. There seems to be political or contractual reasons why the particular provider could not land directly at the hospital.

Recommendation  The New Mexico BLM State Office should work with UNMH to resolve the situation for the future. There should be no delays in medical treatment if a life threatening situation should arise in the future.

Summary

Firefighters should avoid attaching drip torches to their packs during ignition operations.

PPE should be kept clean and inspected often for damage and fuel contamination.

A burn kit should be readily accessible when conducting planned ignition operations, and burn gel should be utilized to help relieve pain.

A trauma kit and backboard should be readily accessible whenever possible.

Fire management should make every effort to obtain medical training for fire personnel.

Medevac sites should be updated regularly when on long duration incidents or as personnel move away from previously identified sites.
Reference Materials

Photo 1 –
Back of Nomex pants.

Photo 2 –
Back, left side of Nomex shirt.
Photo 3 – Back of Nomex shirt and pack, showing burn damage sustained from the attached drip torch.

Photo 4 – Oak-brush patch where drip torch in firefighter’s hand became entangled.

MAP – The map on the following page identifies the approximate locations of the personnel and equipment at the time of the injury.
Appendix A - MTDC Report and Key Findings

Perdida Fire – PPE Report

Pants: Forest Service Specification 5100-92
Fabric: Nomex IIIA
Date of Manufacture: label illegible, estimated 2003
Condition: Dye sublimation is present mostly on the back of the pants, this occurs when the heat “bakes” the dye from the material, the dark green color of the fabric changes to orange. Dye sublimation is present up to the hip pocket flap of the left leg. Char of the fabric is present on the back of the lower left leg. Char occurs when the material reaches 825 degrees F.

Shirt: Forest Service Specification 5100-91
Fabric: Nomex IIIA
Date of Manufacture: label illegible, estimated 2000
Compliant to NFPA 1977 standard, 1998 Edition
Condition: Dye sublimation is present on the left back and left arm of the shirt. Char is present on the left elbow area. There is also what appears to be melted nylon on the left back. The melted nylon most likely came from the fireline pack.
Fireline Pack: Make and model unknown
Condition: Much of one side of the nylon pack cloth and shoulder harness is melted.

Fireline Pack

Item conditions and corresponding temperatures:

<table>
<thead>
<tr>
<th>Item Conditions</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Flame (typical)</td>
<td>1600 F</td>
</tr>
<tr>
<td>Aramid Cloth – Char</td>
<td>825 F</td>
</tr>
<tr>
<td>Nylon Webbing and Material – Melt</td>
<td>500 F</td>
</tr>
<tr>
<td>Aramid Cloth – Dye Sublimation</td>
<td>425 F</td>
</tr>
<tr>
<td>Human Skin – 2nd Degree Blister</td>
<td>130 F</td>
</tr>
</tbody>
</table>

Discussion:
Apparently a drip torch was attached to the fireline pack and carried in a horizontal position. The odor of drip torch fuel was evident in the clothing and pack.

The burned FR clothing from this incident is similar to past incidents of flaming drip torch fuel on FR clothing and testing conducted my MTDC.

Reminders:
- The direct flame contact associated with fuel will burn no matter the substrate on which it lands and the heat produced by its flame will eventually conduct through fabric. The fabric provides limited protection, so burn injury can be expected.