Oak Mesa Fire
Lessons Learned
October 17, 2008

Fire Summary
The Oak Mesa Fire was discovered on the evening of 1 August 2008 at approximately 1800 hours. Cause of fire was determined to be a lightning strike and fuels were pinon/juniper and a sage/grass mixture. The fire was contained on 3 August at 2041, was controlled by 5 August at 1300, and was completely extinguished on 15 August at 1430 hours. The total acreage burned was 45.5 acres. This was a Type 4 during the entire event.

Weather readings, from the Jay RAWS Station, which is located just north of Hotchkiss, at 1400 hours, 2 August, were: Temperature 96° F, Relative Humidity 14%, Wind was low at 5 mph, and there was approximately 5% cloud cover.

Narrative
On 2 August 2008, at approximately 1500 hours, a member of a Hotshot crew, participating in wildfire suppression duties on the Oak Mesa Fire, was burned and received a head laceration while performing sawyer duties. The firefighter was initially transported to a medical clinic in Hotchkiss and was later transported to the Montrose Hospital. He eventually was diagnosed as having 1st and 2nd degree burns on his face, neck, upper right extremity, and elbow and wrist as well as a head laceration requiring 3 sutures. Individual was driven back to his home unit on 3 August and went for follow-up care at a burn unit.

At the time of the incident, crew members were cutting fire line during initial attack. The injured individual was running a saw and another crew member was swamping. The chainsaw operator thought the saw was running low on fuel, due to the way it was running and sounded, and stopped to check. The sawyer stepped back from the line about 5 feet and when the fuel cap was opened, pressurized fuel and vapors vented from the fuel tank, spilling onto the right sleeve of the individuals Nomex fire shirt. He tried to move the chainsaw but it ignited almost immediately and the fire spread instantly to his right arm. The individual then ran toward the other squad members who shouted “Drop and roll.” While dropping to the ground, the individual’s head struck a rock, causing the laceration to the forehead. The other crew members were able to extinguish the fire with dirt and water. 1st aid was rendered immediately by squad members then individual was escorted to an ambulance and taken for medical treatment.

At the Hotchkiss medical clinic, the injured individual was told he had suffered 1st degree burns and that he would require 3 sutures for the laceration to his head. After antibiotic cream was prescribed for the burn and the laceration was closed, the individual was told he could resume regular work, but to keep his wound clean and bandaged. Individual then returned to the fire. The crew boss, after seeing pictures of

the burns and having knowledge of burns and their severity, insisted the individual be taken to the hospital in Montrose. A member from the local fire unit took the individual to the Montrose Hospital at approximately 1130 that night. The physician on staff also decided that the individual could return to work. Individual then went to quarters for the night.

The next morning, 3 August, personnel from the local fire unit took the injured individual back to the hospital with a copy of the National Wildfire Coordinating Group (NWCG) Burn and Injury Protocol. The physician at the hospital was reluctant to refer the injured individual to a burn center but did agree to refer him to his primary physician back at his home unit. After returning to his home unit, he went to his primary care physician, and was diagnosed with 2nd degree burns. He was given directions on how to change dressings, prescribed an antibiotic cream as well as a pain killer, and referred to a burn center twice a week for two weeks where his burns were debrided.

Investigation

A local Law Enforcement Ranger was called in to conduct interviews on 3 August 2008. He obtained a verbal statement from the injured individual and written statements from two other crew members that had witnessed the incident. All interview documentation was turned over to the local safety manager, who then conducted further follow-up and reviews with involved individuals. Human, material, and environmental factors were all considered during this process to determine if any or all may have contributed to the incident. This Lessons Learned Review was also accomplished by the Hotshot crew. The local Interagency Fire Unit was included in this review and responses and recommendations from both have been included.

Human Factors

- This incident occurred in an initial attack situation which meant the crew was dealing with the factors of an uncontrolled fire and the sense of urgency.
- While there is definitive guidance for refueling of a chainsaw in the S-212 and the FSH 6709.11, the act of simply checking fuel level is not defined.

The crew and the injured individual agreed that this accident was avoidable. The complex environment (uncontrolled fire and the sense of urgency) were causal, in that the individual took a shortcut, which he might not have otherwise taken.
When questioning other firefighters, not related to this incident, the 5 minute cool down period and the 20 foot rule for refueling chainsaws are not always followed and are sometimes impossible to adhere too.

Material Factors

- The air filter on the chainsaw was clogged.
- Symptoms of vapor-lock and an empty fuel tank are similar in nature.
- The particular chainsaw being used at the time of this incident has an opaque tank which allows sawyers to determine fuel level, without opening the gas tank cap.
- Chainsaw construction and winter blend fuels were researched but neither were a determining factor in this incident.

Recommend that fuel behaviors are included in The Job Hazard Analysis or Risk Management Assessment covering chainsaw use, and should address the following information:

- In high temperatures, fuel will expand and chainsaws may exhibit performance problems such as vapor-lock or a pressurized fuel tank.
- Fuel levels are to be checked through the see-through tank, rather than trying to open the fuel cap. If fuel is present, open tank cover SLOWLY, to release pressure.
- Allow the saw to cool and refuel at least 20 ft from ignition source, where possible.
- Realize that other fuel containers (sigs, driptorches, etc) can become pressurized and should also be opened slowly and away from flame.
- If unable to refuel a safe distance from ignition source or flame, remove yourself from the situation.
- Lives are more important than property.

Environmental Factors

- The high temperature and the fact that the sawyer was cutting a hot tree prior to the incident appear to have caused the chainsaw to exhibit performance problems.

Once again, the crew agreed that refresher training must encompass the need to pay attention to performance problems and that the environment must be factored into chainsaw performance. Stressing that weather conditions can impact fuel behavior is an important factor for firefighters to remember.

Lessons Learned

To determine what lessons were learned from this incident, the following questions were asked:

- What was the root cause(s) of this accident?
- What lessons can be learned for the greater good of all fire crews from this incident?
- What can management learn from this incident?
- What can management do to prevent this type of incident from occurring again?

The root cause of this accident can be attributed to human factors. Adherence to all safety practices and procedures set forth in the S-212 class, the FS Health and Safety Code Handbook, as well as the chainsaw Manufacturer's Instructions will help prevent reoccurrence of this type of incident. During initial attack, firefighters must continue to adhere to the safety rules and parameters set forth for operations AND equipment. While a sense of urgency is understandable and expected, injury or loss of life are not.

All fire crews can learn from this incident by sharing the information from this review, by including chainsaw and fuel performance in their refresher trainings and safety briefings, and by enforcing the standards that are already in place.

An important part of any accident is ensuring the injured individual receives prompt and proficient medical attention. Management's lesson, in this case, was that not all local clinic's or hospitals understand how burns manifest themselves or that aftercare for a firefighter is different and substantially more difficult than for other people. Sending a firefighter back to work with the instruction to keep the wound clean and change dressings every few hours is not feasible. Having a copy of the NWCG Standard for Burn Injuries to share with the Emergency Room personnel was critical to this individual finally being referred to his Primary Care Physician and eventually the burn center.

The NWCG Standard for Burn Injuries must have clear guidance for both minor and severe burns, so local health care physicians will not hesitate to refer an individual for further treatment, if need be. This firefighter was initially diagnosed with 1st degree burns but had actually suffered 2nd degree burns and ultimately received treatment from a burn facility, on an outpatient basis, to aid in his healing process. The time from initial to final diagnosis was only a few days for this incident and the individual received the treatment he needed, however, a few days could be too long for other burn injuries. Accurate, initial, diagnosis is critical for these types of injuries and developing an appropriate burn protocol, for both minor and severe burns will help to remove delay and confusion. Allowing firefighters with burn injuries to return to the fire-line is not practical for many reasons, two of which are the inability to truly keep the wound clean which could lead to the possibility of infection as well as affecting the performance of one's duties, which might lead to further injuries.

Also identified during this process, although the injured individual had Health Maintenance Organization (HMO) medical insurance and was assigned a doctor, efforts to reach his appointed doctor, were unsuccessful because he was not on duty that weekend. The Montrose ER physician had previous experience working with burn injuries and was willing to refer the patient to his primary care physician but did not feel his injuries warranted a referral to a burn unit. He did agree, however, that the individual was not to return to the fire line and referred the patient to his HMO primary care physician.

Positive Factors

- Albuquerque Service Center (ASC): The ASC numbers for Workers Compensation and after-hour emergencies actually do work, and were instrumental in ensuring proper care.
- The IC had effective transportation on hand, and an alternate way out on the road system, ensuring individual was taken for medical help almost immediately.
- The local fire unit mobilized staff that was instrumental in helping take care of the injured employee, accompanying him to the hospital, dealing with paperwork, and arranging for transportation, which allowed the Superintendent to continue command of the crew on the incident.
- The local unit identified areas for improvement in their processes to help ensure the immediate and proper care of injured individuals.
- Proper PPE was available and worn, which greatly reduced the severity of this injury.

In Summary

The entire goal of this review is mishap prevention. An injury, almost identical to this one, occurred in 2006. The fire community, as a whole, needs to address/review the chainsaw safety procedures and protocols dealing with fuel procedures. Luckily, the injuries to the firefighters have not caused any long lasting or severe effects, but that may not be the case, if this type of incident happens again.

The NWCG Standard is an important tool for diagnosing and treating burn injuries. The Standards make it easier to make an assessment on the seriousness of an injury. All Fire Units should have a copy of this standard available for immediate reference.

Thanks to all who participated in this process. Their comments, concerns, and input are what make this process successful.

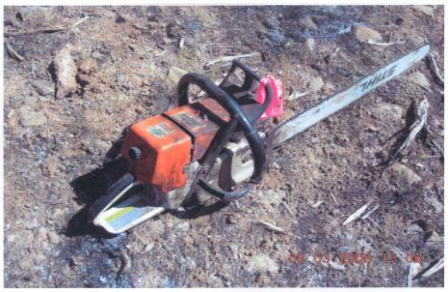
Oak Mesa Review 2008

Additional Information

- The following "Six Minutes for Safety" addresses chainsaw safety. Mention should be made of vapor-lock or pressurized fuel and vapors.

http://www.nifc.gov/sixminutes/dsp_discussion.php?id=175

Photos from incident:
Stihl chainsaw



Nomex fire shirt:

Map of area:

Oak Mesa Review 2008