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# Scratchline

Knowledge management is getting the right information to the right people at the right time.

## In This Issue



**Lesson Learned** – An innovative approach or work practice that is captured and shared to promote repeat application. A lesson learned may also be an adverse work practice or experience that is captured or shared to avoid recurrence.

**Best Practice** – A process, technique, or innovative use of resources, technology, or equipment that has a proven record of success in providing significant improvement to an organization.

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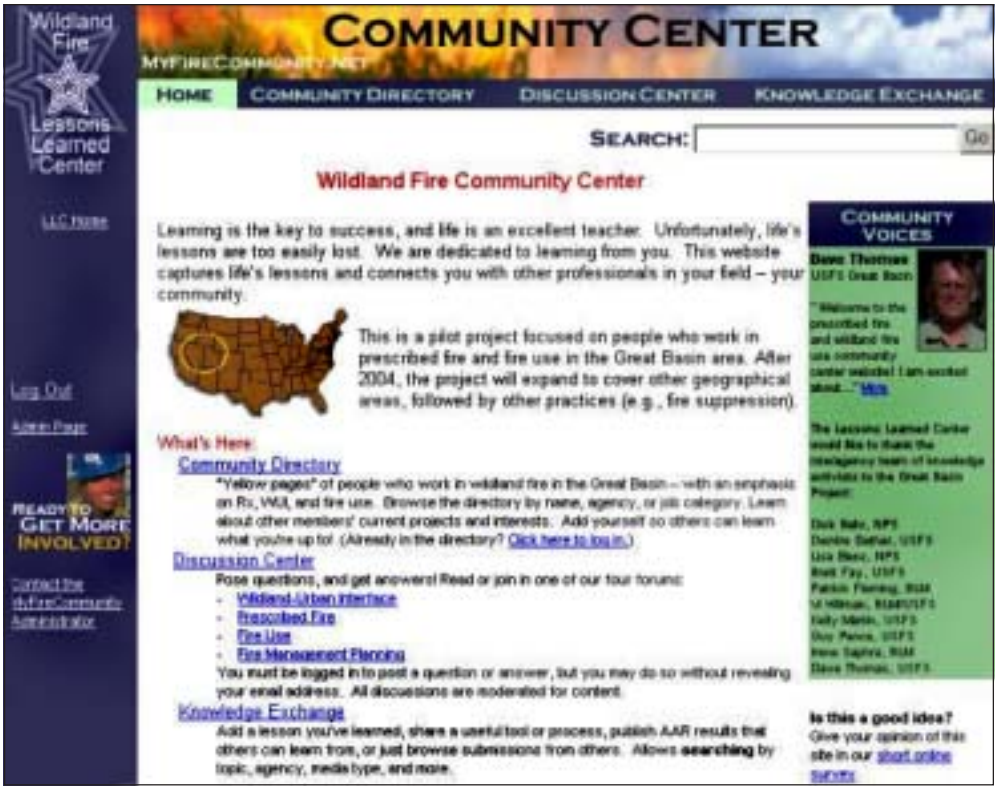
## WILDLAND FIRE COMMUNITY CENTER – HOW CAN IT SERVE YOU?




**Learning is the key to success**, and life is an excellent teacher. Unfortunately, life's lessons are too easily lost. How can we learn from each other? Through the Community Center website, which was launched by the interagency Wildland Fire Lessons Learned Center (LLC) in June 2004.

This prototype ***Community Center*** features a **Community Directory, Discussion Center and Knowledge Exchange**. This prototype is a small example of what a larger wildland fire community center can be for everyone, wherever you are, and whatever your area of interest is. Much

more than an archive of reviews and reports, the Center provides:

· A **Community Directory**, which is a voluntary "Yellow Pages" of people who work in wildland fire in the Great Basin – with an emphasis on Rx, WUI, and fire use, Browse the directory by name, agency, or job category. Learn about other members' current projects and interests.

· The **Discussion Center** where you can pose questions and get answers! Read or join one of four forums: Wildland Urban Interface, Prescribed Fire, Fire Use, and Fire Management Planning.

· And at the **Knowledge Exchange** you can add a lesson you've learned, share a useful tool or process, publish AAR results that others can learn from, or just browse submissions from others.

The MyFireCommunity Center can be found at the Lessons Learned Center's home page at: **http://www.wildfirelessons.net** or directly at **http://www.myfirecommunity.net**.

For background on the Wildland Fire Community Center go to: **http://www.wildfirelessons.net/org_learning.htm**. ★

# 2003 SUCCESSES AND CHALLENGES

## *FROM AAR ROLLUPS*

Before the summer fire season heats up, wildland fire personnel might want to familiarize themselves with all the lessons learned from the 2003 incident year submitted to the Lessons Learned Center. These Successes and Challenges are now on line at: **http://www.wildfirelessons.net/Lessons.htm**.

These lessons learned and best practices can be retrieved through each Incident Command System (ICS) function: Command, Safety, Information, Planning, Operations, Finance, Logistics, Liaison, and Training. Lessons learned from Prescribed Fire and Fire Use After Action Review (AAR) Rollups can also be viewed.

The Lessons Learned Center encourages wildland fire personnel at all levels to submit AAR Rollups so others can learn from your experiences in wildland fire and all risk. Whether you are a type 1-5 incident commander, crew, single resource, fire use incident commander, burn boss, or agency administrator, your lessons are important to capture and share. Timely submittals are important so the Lessons Learned Center can share the knowledge in a timely manner.

For more information on AAR Rollups please go to: **http://www.wildfirelessons.net/AAR_Rollup.htm**. ★


# TRAVELING TO UNFAMILIAR TERRITORY?

And wishing you knew ***just a little more*** about fighting fire in the part of the country you are heading out to?

Check out the Winning Series at **http://www.wildfirelessons.net/Winning_Series.htm** for information on wildfire fuels, strategy, tactics, and related special safety and logistical concerns. This Web page contains information relative to all United States geographic areas. The Winning Series also has useful sections on Structures in the Wildland, Aviation, Federal Emergency Management Administration/U.S Department of Homeland Security, and a Safety Briefing Pocket Card template. ★

# Common Denominators of Serious Wildland Fire Related Vehicle Accidents

**By Mark T. Bailey, ACTAR No: 1075**

*When the causes of the calendar year 2002 and 2003 serious wildland fire vehicle accidents were examined, six major common denominators involving human factors and three major common denominators involving vehicle characteristics that differ from regular automobiles were identified:*

**Human Factors**

- Perceptual Errors
- Inattention
- Alcohol Use
- Fatigue
- Inexperience
- Lack of Seat Belt Use

**Vehicle Characteristics Different than Regular Automobiles**

- Higher Center of Gravity
- Braking System
- "Surge" – Shifting of Water in Tank

CAUTION CAUTION CAUTION CAUTION

## INTRODUCTION

A review of the 2002 and 2003 wildland fire serious accident driving reports has yielded some very common accident denominators. The most prevalent cause of injury or death is due to the overturning (rollover) of the vehicles that are being utilized to transport the firefighters and/or water to the fire. Several of these rollovers led to occupant ejection due to seat belts not being worn. In each and every case, the overturning vehicle was not the cause of the accident, but was the most severe event in a series of events leading to injury or death. The principal causes in the vast majority of these serious accidents were **human factors**, namely **perceptual errors**.

## PERCEPTUAL ERRORS

Driving is basically a "perceptual-motor oriented task" requiring the driver to process information from the roadway and vehicle, and to act accordingly to maintain safe control of the vehicle. Perceptual errors that resulted in the majority of these serious accidents were caused by inattention, alcohol use, fatigue and inexperience. The most prevalent of these perceptual errors that led to rollovers was inattention or inexperience by failing to perceive a safe speed for curves or turns in the roadway.

Most firefighter vehicles, especially ***tenders*** and ***engines***, operate and handle much differently than regular automobiles. This is due to their high center of gravity, weight, suspension, braking system and "surge" (surge is the shifting of water in the water storage tank). Due to these vehicle characteristics, "excess speed" could actually be below the posted speed limit. It is not uncommon for engines or tenders to overturn at speeds below the recommended posted speed for a curve. Additionally, failure to slow down *well before* negotiating a curve can be just as critical in leading to a rollover as misjudging the safe speed of the curve. This is often due to the operator of this type of vehicle not understanding that the slowing and stopping characteristics are not nearly as efficient as that of a passenger car. Many people wait too long to apply the stop.

A large truck, such as a tender or engine, when equipped with properly working air brakes, only achieves a maximum of eighty-five percent braking efficiency when compared to a passenger car. Additionally, air brakes typically have about half a second of "lag time" which is the time it takes the brakes to actually engage *after* pressing down on the brake pedal. Eighty-five percent of braking efficiency and a half second of time might not seem substantial, but collectively it is significant.

**Example:**

A passenger vehicle travelling at 45 miles per hour (66 feet per second) on an average asphalt roadway would come to a stop in about 97 feet in 2.92 seconds during hard braking. An air brake equipped truck travelling at 45 miles per hour on the same road surface would come to a stop in 147 feet in 3.44 seconds.

In the real world it would take the truck even longer to stop since these figures assume cool and perfectly adjusted and performing brakes on the truck (a rarity for air brakes) and didn't account for "surge" from the water tank. Even converted engines with regular hydraulic brakes such as a pickup truck, can still take longer to slow due to excess weight and "surge". Regardless of which braking system a vehicle has, the later and harder the brakes are applied, the more "surge" can have an adverse reaction to the vehicle stopping distance. That is why a professional tender or engine driver will slow down smoothly well before a curve or turn has to be negotiated.

Tanker Accident on KP Incident, Arizona
May 2004 Steve Hensel

## ALCOHOL & DRIVING

There were two accidents involving alcohol during this review period, resulting in multiple fatalities. Alcohol is the single largest human condition factor that adversely affects driving performance leading to fatal accidents. Alcohol acts on the central nervous system such as the cells of the cerebral cortex, the body's command center. This slows the motor response of the brain, greatly decreasing perception, information processing and reflexes. Risk taking however, is increased.

Alcohol also impairs vision by acting on the optic nerve in the process of sending images to the brain. This can lead to unsafe overtaking due to false distance estimates, slower recovery time from glare, increased duration of eye fixations, reduced peripheral vision and tunnel vision. Studies have shown that even low alcohol levels (significantly lower than State Driving Under the Influence (DUI) levels) cause significantly reduced information processing in the brain and deteriorating driving skills. Alcohol of any amount is too much to safely operate a motor vehicle.

For alcohol laws and facts for all 50 States from the Insurance Institute for Highway Safety, go to **http://www.hwysafety.org/safety_facts/alcohol_drugs.htm**.

## FATIGUE

The last of the identified human factors, fatigue, was a contributing factor in six of the serious accidents in this review, three of which resulted in a rollover. In the trucking industry, fatigue is now garnering more interest than ever. A study of 225-truck accident reports by the AAA Foundation for Traffic Safety, indicated that fatigue was a probable or primary cause in

41% of the accidents. Firefighter fatigue can be attributed to working, long, hard, irregular hours, with inadequate sleep. Fatigue when driving can lead to poor judgement, inattention, vehicle wandering, and falling asleep at the wheel. Even with adequate rest breaks, firefighter schedules often contradict with our "natural circadian rhythm clock" schedules of being awake during the day and sleeping at night, thus further contributing to fatigue. Due to the aforementioned types of vehicles driven by firefighters, fatigue can take a dangerous situation such as drifting off of the road, and turn it deadly with a subsequent rollover.

This is especially true for 15 passenger vans that are often used to transport firefighters. When these vans are fully loaded with occupants, they become top heavy and the propensity to roll increases. A natural tendency for a driver whose vehicle has drifted off of the roadway and the wheels have dropped off the pavement is to immediately steer hard back onto the road. While this practice is often forgivable in a normal passenger car, it is likely to cause a rollover in a top heavy or high center of gravity vehicle. If a vehicle or one of its wheels does drift off of the roadway, the operator should slow down gradually, and then ease back onto the road when it is safe to do so and they are in full control of the vehicle. An article on 15-passenger van safety published by the National Highway Transportation Safety Administration (NHTSA) can be accessed at:

**http://www.nhtsa.dot.gov/NHTSA/ANNOUNCE/PRESS/pressdisplay.cfm?year=2004&filename=pr25-04.html**.

It is important for all vehicle operators to recognize signs of fatigue. These can include yawning, vision difficulties or sore eyes, making fewer and larger steering corrections, restlessness, having trouble maintaining a steady speed, having difficulty staying in the lane, struggling to keep your eyes open, and a heavy headed feeling (nodding).

There are several widely published reports and even "alert devices" on how to combat driver fatigue, none of which are as effective as simply getting adequate sleep and taking scheduled breaks. If you do feel fatigued behind the wheel, pull over in a safe location, take a break, stretch your legs and get some fresh air.

## Lack of Seat Belt Use

Many of the fatalities in this review could have been avoided had seat belts been used. All vehicles, regardless of age, should be equipped with seat belts. All fire agencies have mandatory seat belt policies. The issue is voluntary compliance. People need to be aware of recent statistics that show while only twenty-five percent of people still do not wear seat belts, this one person in four minority accounts for a whopping sixty percent of all vehicle deaths. A study by the NHTSA in 2001 identified a seventy-five percent death rate of occupant ejections involving passenger car fatalities. Only one percent of those occupants had been wearing seat belts. During the past 26 years, seat belts have prevented over 135,000 fatalities. It has been estimated that during this same period, if all vehicle occupants had been wearing seat belts, a further 315,000 deaths and 5.2 million injuries could have been prevented. A fact sheet prepared by the NHTSA detatiling those statistice and other seat belt facts can be accessed at:

**http://www.nhtsa.dot.gov/people/injury/airbags/buckleplan/mayplanner2003/factsheet.htm**.

## CONCLUSION

The keys to avoiding the pitfalls of these human factor accidents are driver education, hands on training and refresher training. Vehicle operators should receive supervised driver education in a controlled environment and become completely familiar with each vehicle's characteristics. Hands on training should include completing a pre-trip vehicle safety inspection and knowledge of the vehicles load capacity. The training should conclude with a road test to demonstrate the operator proficiency of each vehicle to be driven. Refresher training should also be provided since another human factor, redundancy, often leads to complacency. For further recommendations relating to vehicle operator training, go to:

**http://www.wildfirelessons.net/Library/Safety_Health/Bailey_drive.pdf.**

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