



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

### In This Issue

Page 1  
New Web Site

Page 2  
Driving and Wildland Fires

Page 3  
Crews and Line Overhead

Page 4  
Fire Use Modules

**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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## NEW WEB SITE LAUNCHED

The Wildland Fire Lessons Learned Center is a resource center for the wildland fire professional. It is here to assist the firefighter both in the field and in the classroom.

**The new Lessons Learned Center Web site was launched on November 1, 2002.**

Please visit the new site at <http://www.wildfirelessons.net>. Among the Features on the home page include the Center Library, a growing collection of wildland fire information including research, studies, periodicals and reviews. A site search will assist you in locating specific information. In the future, an interactive database will support the Center Library.

Over 75 Lessons Learned After Incident Reports (AIR) have been submitted to the Center this season. We continue to use the information to share lessons learned and best practices with the field. The Learning Curve and the *Scratchline* newsletter are two publications used to update the wildland fire community with lessons learned and best practices that can help improve safe work performance. Please continue to submit AIR's for any Type 1-5 incident, wildland fire use or prescribed burn. The information still has value and can be included in upcoming publications. Remember to also include any innovative work practices or job aids that can be used by others.



The Center also compiled two reports from the AIR's. "Recommendations on the 30 Mile Abatement Plan" were forwarded to the 30 Mile Coordinator in August. "Recommendations To Improve the Wildland Fire Training Curriculum" were presented to the NWCG Training Working Team in September.

Four Lessons Learned Information Collection Teams interviewed overhead teams, line overhead and crews this summer on three wildland fires and on one district. The teams collected information on lessons learned, best practices, and a variety of current issues. Highlights from interviews at the Tiller-Umpqua Complex in Oregon appear on page 3.

Finally, we welcomed Dave Christenson as the new assistant center manager in late September. Dave brings strong skills in Web site and database development. ★



## Lessons Learned:

# Driving *and* Wildland Fires

DATE	LOCATION	ACCIDENT TYPE	ORGANIZATION	#PEOPLE	FATALITIES	INJURIES
5/07/2002	Socorro, NM	Bus Rollover	Contractor	21	0	Minor, Broken Arm
5/17/2002	Long Lake NWR, ND	Engine Collision	Federal	2	0	Minor
6/17/2002	Cannon Incident, CA	Water Tender Rollover	Contractor	1	0	1 Injury
6/21/2002	Parachute, CO	Vehicle Rollover	Contractor	11	5	Serious Injuries
7/28/2002	Stanza Incident, CA	Vehicle Accident	Federal	5	3	2 Injuries
8/11/2002	San Bernadino, CA	Engine Rollover	State	3	0	3 Injuries
9/5/2002	Smyrna, GA	Water Tender Rollover	Volunteer	1	1	
<b>TOTALS</b>				<b>44</b>	<b>9</b>	<b>26</b>



### Vehicle Accidents

*Situational awareness* is as important while operating a motor vehicle as it is on the fireline. As can happen from entrapments, deployments, burnovers or cardiac emergencies, firefighters can be, and are, injured or killed while operating vehicles on wildland fire assignments.

In the first nine months of 2002 there were seven serious vehicle accidents reported via the National Wildfire Coordinating Group (NWCG) Safety and Health Working Team Safety Gram. All of these accidents were single vehicle incidents with 44 occupants. The accidents resulted in nine fatalities and 26 injuries. See the table above for more specifics. During the period from 1998-2001, firefighters were involved in an additional 15 serious vehicle accidents that resulted in 16 fatalities as well as personal injuries. These incidents also involved fire line and crew transport vehicles.

A review of the types of vehicles involved and the operator qualifications of those involved in these accidents disclosed that the operators had mixed levels of prior experience in these vehicles. Their experience ranged from extremely limited in the vehicle type they were operating when the accident occurred to those with numerous years experience operating the type of vehicle involved in the accident.

In general, mechanical failure has rarely been a contributing factor to recent vehicle accidents. Specifically, the U.S. Forest Service National Fleet Program has not noted any trend of vehicle mechanical failures as a factor in recent Forest Service vehicle accidents. They stated new vehicles coming off the production line are well built and mechanical breakdowns are rare in the newer vehicles.

### Lessons Learned

Human factors are the major contributing factor to wildland fire motor vehicle accidents. **Human factors can include fatigue, level of operator proficiency and experience in the vehicle type, and unsafe operator practices.**

On wildland fire serious and fatal accidents, **fatigue** has been identified as a significant factor especially when operators have pushed to *cover long response distances or are otherwise working extended shifts*. Furthermore, it is during these periods when operators are likely to be driving in country that is unfamiliar to them. Generally, the cited accidents occurred while the operators were enroute to or returning from an incident, or driving on unfamiliar roads while at the incident location.

A second factor was identified when **operator proficiency and experience** was reviewed that demonstrated a pattern of the *wrong driver operating the wrong vehicle*. The operator may have had many years of experience driving a sedan or light truck but they were often relatively inexperienced in operating an engine, utility truck or 15-passenger van, all of which have unique and specialized loading and handling characteristics that warrant additional operator training.

**Unsafe practices** and poor decisions of the operator have been a third human factor. These have included acts such as *talking on a cellular phone while driving* and an *operator removing an article of clothing while the vehicle was in motion*. Poor decisions, such as not wearing seatbelts, is both an illegal and an unsafe practice that has contributed to past injuries or death. The value of consistent seatbelt use, even at low speeds, can easily be illustrated. During the 2002 season, an operator with a passenger driving on a narrow mountain road 5 mph went off the soft shoulder, rolled four times down a 50 percent slope into a steep ravine where the truck struck a large rock and landed upside down. The driver and passenger *were wearing their seatbelts and walked away* with minor bruises and abrasions.

One of the least recognized human factors contributing to accidents are **environmental** ones. Vehicle operators and even their passengers need to maintain alertness to the variety and changing environmental conditions on fires such as narrow roads, smoky conditions that reduce visibility, soft shoulders, roadway edge drop offs, high

winds, and fallen snags obstructing roads. This enhanced level of *situational awareness by operators and their occupants* is also needed driving to or from an incident where abnormal roadway conditions may be encountered. These may include heavy highway or urban traffic, steep mountain grades that can cause the sudden appearance of slow moving vehicles, rain, or the presence of snow, sleet or ice at higher elevations in summer months.

As a preventative action, **specialized training is needed for those who operate vehicles with a high center of gravity.** These vehicles include engines, water tenders, utility trucks, SUV's, and 15-passenger vans. The operators of these types of vehicles should be provided with situational awareness training followed up with practical experience so they understand how to load and safely operate these types of vehicles. Practical training resources are available such as through the National Highway Transportation Safety Administration (NHTSA). Their guidance to reduce the risk of rollovers in 15 passenger vans has been adopted by the Bureau of Land Management (BLM). The guidance includes assigning only those experienced in operating these types of vans as drivers. It also includes removal of the rear seat and properly screening the rear area to provide small

storage space that separates cargo from the passengers. And lastly, using the roof racks for light load items only. To view the entire NHTSA 15 passenger van safety flier click on <http://www.nhtsa.dot.gov/Hot/15PassVans/index.htm>.

## A Potential Best Practice

The five Federal Fire agencies and the States are currently developing a **National Emergency Driving Policy** for operating vehicles assigned to interagency emergency response assignments. The policy is now in draft and is anticipated to cover the need to demonstrate various operator practices routinely utilized during emergency incident mobilization and demobilization. Points being considered are limiting driver duty hours behind the wheel within a duty day and restricting the window of travel hours to and from an incident. Recently drafted by the NWCG Safety and Health Working Team, it is currently being reviewed by participating agencies. Look for this new standard in early 2003 after it is approved by NWCG ★

*Additional driving best practices will be featured in a future issue of Scratchline.*

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## Lessons Learned and Best Practices

# CREWS *and* LINE OVERHEAD

*These lessons learned and best practices were compiled by a Lessons Learned Information Collection Team through interviews at the Tiller-Umpqua Complex in Southwest Oregon. Special thanks are extended to crew bosses and the division supervisor for sharing their experiences.*



### Operational Tactics

**Division supervisors must keep a tactical focus without physically doing the work.** When resources get tight, avoid picking up the drip torch. It is essential that the supervisor maintains communications with the task force and strike team leaders to ensure the integrity of the command structure so people know what is going on and where to go if conditions change. On a recent firing assignment, the task force leader was stretched very thin with all engines and crew bosses already assigned. The division supervisor was tempted to pick up a drip torch and start the firing operation himself but resisted the temptation and successfully reorganized the resources of the division. This permitted the task force leader to oversee the burning operation while the division supervisor maintained the operational continuity required of his position. (Source: Division Supervisor)

### ICS Briefings

**Work with the crew by orienting them to the Incident Command System (ICS)** and how they fit into the overall command structure. It is also important to have detailed briefings with the crew before they go on the line to better prepare them for their assignments. (Source: State Type 2 Crew Boss)

### Crew Morale

Strive to keep crew morale up. Living with folks long term is tough. **Increase morale, and you increase crew happiness and their attention level, which enhances situational awareness and safe work performance.** Everyone works harder when they are in good spirits. Sometimes joking is good, but do not overdo it. Always respect the sensitivities of crewmembers. Keep the crew up to date with information and avoid hiding anything.



An open door policy of information sharing is better than an “only need to know” approach. Let the crewmembers know if you do not have an answer, but you will inquire on their behalf and provide them with an answer. (Source: Type 1 Crew Superintendent)

## Safety and Communications

**Assume an open door exists to upper command staff regarding safety.** As a supervisor it is important not to just make internal comments to the crew about safety concerns. Within a crew it is often easier to address safety issues because everyone knows each other. Upper levels of the command staff, especially safety officers, therefore need to present a friendly and approachable persona to eliminate communication barriers and any climate of intimidation that could impede people from coming forward with their concerns. No one can afford to lose sight that firefighting is not as important as lives.

Keep communications open throughout the incident. Participate in After Action Reviews. Constantly identify areas of potential improvements, especially those related to radio communications, as quickly as possible as they can most effect safety if there is a sudden change in fire behavior. Lack of authorization for discrete crew radio frequencies (talk channel) can be another big safety factor. Crews need their own discrete frequency for overall unit safety and operational efficiency. (Source: Fire Use Module Leader)

## Physical Training

**Prepare yourself before a dispatch to adjust to the altitude change** that occurs when you come from the East to the West for an assignment. Stay in shape by participating in a regular aerobic exercise program in addition to strength training. A crew from Pennsylvania reported it took them two days to acclimate to the altitude change. (Source: State Type 2 Crew Boss) ★

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# Lessons Learned After Incident Reports: Fire Use Modules 2002 Season

*The National Park Service, U.S. Forest Service, and U.S. Fish and Wildlife Service utilize fire use modules (FUM). The primary task of these 7-10 person modules is to support fire use and prescribed burn activities nationwide. This edition of *Scratchline* focuses on insights from two of the nine NPS modules. A special thank you is extended to Assistant Module Leader Adam Luraas of the Buffalo National River FUM and Assistant Module Leader Susan Ross of the Great Smoky Mountains FUM for sharing their own lessons learned, best practices, and recommendations. U.S. Forest Service and U.S. Fish and Wildlife Service modules will be featured in a future issue.*

## Lessons Learned – Notable Successes

The Buffalo National River FUM participated in a variety of wildland fire use, prescribed fires, and suppression fires during 2002. During June the module was integrated into a Type 2 interagency hand crew at the Rodeo/Chediski Complex in Northeastern Arizona. The most notable success the hand crew experienced at the incident **was the acceptance of firefighter safety commitment as paramount.**

All crews were ordered to stand down and not tasked with line assignments from overhead during extreme fire behavior.

Although crews were eager and available to work, assignments were restricted to stand down status in camp during periods of extreme, unknown, or difficult to predict fire behavior. Suppression actions, during these periods of extreme fire behavior, were confined to air operations, plow/dozer operations, and urban-interface protection. Regardless of the size of any incident, if fire behavior is anticipated to pose no threat to life, property, including cultural, historical, ecological, and marketable resources, action by any line firefighting resource should be limited for both safety and economic reasons.



“The most notable success...  
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safety commitment as paramount.”

**Utilization of temporary staffing details for developmental purposes** by the Great Smoky Mountains FUM has been a most notable success that others can institute. Since all fire qualifications for prescribed fire are based on wildland fire experience, these assignments are beneficial and can be crucial to both the detailed individual and FUM crew development. FUM crewmembers have completed task books during details on wildland fire assignments. The FUM has also detailed individuals into their program. This has permitted the participants to gain experience in different fuel types as well as the opportunity to work on their qualifications. In return, these participating individuals have brought their own experiences, insights, and ideas, which has led to improvements in the FUM program.

## Lessons Learned – Overcoming a Challenge

The Buffalo River FUM has been exposed to a variety of “**safety cultures**” while supporting incidents around the country. One common observation is that many areas are used to performing operations in a unique local manner. Because local staff can be very familiar with their own their unit procedures, local overhead initially provided only minimal briefings that were inadequate for out of area resources. The FUM leader overcame this challenge by first asking for additional clarification to resolve questions and then expressing any remaining safety concerns to line overhead.

Less experienced firefighters on the Great Smoky Mountains FUM have gained invaluable insight and experience by **being partnered whenever possible with more senior crewmembers during prescribed burns** and wildfire assignments. These less experienced crewmembers are also targeted to receive training in areas where they need to improve their knowledge and practical skill level.

### Best Practice

**Effective crew teamwork** has been enhanced by FUM crewmember exposure to a diversity of wildland fire experiences. Multi-region and interagency operations in many fuel types during prescribed fire, fire use, and suppression all have contributed to effective team building. The Buffalo River FUM also works together from January through October. They learn how to interact with and acknowledge that each crewmember has a different background and skill set. When the module integrates into a 20-person hand crew on a wildland fire assignment, they put forth the interpersonal skills needed to blend into the newly formed crew atmosphere. It is important for all crewmembers and crews to swallow their pride and adopt a professional attitude. Friendly competition among crews is fine but a crew should never have the attitude that they are better than another crew.

### Training Curriculum Recommendations

The Buffalo River FUM believes that the curriculum should incorporate **more realistic situational awareness training to include “what if” situation drills and team problem solving exercises**. Many subject topics are currently too broad, vague, and general in scope. They are given over too condensed a time period in order to satisfy a requirement. Requirements in classes and in task books should be met with a more “real-time situation” development emphasis. This kind of extended real-time training would instill the important real world stress factor skills into the training, rather than the currently created artificial environment utilized mainly to meet position qualifications as quickly as possible.

The Great Smoky Mountains FUM offered the following suggestions to improve the training curriculum:

**Include the Eastern fuel models** and information in all S-courses with an emphasis in S130/190 Basic Firefighter. The Eastern fuels are overlooked in most training courses. This omission lends false credence to the idea that these fuels are not to be considered a concern or threat to firefighter safety.

**Require the S200 (Initial Attack Incident Command) Course for an Incident Commander Type 4 (ICT4)**. Within NPS regulations (310-1) the S200 course for an ICT4 is only recommended, not required training. This course should be made mandatory as it would facilitate ICT4 understanding of the requirements and responsibilities associated with this position. It is at the ICT4 level, more likely than any other ICS position, where poor decisions can reach limited experienced line personnel, and be implemented without additional supervisory oversight.

**Create a specific standard for chainsaw qualifications**, including a task book. Developing chainsaw operator standards for the fire community would create a standard for determining if in fact an individual is properly qualified. It would also lead to an operator performance standard for those agencies currently without a chainsaw specific training or qualification standard.

**Develop a wildland fire oriented vehicle operator defensive driving course**. Development of a tailored defensive driving course would promote safety while educating firefighter vehicle operators on the hazards associated with operating various vehicle types under both routine and emergency conditions.

A portion of this training should deal with the extensive amount of time crews spend driving on unfamiliar roads and terrain, an often unrecognized safety issue within the wildland fire community. The Great Smoky Mountains FUM spends most of its time in travel status. To reach an assignment the crew travels by highway transportation to and from 14-day fire assignments within the NPS Southeast Region. Even though the FUM is generally limited to travel within the Southeast, sometimes a two-day drive is required to adhere to work/rest requirements. There are also many large, heavily populated cities along with most of the popular vacation spots in the region and their associated congested roads. Both a defensive driving course and **a national driving standard should be formulated to address this operator issue**.

### Unresolved Issues

On prescribed fires, more emphasis and discussion needs to be put on **safety zones and escape routes when utilizing complex ignition plans**. These factors must be discussed at each briefing, to ensure that all safety zones and escape routes will be maintained on the ground during the burn operations.

Buffalo River FUM has noted the need for **common interagency guidelines for all Fire Use Module utilization**. Now in the preliminary stages of development, these guidelines, once in place, will assist the field in understanding the purpose of the FUM’s and the role they should have in the wildland fire environment. ★