SCOTTS CHAPEL ROAD FIRE

INCIDENT AND ACCIDENT REVIEW

SEPTEMBER 7, 2010

KENTUCKY DIVISION OF FORESTRY

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SCOTTS CHAPEL ROAD FIRE

EXECUTIVE SUMMARY

On September 7, 2010 at 1140 hours, Don Lam, a 12 year Kentucky Division of Forestry Forest Ranger Technician III, was seriously injured during fire suppression activities on the Scotts Chapel Road Fire in Livingston County, Kentucky. The fire was reported the evening of September 6, 2010. After noting the presence of steep terrain, bluffs, rock outcrops and snags, the incident commander determined that no suppression actions would be attempted that night.

Lam was a member of a four person crew using rakes to construct a hand line firebreak near the base of a rocky bluff. The fuel was primarily hardwood litter, and the crew was attempting to contain the fire near the edge of the rocky bluff to preventing it from spreading to a previously cutover area. The fire had already been contained in the area on top of the bluff.

After the employee injury and with the presence of additional standing snags and rolling materials, the fire was monitored the rest of the day on September 7 and September 8. The fire was declared controlled at 1120 hours on September 9 at 12 acres.

Factors contributing to this accident include:

1. An illegal debris burn escaped causing the fire.
2. The fire area had experienced an abnormally dry period.
3. The presence of snags, a rocky bluff, and the debris burning caused the roots of a standing snag to burn through, fall and roll over the rocky bluff.

To address the causal factors of the injury the following recommendations are made:

1. The division incorporates hazard tree safety information into standard operating procedures and all fire line and/or tailgate safety briefings.
2. The division develops specific guidelines for fire line construction near and around bluffs and/or cliffs.
3. The division and field supervisors reemphasize the hazards present and the change in tactics needed during extended dry periods or drought.

INCIDENT SUPPORTING INFORMATION

Date of Review: 9/10/10 **District:** Western **Incident Name:** Scotts Chapel Road

Reviewer: Bernie Andersen **Incident Dates:** 9/6 - 9/2010

Review Team: Tim Brown, Darren Morris, Joe Curtis, James Armstrong, Brad Whybark, Steve Hammond

Others present: None.

Data and Information:

Weather: On 9/7/10 weather conditions were hot with recordings from Dixon Springs Remote Automated Weather Station (RAWS) showing temperatures reached 92 degrees, a low relative humidity of 45% and variable winds up to 9 mph. See Appendix A for hourly RAWS weather indices. On site weather was taken at 1456 hours and showed a temperature of 74 and RH of 20%.

Communication Logs: Dispatch log and communications log were complete.

Report of Fire by Telephone: The F-20 "Forest Fire Reported by Telephone" form was completed.

Fire Reports: #9002, Livingston County.

The individual fire report (F-1) was complete and reviewed and signed by District Ranger and approved and signed by District Forester.

Locality Maps and Topographic Maps: Maps of the fire were provided and used for reference. Aerial photo maps of the fire were also provided.

Fire Cause Investigation: Debris burning was determined to be the fire cause.

Point of Origin: The point of origin was determined and documented as a debris pile.

Law Enforcement Reports: After consultations with the Livingston County Attorney, Bill Riley, a summons was issued and a Kentucky Uniform Citation was written for violation of KRS 149.375 and KRS 149.401. A court date has been set.

Other Pertinent Documentation: The Communication's Log, Dispatcher's Daily Report (F-2), and the Telephone Fire Report (F-20) were provided and reviewed. The fire weather narrative and MESONET weather were provided and reviewed.

Safety Briefing: Safety briefings on hazards present such as current fire activity, rolling debris, rough terrain, loose footing, and amount of debris present were conducted.

LCES:
Lookouts – No separate lookout was posted, but employees worked in pairs and could see the fire.
Communications – Communications were established.
Escape Routes - Escape routes were established both while working on top of the bluff and while working below the bluff.
Safety Zone – A safety zone was established.

CHRONOLOGICAL SEQUENCE OF EVENTS

9/6/2010

2030 hours: Fire reported to District Forester Darren Morris at his home by Livingston County Dispatch. The fire was reported off Highway 70, East of Smithland and off Scotts Chapel Road. Several fire departments were already on the scene but were not able to contain the fire.

2030 hours: Forest Ranger Technician III James Armstrong was dispatched to the fire and given information about the day's fire activity and humidity reaching 19% with 9-11 mph winds (gusts to 17) at the nearest MESONET weather station site in Draffenville. Armstrong was the designated incident commander (IC).

2030 hours: Morris drove to the Western District Office to dispatch.

2040 hours: Morris arrived at the KDF office.

2045 hours: Armstrong was en route to the fire.

2102 hours: Forest Ranger Technician III Don Lam was contacted to assist with the fire and directed to go to Salem to bring tractor/plow unit to take to the fire.

2122 hours: Armstrong signed out of service at fire to begin size-up of the fire and to talk to the fire departments on scene.

2130 hours: Armstrong contacted dispatch to give size-up report. He estimated the fire at 4 – 5 acres and indicated there was a bluff present and he hadn't been able to walk the fire. Morris informed Armstrong of the current weather – RH was 36% with 5 mph southerly winds.

2156 hours: Armstrong contacted Morris to report that bluff and hills are too steep and he couldn't get to the fire. He was going to hike in from an old access road on what he believed to be old Westvaco property. He determined that a dozer should not be used because of all the bluffs and rocky outcrops.

2156 hours: Lam arrived at the Salem tractor/plow unit and was told by Morris to continue to the fire without the tractor/plow unit because of the rough terrain and the darkness. Lam was given information about the day's fire activity and weather with humidity reaching 19% with 9-11 mph winds (gusts to 17) at the nearest MESONET weather station site in Draffenville. Morris informed Lam of the current weather, humidity and wind.

2224 hours: Lam signed out of service at the fire. He had parked by Armstrong's truck and was going to make contact with him.

2245 hours: Armstrong contacted Morris and reported that nothing was threatened by the fire. Morris and Armstrong agreed the rocky conditions, steep bluffs, and abundant woody debris were too dangerous for night fire suppression activities. It was agreed that Armstrong and Lam would report to work at 0700 hours, gather necessary equipment and continue suppression efforts the next morning. Weather conditions for the next day were discussed between Morris and Armstrong with a forecasted RH of 40% with SW winds of 5-7 mph.

2245 hours: Lam was en route to his home.

2300 hours: Armstrong was en route to his home.

2330 hours: Armstrong signed out of service at home.

2345 hours: Lam signed out of service at home.

2400 hours: Morris completed necessary paperwork and was out of service at home.

9/7/2010

0658 hours: Armstrong signed on in service to Scotts Chapel Road Fire.

0700 hours: Lam signed on in service to Scotts Chapel Road Fire.

0747 hours: Armstrong signed out of service on Scotts Chapel Road Fire.
0800 hours: Morris began work on fire report for yesterday's fires and other necessary paperwork.
0805 hours: Lam signed out of service on Scotts Chapel Road Fire.
0830 hours: Forest Ranger Technician I Brad Whybark and Forest Ranger Technician I Stephen Hammond, who had recently signed out of service at John P. Rhody Nursery, were contacted by Morris to report to Armstrong at the Scotts Chapel Road Fire to assist with suppression efforts.
0905 hours: Whybark and Hammond signed out of service at Scotts Chapel Road Fire to assist with suppression efforts. It had been decided by Armstrong to not use the dozer because of the numerous bluffs and rocky outcrops.
1140 hours: Chief Forester Randy Gardner received the call from Hammond that Lam had been hit in the head and was not moving, and they were calling for an ambulance.
1150 hours: Morris called Armstrong for an update on Lam's injury. Armstrong reported that an ambulance was on the way and that Lam was still not fully conscious.
1150 hours: District Forest Ranger Technician Joe Curtis and Forest Ranger Technician III Dennis Woolard were in route to the scene at Scotts Chapel Road Fire.
1224 hours: Curtis and Woolard were out of service at Western Baptist Hospital.
1235 hours: Curtis contacted the office to report that Lam was being airlifted to Evansville with a head injury.
1238 hours: Armstrong contacted the office to report that a falling snag rolled down hill over the bluff and hit Lam in the head. Lam had been wearing his hardhat. Whybark barely got out of the way of the falling snag.
1242 hours: Armstrong, Whybark, and Hammond were out of service on the fireline for a 30 minute break.
1247 hours: Curtis and Woolard were en route to Scotts Chapel Road Fire.
1317 hours: Armstrong, Whybark, and Hammond are back in service gathering up equipment. They would be pulling back resources and would not continue active suppression efforts that day. Armstrong would continue to monitor fire burning conditions from a distance. Armstrong was given a current weather update along with forecast for the evening.
1353 hours: Woolard is en route to Hickman County.
1353 hours: Whybark and Hammond are en route to John P. Rhody Nursery to get vehicle.
1412 hours: Whybark is en route to Graves County.
1423 hours: Curtis is en route to Mayfield.
1423 hours: Armstrong is en route to McCracken County.
1456 hours: Whybark, Woolard, Armstrong, and Hammond out of service for the day.
1456 hours: Armstrong contacted the office to report that the fire is still not contained. District will continue to carry it as an uncontrolled fire on the daily fire report and monitor the next day.
1528 hours: Curtis arrived at Mayfield office.

9/8/10
0800 hours: Armstrong contacted the office for an update on the day's weather forecast. Armstrong relayed the information that the fire would be monitored for the day.

9/9/10
0825 hours: Armstrong signed on in service to meet Curtis at Smithland.

0830 hours: Curtis signed in service to Scotts Chapel Road Fire.
0954 hours: Armstrong and Curtis signed out of service on Scotts Chapel Road Fire.
1000 hours: Curtis contacted dispatch to report they were mopping up fire on the lower side of the bluff.
1120 hours: Curtis contacted dispatch to report that the Scotts Chapel Road Fire is controlled.

SCOTTS CHAPEL ROAD FIRE NARRATIVE

The Scotts Chapel Road fire was initially reported by phone from Livingston County Dispatch at 2030 hours on 9/6/10. Forest Ranger Technician III James Armstrong was dispatched to the fire and arrived at the fire at 2122 hours. Armstrong was the designated incident commander, and District Forester Darren Morris was the dispatcher. Forest Ranger Technician III Don Lam was dispatched to pickup the Salem tractor/plow unit. Armstrong informed Morris at 2156 hours after scouting the fire that due to the bluffs and rocky outcrops the tractor/plow could not be used. Lam was told at 2156 hours to proceed directly to the fire without the tractor/plow unit. Armstrong contacted Morris at 2245 hours and, after consultation and discussion on the weather determined that no suppression actions would be taken that night because of terrain, woody debris present, and lack of resources at risk. Armstrong and Morris discussed the more favorable weather predicted for the next day, which included a RH of 40% and SW winds of 5-7 mph.

On 9/7/10 Armstrong and Lam were dispatched back to the Scotts Chapel Road at 0700 and Forest Ranger Technicians Brad Whybark and Stephen Hammond were dispatched to the fire at 0830. The crew conducted a safety briefing where they discussed the terrain, rolling debris, and the fire activity. They began line construction at 0910 hours in the area on top of the bluff. They constructed a fire line on the east flank of the fire and burned out the east fire lines as necessary. In some areas they "cupped" the constructed fire line to prevent materials from rolling.

At approximately 1100 hours, Armstrong and the other three employees drove to the lower end of the bluff to continue fire suppression efforts. The area adjacent to the base of the bluff was burning in spots. Armstrong and three employees were constructing a small "scratch" hand line near the base of bluff when a snag on top of the bluff that had its roots burned through fell and rolled over the bluff. At 1140 hours the snag hit Lam in the head causing serious injuries (refer to pictures starting on page 11). The local county 911 was immediately contacted, and the crew spent the next ninety minutes assisting with providing aid to the injured Lam, moving him to the road, and helping with his transport to the hospital by Life Flight. After the accident all personnel and equipment were pulled off the line, and the fire and fire conditions were monitored for the remainder of the day.

On 9/8/10 Armstrong and the district management team decided to monitor the fire and not take any fire suppression actions because of snags, rocky bluffs, rock outcrops, and the lack of structures or other resources at risk. In addition the district management and Armstrong realized the importance of beginning the investigation and documenting the event. They began gathering the required accident information. The status of the fire was checked throughout the day.

At 0830 hours on 9/9/10 Armstrong and District Ranger Joe Curtis were dispatched to the Scotts Chapel Road Fire to complete fire suppression activities. The two firefighters completed the scratch line and the little mop-up that was required on the lower side of the bluff. The fire was declared controlled at 1120 hours on 9/9/10 at 12 acres.

INCIDENT REVIEW CONCLUSION

The incident and accident review concludes that the serious injury suffered by a Division of Forestry firefighter was the result of fire suppression activities taken in response to illegal burning during extended dry conditions. The illegal burning resulted in an approximate 11 foot standing snag whose roots burned through causing the snag to fall and roll over a bluff striking the employee on his hardhat causing serious injuries.

Rocky bluff that snag rolled over and struck employee.

COMMENDATIONS

- All personnel involved responded quickly requesting assistance for the injured employee, in notifying dispatch, and providing assistance with transporting the employee to hospital.

- Dispatch followed protocols and provided the incident commander and firefighters with regular updated weather information.

- The communications between the incident commander and dispatch about the incident and the accident greatly assisted in orderly follow-up actions.

- The employees and supervisors provided crucial information needed to complete investigation and subsequent recommendations.

RECOMMENDATIONS

Some primary issues of the fire were presence of snags, rocky bluffs, rock outcrops, and the illegal burning. The following recommendations address the significant causal factors of the serious fireline injury.

- The Kentucky Division of Forestry incorporates hazard tree safety into standard operating procedures and all fire line and/or tailgate safety briefings. A copy of hazard tree checklist is included as Appendix B.

- The division and field supervisors reemphasize the hazards present and the change in tactics needed during extended dry periods or drought. A copy of wildland fire behavior and fire suppression tactics during drought periods is included as Appendix B.

- The division develops specific guidelines for fire line construction near and around bluffs, cliffs, and high walls.

Pictures:

Fire origin – Debris Burning Pit after It Was Covered Over

Employee Hard Hat

Downed Snag that Struck Employee

Base of Burned 11' Snag That Struck Employee

Scratched Fire Line Near Base of Rocky Bluff

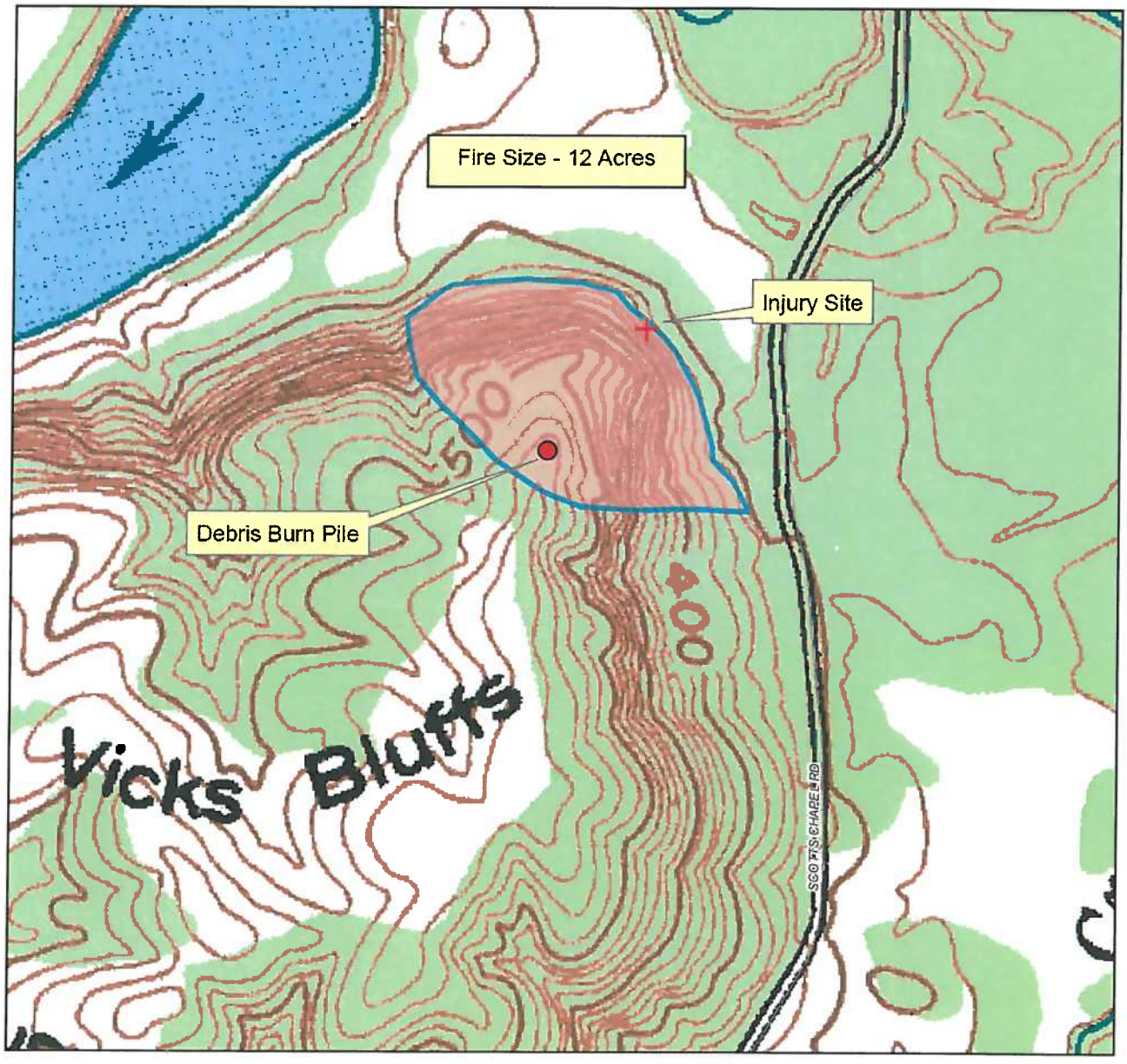
FINDINGS

S: Significantly Contributed **I: Influenced** **D: Did Not Contribute**

	FUELS
D	Fuel Model 9 (Hardwood Litter)
D	Light flashy Fuels
D	Heavy layer of fuels
S	**Standing Snags**
	WEATHER
D	Relative Humidity
D	Wind Speed
D	Class Day
I	Extended Dry Period
	ENVIRONMENTAL FACTORS
S	**The terrain had bluffs and cliffs present**
S	**The terrain had slopes present**
I	The incident area was experiencing moderate drought
D	The presence of various aspects
D	The time of day when the injury occurred
D	Smoke in the area
	INCIDENT MANAGEMENT
I	The fire resulted from escaped debris burning
D	Instructions were given and understood
D	Safety briefings and LCES were used
S	**Fireline being constructed near the base of rocky bluff**
D	Experience of KDF employees
D	Span of control was good
D	Employees experience varied
D	All employees met training requirements
	EQUIPMENT
D	The employees had sufficient equipment
D	All equipment function properly
D	Injured employee was wearing full PPE

APPENDIX A

Scotts Chapel Road Fire
Livingston County Kentucky



0 150 300 600 900 1,200
Feet

N
W E
S

APPENDIX B

WEATHER READINGS FROM DIXON SPRINGS RAWS

(RAWS located approximately 20 miles west of fire)

Temperatures – September 7 – Dixon Springs RAWS

Local Hour of Day	Temperature
00	75° F
01	73° F
02	72° F
03	69° F
04	69° F
05	69° F
06	68° F
07	73° F
08	76° F
09	82° F
10	85° F
11	89° F
12	90° F
13	92° F
14	92° F
15	88° F
16	75° F
17	76° F
18	78° F
19	77° F
20	76° F
21	74° F
22	73° F
23	69° F

Relative Humidity – September 7 – Dixon Springs RAWS

Local Hour of Day	Relative Humidity
00	45%
01	47%
02	50%
03	59%
04	61%
05	69%
06	67%
07	76%
08	72%
09	65%
10	60%
11	53%
12	53%
13	47%
14	49%
15	52%
16	80%
17	82%
18	86%
19	87%
20	88%
21	95%
22	97%
23	86%

Winds – September 7 – Dixon Spring RAWS

Local Hour of Day	Wind
00	3 /SE
01	3 /SE
02	1 /SE
03	1 /E
04	1 /NW
05	1 /E
06	1 /E
07	2 /S
08	2 /S
09	4 /SW
10	9 /W
11	8 /SW
12	8 /W
13	9 /W
14	8 /NW
15	7 /SW
16	4 /N
17	2 /SE
18	5 /SW
19	5 /W
20	6 /NW
21	4 /NW
22	3 /N
23	1 / NE

APPENDIX C

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 forces, your supervisor, and adjoining forces.
8. Give clear instructions and ensure they are understood
9. Maintain control of your forces at all times.
10. Fight fire aggressively, having provided for safety first.

***None contributed to accident.**

WATCH OUT 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. Uniformed on strategy, tactic, and hazards.
6. Instructions and assignments not clear.
7. No communication link with crew members/supervisor.
8. Constructing fireline 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.

****Designates those that apply to incident.**

Hazard Tree Safety

Hazard trees, both dead snags and live green trees, are one of the most common risks encountered on the fireline. All firefighters should frequently survey their work area for potential hazard trees.

Situation Awareness

Environment:

- Current and forecasted winds
- Night operations
- Steep slopes
- Diseased or bug-kill areas
- Number and height of hazard trees
- Anticipated burn-down time
- Potential for trees to domino

Hazard tree indicators:

- Trees burning for any period of time
- High risk tree species (rot and shallow roots)
- Numerous downed trees
- Dead, broken, or burning tops and limbs overhead
- Accumulation of downed limbs
- Absence of needles, bark, or limbs
- Leaning or hung-up

Hazard Control

- Eliminate the hazards with qualified sawyers, blasters/explosives, or heavy equipment.
- Avoid hazards by designating "No Work Zones" (flag, sign, and map).
- Modify suppression tactics or fireline location to avoid high risk areas.
- Post lookouts to help secure high risk areas.
- Use road/traffic controls in high risk areas.
- Fireproof potential hazard trees to prevent ignition.
- Keep clear of bucket drops near trees/snags.
- Reposition firefighters to secure areas in response to high winds forecast.
- Provide timely feedback to others regarding any hazard trees.

In addition to suppression and mopup operations, assess, control, and monitor hazard trees along roads and when selecting break areas or campsites.

APPENDIX E

WILDLAND FIRE BEHAVIOR AND FIRE SUPPRESSION DURING EXTENDED DROUGHT PERIODS

During drought conditions wildland fire suppression techniques may have to be altered to ensure for the safety of firefighters and to account for possible extreme variations in fire behavior. **In general wildland fires may be more active and extreme, and fire behavior may not follow the typical fire behavior rules.**

Listed below are factors to consider and some recommendations for wildland fire suppression tactics during drought.

Fire Behavior

- Lower humidity recoveries at night can occur resulting in more active burning conditions at night.
- In general fire behavior may be more active and extreme.
- The chance of more active fire behavior increases the chances for sudden and seemingly unexpected flare-ups. Personnel should be on the alert for more intense burning conditions that may cause flare-ups.
- Firefighter safety briefings should detail the worst case fire behavior expected for the day.

Fire Suppression Tactics

- The need for working from anchor points and the identification of safety zones/escape routes should be emphasized repeatedly.
- Fire suppression tactics used during normal fire weather periods may not be effective during drought periods.
- Dozer fire lines should be used wherever possible instead of hand lines or blower lines.
- Fires may burn underneath and across fire lines so fire lines may need to be checked for several days after fire is declared controlled.
- More intense fire behavior could require the use of more indirect fire suppression tactics increasing the need for anchor points.

- ► The amount and duration of mop-up is likely to increase to account for the need to mop-up a further distance inside fire lines. Fire lines may have to be constructed deeper.

- ► Great caution should be used in attacking the head of a wildland fire. Engines should "attack from the black" with water and/or foam.

Normal wildland fire "rules of thumb" during non-drought periods may be challenged during drought periods. Keep in mind the following:

- Staying in the black may not be as safe because of more chances for fuel to reignite. Be alert for snags and other fuels that can reburn. Roots are much more likely to burn out from under snags causing them to fall.
- Fire may burn more actively at night because of lower humidity.
- Fires may burn actively downhill because of less fuel moisture, more pre-heating, increased dead fuels, and sudden flare-ups.

8/24/07