Modoc Lightning Complex

Extended Incident Action Plan

July 30-August 3, 2010

Day Shift

TRANSITION

- Know the plan, when in doubt, ask questions!
- Use the proper radio frequencies

Situational Awareness

- Look Up, Look Down, Look all Around
- Take corrective actions as needed, notify

Work/Rest

- Follow 2 to 1 work/rest ratio
- No shifts over 16 hrs. without I.C. approval

Driving

- Headlights on, wear seatbelts, follow speed limits

Remember the 10 Standard Fire Orders, the 18 Watch-Out Situations, and L.C.E.S.

CA_MDF_000343

Modoc National Forest

Northern California Team 1

INCIDENT OBJECTIVES	1. Incident Name	2. Date Prepared	3. Time Prepared
ICS 202	**Modoc Lightning Complex**	**07/28/2010**	**1800**

4. Operational Period

07/30/2010 to 08/03/2010 EXTENDED Day Shift 0600 - 2100

5. General Control Objectives for the Incident (include alternatives)

1. Provide for public and firefighter safety through application of the Risk Management Process.
2. Minimize incident costs and potential resource damage by suppressing all fires in the assigned area.
3. Avoid actions which could result in adverse effects to cultural and natural resources.

6. Weather Forecast for Period

See attached spot weather forecast

7. General Safety Message

8. Attachments

x	Organization List-ICS 203	x	Air Ops Plan ICS-220	x	Fire Weather Forecast
x	Division Assignment List-ICS 204	x	Incident Map	x	Fire Behavior Forecast
x	Communications Plan-ICS 205		Traffic Plan	x	Unit Log ICS-214
x	Medical Plan-ICS 206	x	Safety Message		Vicinity Map

9. Prepared by	10. Approved by (Incident Commander)
Valery Lambeth	Kent Swartzlander

ORGANIZATION ASSIGNMENT LIST

1. Incident Name

Modoc Lightning Complex

2. Date	3. Time
July 28, 2010	**1930**

4. Operational Period

Day 07/30/10 to 08/03/10 Extended, Day 0600 - 2100

Position	Name
5. Incident Commander and Staff	
Incident Commander	Chris Orr
Deputy	
Safety Officer	
Information Officer	
Liaison Offier	
6. Agency Representative	
Agency Admin	Robert Trujillo
Agency Admin Rep	Ray Torres
Resource Advisor	Mary Flores
7. Planning Section	
Chief	
Deputy	
Resources Unit	
Situation Unit	
Documentation Unit	
Demobilization Unit	
Technical Specialists	
Human Resources	
Training	
CTSP	
GIS	
FBAN	
IMET	
8. Logistics Section	
Chief	
Deputy	
Supply Unit / Ordering	
Facilities Unit	
Ground Support Unit	
Communications Unit	
Medical Unit	
Receiving & Distribution	
Security Unit	
Food Unit	

9. Operations Section	
Operations	
Planning OPS	
a. Branch I - Division/Groups	
Branch Director	
Division/Group ALL	Josh Wright
Division/Group	
Division/Group	
Division/Group	
b. Branch 2 - Division/Groups	
Branch Director	
Deputy	
Division/Group	
Division/Group	
Division/Group	
Division/Group	
Division/Group	
c. Branch III - Division/Groups	
Branch Director	
Deputy	
Division/Group	
Division/Group	
Division/Group	
Division/Group	
Division/Group	
d. Air Operations Branch	
Air Operations Branch Director	
Air Attack Supervisor	
Air Support Supervisor	
Helicopter Coordinator	
Air Tanker Coordinator	
10. Finance Section	
Chief	
Deputy	
Time Unit	
Procurement Unit	
Compensation/Claims Unit	
Cost Unit	

Prepared by (Resource Unit Leader)

Gary R. Deboi

DIVISION ASSIGNMENT LIST	1. Branch	2. Division/Group **All Divisions**
3. Incident Name MODOC LIGHTNING COMPLEX	4. Operational Period Date: 07/30/10 to 08/03/10 Extended Time: Day Shift 0600 - 2100	

5. Operations Personnel

Operations Chief		Division/Group Supervisor	Josh Wright
Planning Ops		Air Attack Supervisor No.	

6. Resources Assigned this Period

Strike Team/Task Force/ Resource Designator	Leader	Number Persons	Trans. Needed	Drop Off PT./Time	Pick Up PT./Time
ST Engine 3675C	Josh Wright	28	N	Per DIVS	Per DIVS

7. Control Operations

Mop-up and patrol existing fires.

Special Instructions:

Backhaul all trash and excess equipment.

Use screens on all draft lines.

Function	Frequency		Channel	Function	Frequency		Channel
Command Repeat (Tones 5 & 7)	RX 168.1500 N	TX 171.3875 N	4	Air to Ground	RX 168.6375 N	TX 168.6375N	13
Tactical Div/Group 1	See Comm Plan	See Comm Plan					

Prepared by (Resource Unit Leader)	Approved by (Planning Section Chief)	Date	Time
Gary R. Deboi	Valery Lambeth	07/28/10	1930

FIRE WEATHER FORECAST NO. 2

NAME OF FIRE: Modoc Cmplx	UNIT: CA-MDF-000343	PREDICTION FOR: Day Shift
FORECAST ISSUED: 1600 PDT 7/28/2010	SIGNED: Mark Burger Incident Meteorologist	SHIFT DATE: Thu. 7/29/2010

FIRE WEATHER WATCH beginning Friday afternoon and continuing through Saturday evening for low humidities and strong southwest winds

WEATHER DISCUSSION: Dry weather will prevail today, but afternoon southwest to west winds will be slightly stronger than in previous days. Relative humidity will also be a couple percent lower today. Further decreases in humidity and increases in wind speed are expected for Friday and Saturday. However...even though our fire is not technically in red flag criteria today...IT IS CLOSE AND FIRE ACTIVITY DOESN'T DISCRIMINATE ON A COUPLE OF MPH!!

WEATHER FORECAST FOR TODAY:

SKY/WEATHER:	Sunny.
MAXIMUM TEMPERATURES:	83-88.
MINIMUM HUMIDITY:	11-16%
EYE LEVEL WINDS:	
LOWER SLOPES/DRAINAGES:	Variable/upslope 3 to 6 mph becoming southwest to west 6 to 12 mph after 1200 PDT. A few gusts to 17 mph in the afternoon.
UPPER SLOPES/RIDGETOPS:	Variable 3 to 6 mph becoming southwest 8 to 14 mph with a few gusts to 20 mph after 1200 PDT.
SMOKE/STABILITY INFORMATION:	Haines index 5 (moderate). Good for aviation ops. Minimal inversions.

WEATHER FORECAST FOR TONIGHT:

SKY/WEATHER:	Clear.
MINIMUM TEMPERATURES:	42-47 most areas...50-55 ridges.
MAXIMUM HUMIDITY:	55-60% most areas...40-45% ridges.
EYE LEVEL WINDS:	
LOWER SLOPES/DRAINAGES:	Southwest to west 5 to 10 mph in the evening becoming downslope/downvalley 1 to 3 mph.
UPPER SLOPES/RIDGETOPS:	Southwest to west 8 to 14 mph becoming variable around 5 mph after midnight.

EXTENDED OUTLOOK (Friday through Sunday): Dry with Red Flag conditions probable due to low humidity and higher winds. Highs 86-91. Lows 45-50 most areas...except 55-60 ridges. Minimum relative humidity 7-12%. Maximum overnight humidity recoveries 50-55% most areas...except 35-40% ridges. Southwest afternoon eye level winds 8 to 15 mph with gusts to 30 mph.

Fire Weather Outlook
Modoc Lightning Complex
Prepared by Mark Burger, IMET Eureka, California
28 July 2010

The evolving weather pattern over the next several days will feature little or no chance for rain or thunderstorms and temperatures near seasonal normals, with highs in the upper 80s to lower 90s and lows in the 40s. More notable will be the impact of increasing southwest to west winds accompanied by very low afternoon humidities and poor overnight humidity recovery through Sunday, August 1. In particular, the combination of afternoon humidities between 9 and 14% and sustained eye-level winds of 10 to 15 mph with gusts to as high as 25 mph, are likely to warrant Red Flag Warnings for the Complex for Friday and Saturday. It appears the lowest humidities will occur Friday afternoon, but the strongest winds will hold off until Saturday afternoon, thus precluding the "optimal" pattern. Overnight humidity recoveries during this period may only reach 35-40% along the ridges Friday and Saturday mornings, with 50-55% common elsewhere. This windy and dry pattern is likely to persist into at least the early part of next week, and potentially quite a bit longer.

Extended Fire Behavior Forecast	
Name of Incident: **Modoc Lightning Complex**	**Administrative Unit:** R5 Modoc National Forest
Date & Time Issued: 07/28/2010@2000	**Operational Period**: Extended 7/30-8/3/2010
SITL: Chris Wikeen	**Signed:**

Assumptions:
Several lightning fires occurred out of the last series of storms. Some were detected and suppressed, and some went out. There is a high probability of holdovers for the next several days. A Fire Weather Watch has been issued by the IMET beginning Friday afternoon and continuing through Saturday evening for low humidity and strong southwest winds. Winds will be the strongest on Saturday afternoon.

Weather Summary

See attached Extended Weather Forecast.

Fire Behavior Summary

General

Fuels within the complex range from grass, bitter brush, Manzanita, Pinion-Juniper, to sage with a ponderosa overstory. Live fuel moisture. Heavy Precipitation in the late spring has contributed to relatively high live fuel moisture values between 90%-160% in the herbaceous for this time of year depending on location. The grass has cured on southerly aspects below 6000', but remains uncured at higher elevations on most aspects. 10 hour fuel moisture has been running between 5-7%. Heavier fuels are consuming up to 90%.

Specific Assignments:

As the weather becomes warmer, drier, and windier today, the chance of a holdover becoming active is highly probable. Slopes aligned with southwest to west will exhibit the highest potential for active fire behavior.

Any new starts that move into cured grass on exposed southwest to west aspects could exhibit the highest rate of spread. Behave runs indicate that the ROS could vary between 0-22 ch/hr, 1-4' flame lengths on 0-30% slope at the heat of the day. On slopes not aligned with the southwest to west winds ROS could be around 1-12 ch/hr, with 1-2' flame lengths.

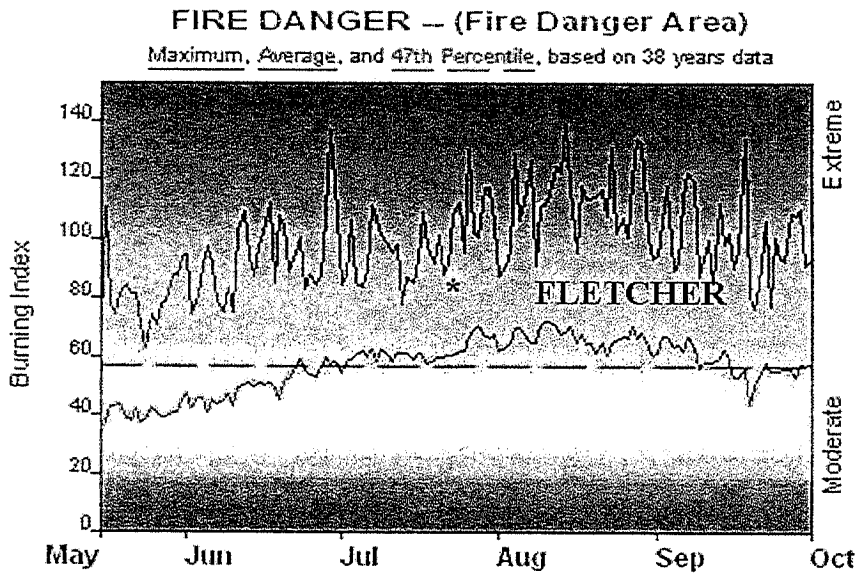
Any new starts that move into sagebrush on exposed southwest to west aspects could have a ROS of 1-10 ch/hr, 1-3' flame lengths, maximum spotting distance 0-.1 mile. On slopes not aligned with the southwest to west winds ROS could be around 1-5 ch/hr, with 1-2' flame lengths.

Any new starts that move into in Sage Brush with Ponderosa overstory in southwest to west aspects expect ROS of 1-7 ch/hr, 1-3' flame lengths with a maximum spotting distance of 0-.1mile at the heat of the day on 0-30% slopes. On slopes not aligned with the southwest to west winds ROS could be around 2-4 ch/hr, with 1-2' flame lengths. Probability of ignition could be in the high 90's for all three scenarios.

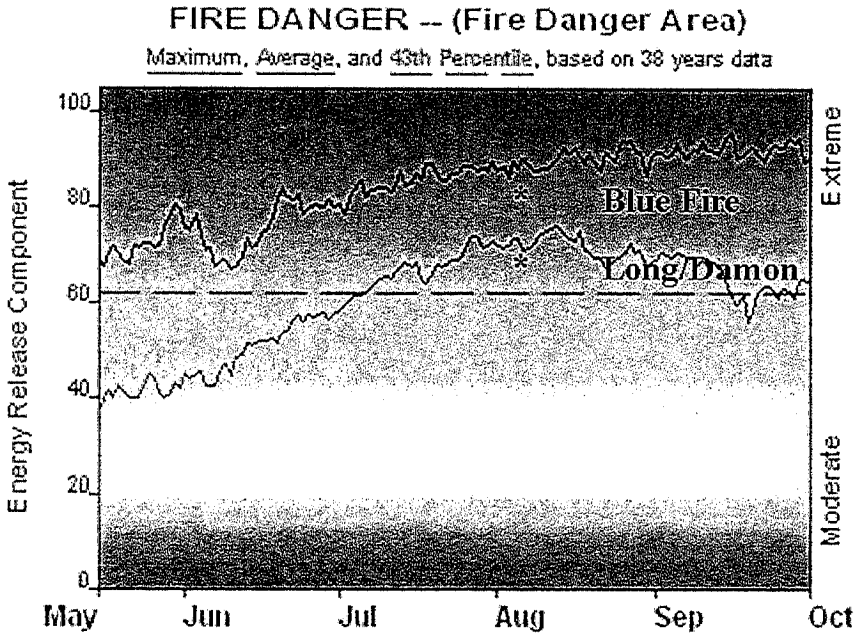
Air Operations: Gusty afternoon winds could hamper aircraft operations.

Safety

As the weather becomes warmer and drier be sure to stay hydrated.



Fuel Model: K—Light Slash



Fuel Model: K—Light Slash

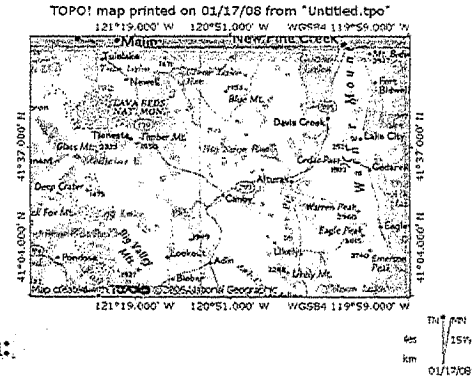
Fire Danger Area:

MODOC 2010 (2009 DATA)

- Northeastern California
- Modoc National Forest

Weather Stations:

- 040306—Timber Mtn (NFDRS)
- 040221—Round Mtn (NFDRS)
- 040312—Rush Creek (NFDRS)



Fire Danger Chart Interpretation:

Background colors

EXTREME .....Use extreme caution

(CAUTION) .....Watch for changes

MODERATE ..... Lower potential, but always be aware

Graph Lines

Maximum—Shows the 38year average highest component by day (ERC & BI)

Average—Shows peak fire season average over 10 years (ERC & BI)

43rd Percentile means 43% of the time the Energy Release Component is below 59

47th Percentile means 47% of the time the Burning Index is below 51

Local Thresholds:

Combinations of any of these factors can greatly increase fire behavior:

- ☐ **20 ft wind speed over 5 mph**
- ☐ **Less than 20% relative humidity**
- ☐ **Temperature over 90**
- ☐ **Burning Index over 51**

Local Knowledge:

- **The east side of the Warner Mtn. Range often has lake effect like strong down slope winds beginning in the afternoon**
- **Flat terrain makes posting lookouts difficult—Utilize lookout stations and aerial observers**
- **During peak fire season humidity recovery often does not occur until just before daylight**

Significant Event:

08/07/1977 CRANK FIRE—Entrapment with 25 shelter deployments due to increased fire behavior caused by the passage of a thunderstorm with strong erratic winds—RH 28% Flat terrain.

Be Alert:

Severe and often unpredictable weather changes caused by thunderstorms or weather fronts can cause erratic winds and downdrafts.

INCIDENT RADIO COMMUNICATIONS PLAN	Incident Name **Modoc Lightning CA-MDF-000343**	Date/Time Prepared 7/28/2010 1800	Operational Period Date/Time 7/30-8/3/10 0600 - 2100

Only frequencies listed on this 205 are authorized for use on this incident.

Ch #	Function	Channel Name/Trunked Radio System Talkgroup	Assignment	RX Freq N or W	RX Tone	TX Freq N or W	TX Tone	Mode	Remarks
1	MDF-DISPATCH	MDF-Forest Direct	Command	168.7500 N		168.7500 N		A	
2	MDF-DISPATCH	MDF-Forest RPT	Command Repeat	168.7500 N		170.1750 N		A	Tone 5 Grouse Mtn, Tone 7 Red Shale Mtn
3	MDF-DISPATCH	MDF-Admin Direct	Not Assigned	168.1500 N		168.1500 N		A	
4	MDF-DISPATCH	MDF-Admin RPT	Not Assigned	168.1500 N		171.3875 N		A	
5									
6	TACTICAL	FS TAC-1	**North**	168.0500 N		168.0500 N		A	MDF Group 3, Channel 6
7	TACTICAL	FS TAC-2	MDF-IA Tactical	168.2000 N		168.2000 N		A	MDF Group 3, Channel 7
8	TACTICAL	FS TAC-3	**South**	168.6000 N		168.6000 N		A	MDF Group 3, Channel 8
9									
10									
11									
12	AIR/GROUND	R5 FS A/G	ALL DIVISIONS	170.0000 N		170.0000 N		A	MDF Group 3, Channel 12
13	AIR/GROUND	Incident Specific	ALL DIVISIONS	168.6375 N		168.6375 N		A	
14	**EMERGENCY**	**AIR GUARD**	**ALL DIVISIONS**	168.6250 N		168.6250 N	**110.9**	A	TONE 1, USE FOR EMERGENCY TO CONTACT AIRCRAFT
15	**CAL-CORD**		**ALL DIVISIONS**	156.0750 W		156.0750 W		A	
16	**EMERGENCY**	**AIR GUARD**	**ALL DIVISIONS**	168.6250 N		168.6250 N	**110.9**	A	TONE 1 USE ONLY IN EMERGENCY TO CONTACT AIRCRAFT

5. Prepared by

Rick Cartoscelli, Nor Cal Team 1, COML

Incident Location

County Modoc State: CA Fire Latitude N Longitude W

The convention calls for frequency lists to show four digits after the decimal place, followed by either an "N" or a "W" depending on whether the frequency is narrow or wide band

MEDICAL PLAN	1. Incident Name **Modoc Lightning Complex**	2. Date Prepared 07/28/2010	3. Time Prepared 1800hrs	4. Operational Period 07/30/10 to 08/03/10 0600-2100

5. Incident Medical Aid Station

Medical Aid Stations	Location	Paramedics Yes	Paramedics No

6. Transportation

AIR Ambulance Services

Name	Address	Phone	Paramedics Yes	Paramedics No
REACH *NVG	3775 Flight Ave. Redding, CA. 96003	Modoc Interagency Communication Center	**RN**	
Mercy Air (PHI) *NVG	1524 East St. Redding, CA 96001	MICC	**RN**	
Mt. Life Flight	650 Ash St., Susanville, CA	MICC	**RN**	
CHP hoist with 165' line	Benton Airfield, Redding, CA	MICC	**X**	

Ground Ambulance Services

Name	Location	Paramedics Yes	Paramedics No
Modoc Med Center Ambulance	Alturas / Adin, CA	**X**	

7. Hospitals

Name	Address	Travel Time Air	Travel Time Ground	Phone	Helipad Yes	Helipad No	Burn Center Yes	Burn Center No
Mercy Medical Level 2 Trauma	2175 Rosaline Ave, Redding N 40° 34.29 / W 122° 23.67	60 Min.	3 hr	530- 225-6000 530- 225-7201	**X**			**X**
UC Davis Level I Trauma/Burn Center.	2315 Stockton Blvd. Sacramento N38 33.17 / W 121 27.05	2 hrs.	6 hrs.	916- 734-3636 916- 734-3790	**X**		**X**	
Modoc Medical Center	228 McDowell, Alturas CA N 41 28.48/ W 120 32.42	5 min.	20 min.	530-233-5131	**X**			**X**
Mayer's Memorial Hospital	Hwy 299, Fall River CA. N 41 01.40 / W 121 25.35		45 min.	530-336-5511	**X**			**X**
Canby Family Practice Clinic	Canby, CA		5 min.	530-233-4641		**X**		**X**

8. Medical Emergency Procedures

- ☐ Contact Modoc ECC and declare a medical emergency on Forest Net, advising your location and situation
- ☐ The closest Divison, Battalion will respond to the location to take control and direct necessary actions
- ☐ The closest EMTs will respond to the location to assist with patient care
- ☐ Secure the scene area and identify witnesses for later investigation – Keep a log
- ☐ **Modoc Interagency Command Center** **Phone # (530) 233-8880**

Prepared by (Medical Unit Leader)	10. Reviewed by (Safety Officer)
Ken Kumpe MEDL	Dave Kirste SOF2

Modoc Lightning Complex Risk Analysis (215a) July 30th-Aug 3rd

Div.	LCES Analysis of Tactical Applications (Hazardous Actions or Conditions)	LCES Mitigations/Warnings/Remedies
All	**Driving Hazards**	• Reduce speed, be watchful of traffic. • Drive defensively! Expect the unexpected around every curve. • Drive with your headlights on. Use chock blocks. Keep windshields clean. Look before backing and use backers. • Don't drive when fatigued • Maintain driving situational awareness. • **Observe speed limits.** • **The roads in the area are open to the public.** • **Unguarded Railroad Crossings** • **Open Range Cattle-Crowder Flat Rd and Hwy 139**
All	**Fire Behavior**	• Closely monitor weather conditions. Communicate weather changes to ICP. • Maintain adequate escape routes and safety zones. Advise all personnel if these are compromised or changed. Set trigger points when appropriate. • Adhere to the 10 standard orders, mitigate the 18 watch out situations where appropriate and maintain situational awareness. • **Be aware of the light, flashy fuels and the winds that affect them.** • **Be aware of the predictable diurnal wind patterns associated with this area.**
All	**Communication**	• Use human repeaters as appropriate. Follow the communications plan.
All	**Initial Attack**	• Perform Risk Mgt Process before engaging. Refer to pg 1 of IRPG
All	**Hydration**	• Drink water before, during, and after shifts. • **Be alert for signs of heat stress in yourself and others.** • Be sure to eat throughout the shift to better assimilate energy/hydration needs.
All	**Foot Travel**	• Watch footing, both in camp and on the line. • Minimize fatigue by pacing yourself. • Treat "hot spots" on your feet before they become blisters.
All	**Fire Area Hazards**	• Maintain snag awareness. • Maintain situational awareness with respect to illicit agricultural activities. • Natural Gas Lines and Overhead High Voltage Lines.
All	**Sanitation**	• Monitor yourself and others for signs of illness (flu,colds,etc.) • Wash hands regularly and thoroughly.
All	**Wildlife**	• **Snakes, Bees, Ticks**
All	**Fatigue**	• Affects judgment, decision making, and performance

Date & Time Prepared: July 28, 2010 @ 1500 Operational Period: July 30, 2010 - August 3, 2010
Prepared By: Dave Kirste, SOF2

CA-MDF-000343

Modoc National Forest

Northern California Incident Management Team 1

HEAT DISORDERS

Heat becomes a problem when humidity, air temperature, and radiant heat combine with hard work to raise body temperature beyond safe limits. Sweat is your main defense. Everyone on the fireline must understand the importance of drinking water often.

- High heat stress can produce three forms of heat related illness;
  - Heat cramps
  - Heat exhaustion
  - Heat stroke

- The mildest is heat cramps. Heat cramps can progress to heat exhaustion and eventually heat stroke.

- Heat cramps are involuntary muscle contractions, typically in the large muscle groups, caused by failure to replace fluids or electrolytes, such as sodium and potassium.
  - Cramps can be relieved with stretching and by replacing fluids and electrolytes.
  - Heat cramps can be prevented by maintaining an adequate intake of water, electrolyte replacement drinks and by eating fresh fuits and vegetables.

- Heat exhaustion is characterized by:
  - Weakness
  - Extreme fatigue
  - Nausea
  - Headaches
  - Wet, clammy skin

- Heat exhaustion results when the body produces more heat that it can dissipate. Inadequate fluid intake is a major contributing factor. Treat heat exhaustion by resting in a cool environment, by removing clothing so that one's sweat can evaporate, and by replacing fluids and electrolytes.

- Heat stroke is caused by failure of the body's heat controls. Sweating stops and the body temperature rises.

- Although classic teaching describes a heat stroke patient as "hot and dry", recent studies have shown that over 50% of heat stroke patients are sweating heavily. Typically, on the fireline we do not have medical thermometers. Therefore, the hallmark of heat stroke is altered mental status. You should suspect heat stroke if a firefighter is hot, fatigued, and shows some altered mental status, such as inability to remember the day or the current situation. They may ask, "Where am I?"

- Heat stroke is characterized by:
  - Hot, often dry skin
  - Body temperature above 105.8 degrees Fahrenheit
  - Mental confusion
  - Loss of consciousness, convulsions, or even coma

- Heat stroke is a medical emergency. Brain damage and death may result if treatment is delayed. Begin rapid cooling with ice or cold water, fanning the victim to promote evaporation. For rapid cooling, partially submerge the victim's body in cool water. Treat for shock if necessary. Provide oxygen if it is available. Whereas heat cramps and heat exhaustion may be treated locally, heat stroke patients should be medivaced off the line ASAP, by air if possible, as their condition may worsen suddenly.

Today's discussion is from the Fireline Safety Category.

INSTRUCTIONS AND ASSIGNMENTS NOT CLEAR

Every firefighter will give and receive briefings at some point on the job. Briefings are an effective way to disseminate information that can make the firefighter's job safer and easier. When giving a briefing, it is important to keep the following questions in mind and remain perceptive to how the audience is receiving the information:

- Did they ask questions? Talk about what it is like giving a briefing. Do you get empty stares? What feedback are you looking for to ensure they understand you?
- Did they take notes? What kind of information would you like to see people write down?
- Did they repeat information back? What other ways can you identify that your briefing is registering?
- Did you give all the necessary information? How will you ensure that you covered everything necessary?
  - Task
  - Location
  - Communications
  - Hazards
  - Who, when, etc.
- It is also important for the firefighter who is receiving instructions to be mindful of the following during the briefing:
  - Did you really listen? What do you do to make yourself pay attention to everything being said?
  - Did you understand the assignment, location, and the nature and location of hazards? Do you expect to figure it out for yourself when you get out there or do you step forward and ask questions?
- To reduce the risks, take the time and get it right!
- You must know the location of the assignment and:
  - What is to be done.
  - Who you are to report to and how often to report.
  - When you are expected to complete the assignment.
  - Hazards.
  - Communication plan frequencies.
  - Weather and fire behavior.
  - Status of adjoining forces.

☒ **Today's discussion is from the Weather / Fire Behavior Category.**

Six Minutes Home Page

INITIATE ALL ACTIONS BASED ON CURRENT AND EXPECTED FIRE BEHAVIOR

☒ Can the resources you are replacing give you a thorough briefing? What information will you want to get from resources you are replacing?

☒ Can you observe the area or use scouts? What information are the scouts looking for?

☒ Have escape routes and safety zones been thoroughly scouted? List some ways your crew will scout out an area before you begin working

☒ Are escape routes and safety zones marked for night use? How do you adjust marking safety zones and escape routes for night use?

☒ Have potential dangers been located and can they be dealt with? List some dangerous fire behavior you may encounter and how you would deal with it.

☒ Do you have access to weather and fire behavior forecasts? What is your unit's procedure for obtaining forecasts?

☒ To reduce risk, initiate the following:

- Post lookouts.
- Check communications.
- Retreat if you have doubts about your escape routes or safety zones or it the situation becomes too complex. Discuss fires where you have adjusted your actions based on current and expected fire behavior.

References:

Incident Response Pocket Guide--PMS 461, NFES 1077, NWCG

Fireline Handbook--PMS410-1, NFES0065, NWCG

Standards for Fire and Aviation Operations, BLM, www.fire.blm.gov/Standards/redbook.htm

Appendix A

The 5-D System for Effective Waterbars

When locating and building waterbars, place them the right **distance** apart, at a **diagonal** to the fireline, so that they **divert,** then **discharge,** then **dissipate** the energy of the flowing water. Be sure to make them deep enough so they'll be durable, and that soil does **not block** the water bar outlet.

Recommended spacing for waterbars on firelines.

Fireline slope %		Maximum Distance Apart (feet)
4-6		250
7-9		150
10-14		125
15-20		60
21-40		30
41-60		15

Waterbars should be at least 2 pulaski widths wide and 12-24 inches high

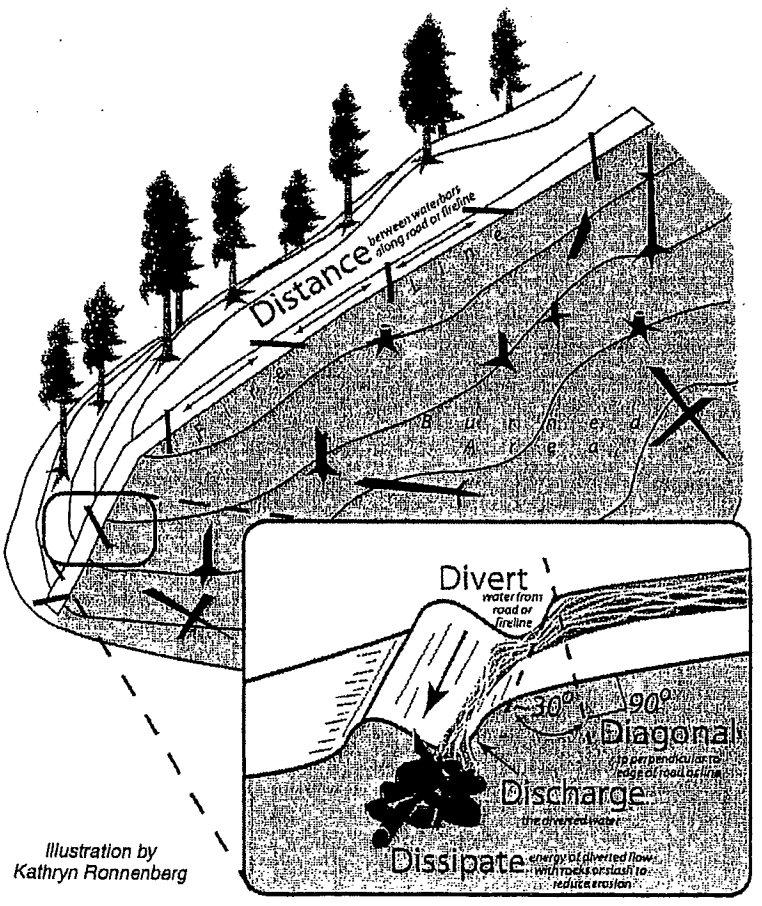


Illustration by Kathryn Ronnenberg