The South Canyon Fire
July 6, 1994

The South Canyon Fire
on Storm King Mountain
July 6, 1994
Glenwood Springs,
Colorado
Let’s Safely Do It Again!

The BLM and
USFS Victims

• West Flank Fireline
  Work Force
  † Kathi Beck, Prineville HS
  † Tami Bickett, Prineville HS,
    Squad Boss
  † Scott Blecha, Prineville HS
  † Levi Brinkley, Prineville HS
  † Doug Dunbar, Prineville HS

• Helitack
  † Terri Hagen, Prineville HS
  † Bonnie Holtby, Prineville HS
  † Rob Johnson, Prineville HS
  † Jon Kelso, Prineville HS,
    Squad Boss

• West Flank Fireline Work Force
  † Don Mackey, Missoula Jumpers, Jumper-In-Charge
  † Roger Roth, Redmond Jumpers
  † Jim Thrash, Redmond Jumpers
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Prineville IHC

General Location Map

Detailed Fire Area Map
The South Canyon Fire
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Storm King Mtn. Aerial Photo

Fuels

- Extremely dry & susceptible to rapid & explosive spread
- Potential present for extreme fire spread
- Two primary fuel models
  - Fuel Model 2: pinyon-juniper
    - Main carrier of fire was grass
  - Fuel Model 4: Gambel Oak

Gambel Oak

- Fuel Model 4
- 6’ to 12’ high
- Dense & continuous
- Little dead material
- Unknown age

- No previous recorded fires
- Unburned live fuel moisture 125%
- Underburned live fuel moisture 59%
- Reburn potential
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Weather

- Cold front with high winds (up to 45 MPH) passed over fire, July 6 afternoon
- Several Red Flag Warnings issued before South Canyon Fire started
- Period of drought; 58% of normal precipitation
- Detailed fire weather & behavior info not transmitted to FF's

The Colorado River Wind Chute

Wind Diagram

- Wind was strongly felt on the Main Ridge
- Little wind was felt on lower West Fireline
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Topography
- Steep topography, 50% to 100% slopes
- Affected fire behavior
- West Flank last pitch was 50 to 55 degrees
- Elev @ H-1 7,000'
- Elev @ H-2 6,700'
- Elev @ I-70, 5,600'

Topographic Map of Locations

Fire Spread Map
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Fire Behavior on July 2 & 3

- July 2:
  - Lightning ignited the fire on afternoon of July 2
  - South end of Main Ridge (Her’s Gate Ridge)
- July 3:
  - First report, July 3, 1100 hrs, Garfield Co Sheriff to Grand Junction BLM
  - BLM Grand Junction dispatch requested 8 jumpers, air tanker & lead plane
  - BLM Engine 611 arrived, did size-up (saw two trees burning) & assessed low potential. BLM District FMO agreed. Aircraft diverted
  - Red Flag (lightning-high winds), 40 new fires, high to extreme fire danger
  - Continued as backing fire in surface litter of leaves, twigs and grasses
  - Low intensity downslope spread with occasional short duration upslope runs and torching in Gambel Oak
  - FMO requested more firefighting resources & requested divert of others

Fire Behavior on July 4

- 1200 hrs: 3 acres
- Red Flag Warning issued & still many fires
- Higher priority given
- 1400 hrs: concerned resident
- 1830 hrs: BLM engine & FS FF’s decide to attack

Fire Behavior on July 5

- 0800 hrs: 29 acres
- BLM crew of 7 FF’s walked to fire from East Drainage. Cut Helispot 1 (H-1) & began fireline down to West Drainage
- Spread downslope through day with intermittent flare-ups & upslope runs
  - IC ordered another eng, copter & 20-person crew (8 jumpers substituted for crew)
  - Air drop near H-1, IC & pilot agreed more drops ineffective
  - Another air drop near I-7
  - 1730 hrs: IC & crew walked down
  - 1745 hrs: 8 jumpers parachute to fire. IC tells them to work H-1 down to drainage. Jumper-in-Charge advises IC fire crossed fireline & requested 2 Type 1 crews
  - Many unburned islands
  - End of day: 50 acres
  - Fire active burning approx. 77 additional acres during night
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Fire Behavior & Activity on July 6, 0000 to 1520 hrs.

- 0030 hrs: Jumpers abandon line east side of fire
- 0430 hrs: 11 BLM FFs walk to fire & clear H-2
- 0530 hrs: Jumper-in-Charge orders copter
- 0600 hrs: 127 acres
- 0730 hrs: NWS fire weather forecast predicts Red Flag Warning for high winds
- Still downslope burning with isolated torching & heating during mid day
- 0845 hrs: IC & JIC discuss plan-Improve Ridge Fireline & start West Fireline
- 0900 hrs: IC & some jumpers hear NOAA wind radio broadcast
- 1030 hrs: 8 more jumpers drop to fire
- 1200 hrs: 10 FFs from Prineville HS crew arrives at H-2 & most start down West Fireline
- 1300 hrs: Flame-up on West Flank
- 1400 hrs: Erratic winds & gusty winds
- 1500 hrs: 10 more Prineville HS FFs arrive & widen Main Ridge fireline
- 1510 hrs: Hot spot near Double Dears
- 1520 hrs: dry cold front; winds 30-45 mph in bottom West Drainage

Fire on July 6 at 1300 Hrs.

- 1300 hrs: Flam-up on West Flank
- 1400 hrs: Erratic winds & gusty winds
- 1530 hrs: Flare-up near Double Dears
- 1545 hrs: Flare-up near Double Dears
- 1553 hrs: Winds approx. 45 mph on Main Ridge
- 1554 hrs: Fire spots across Main Ridge
- 1555 hrs: Several upslope, crown runs near Double Dears, SW side
- 1602 hrs: Fire running upcanyon near the Bowl
- 1606 hrs: Spot seen on west side of West Drainage
- 1605 hrs: More spot fires across Main Ridge
- 1609 hrs: Fire running rapidly upslope near Double Dears toward Main Ridge
- 1611 hrs: IC advises Grand Junction dispatch that fire running & needed AT's
- 1615 hrs: Fire crosses Main Ridge
- 2100 hrs (approx): Fire reached 2,115 acres

Fire Behavior & Activity on July 6, 1520 to 2100 hrs.

- 1520 hrs: dry cold front; winds 30-45 mph in bottom West Drainage
- 1520 hrs: Erratic winds on West Fireline
- 1525 hrs: Flame-up near Double Dears
- 1533 hrs: Winds approx. 45 mph on Main Ridge
- 1544 hrs: Fire spots across Main Ridge
- 1555 hrs: Several upslope, crown runs near Double Dears, SW side
- 1602 hrs: Smoke coming from bottom of West Drainage, near Double Dears; Fire across drainage
- 1603 hrs: Fire running upcanyon near the Bowl
- 1606 hrs: Spot seen on west side of West Drainage
- 1605 hrs: More spot fires across Main Ridge
- 1609 hrs: Fire running rapidly upslope near Double Dears toward Main Ridge
- 1611 hrs: IC advises Grand Junction dispatch that fire running & needed AT’s
- 1615 hrs: Fire crosses Main Ridge
- 2100 hrs (approx): Fire reached 2,115 acres
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The Blowup at 1555 Hrs.

The Blowup at 1602 Hrs.

Bottom of West Drainage, 1999
The South Canyon Fire
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The Blowup at 1610 Hrs.
- Walked 1108' for about 5 mins.
- Ran 317' with tools

Times of Fire Spread & Positions

General Work Areas
- Main Ridge (Hell’s Gate Ridge)
- Lunch Spot Ridge
- West Flank Fireline
- Helispot 2 & ICP
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The Main Ridge Workforce

- Prineville Hotshots
  - Bill Baker
  - Kip Gray
  - Tony Johnson
  - Brian Lee
  - Louie Navarro
  - Tom Rambo
  - Alex Robertson
  - Bryan Schloz (Foreman)
  - Tom Shepard (Superintendent)
  - Mike Simmons
  - Kim Valentine

- BLM/USFS
  - Todd Abbott
  - Butch Blanco (IC)
  - Jim Byers
  - Eric Christianson
  - Mike Hayes
  - Loren Paulson
  - Brian Rush
  - Michelle Ryerson
  - Neal Shrunk

Main Ridge Looking South from H-2

Main Ridge at 1600 hrs.
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The West Fireline Workforce

- **Prineville Hotshots**
  - Kathi Beck, Prineville HS
  - Tami Bickett, Prineville HS, Squad Boss
  - Scott Biecho, Prineville HS
  - Levi Brinkley, Prineville HS
  - Doug Dunbar, Prineville HS
  - Teri Hagen, Prineville HS
  - Bonne Halby, Prineville HS
  - Rob Johnson, Prineville HS
  - Jon Kelso, Prineville HS, Squad Boss

- **BLM**
  - Derek Binney
  - Brad Haugh

- **USFS**
  - Sonny Archuleta
  - Sarah Doehring
  - Kevin Erickson
  - Eric Hipke
  - Don Mackey, JIC
  - Roger Roth
  - Jim Thrash

View of West Flank from the West

West Fireline at 1605 Hrs.
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West Fireline at 1605 hrs.

Photo Point, 1999

West Fireline Escape Route
The South Canyon Fire
July 6, 1994

West Flank Fireline, 1999

West Fireline, Draw, 1999

Base of West Fireline, 1999
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Don Mackey
Fatality Site, 1999

Jim Thrash (top),
Terri Hagen, Kathi Beck (left),
Doug Dunbar & Roger Roth (center)
Fatality Sites, 1999

Last Pitch, West Fireline, 1999
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West Fireline Fatality
Locations

- Location 1
  - Scott Blecha
- Location 2
  - James Thrash/deployed
  - Kathi Beck
  - Terri Hagen
  - Doug Durber
  - Roger Root/deployed
- Location 3
  - Tami Bickett
  - Levi Brinkley
  - Jon Kelso
  - Rob Johnson
  - Don Mackey
  - Bonnie Holby

The Lunch Spot Ridge Workforce

- USFS
  - Michael Cooper
  - Mike Feliciano
  - Dale Longanecker
  - Tony Petrilli
  - Quentin Rivarde
  - Eric Shelton
  - Sonny Solo
  - Bill Thomas
  - Keith Woods

Lunch Spot Ridge, 1999
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The Double Draws & Fire Crowning

The Helispot 2 Workforce

Helitack Fatality Site
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Helitack Fatality Spot, 1999

Escape Route, 1999

East Drainage Escape Route
- FF’s began leaving Main Ridge at about 1605 hrs
- Last FF out about 1730 hrs.
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The Blowup at 1630 hrs.

Jumpers Watching & Waiting at Canyon Creek Staging

Escaped Firefighters at Canyon Creek Estates
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West Flank Fireline & Access Trail, 1999

Two Rivers Park Memorial Site, Glenwood Springs, Colorado (Colorado & Roaring Fork Rivers confluence)

Memorial Park, 1999
The South Canyon Fire  
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Investigation Report Findings

Three Factors that Changed Fire Behavior

- Steep, complex topography
- Strong, turbulent & variable winds
- Involvement of live fuels

Predicted Fire Behavior

- July 6 fire behavior could have been predicted on basis of fuels, weather & topography
- Fire behavior info not requested nor provided
- Critical info not available for developing strategy & tactics
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Fire Support Structure

- Above normal fire activity overtaxed relatively small local firefighting organization
- Local dispatch did not provide clear understanding of what resources would be provided
- Unclear priority setting between local dispatch center & local firefighting organization resulted in confusion about priorities, operating procedures & resource availability
- Lack of management oversight, technical guidance & direction to local firefighters

Strategy & Tactics

- Escape routes & safety zones were inadequate for burning conditions
- Most of West Flank effort was hazardous
- Most of Downhill Fireline Construction Guidelines were not followed
- Did not compensate for changes in observed or potential extreme fire behavior
- There was a question of whom was the incident commander
- There was no organizational division of labor, i.e. divisions, etc.

Safety Briefing & Major Concerns

- With fire’s potential, escape route along West Flank was too long & steep
- 8 of 10 of Standard Firefighting Orders were compromised
- 12 of 18 Watch Out Situations were compromised
- Downhill Firefighting Guidelines were compromised
- Prineville HS were not briefed on local conditions, fuels or fire weather forecasts
- Air support was inadequate
- Any suppression was delayed until Day #2 with major suppression only started late on Day #4
- IC & Jumper-In-Charge never had chance to communicate prior to morning of July 6
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**Equipment**

- Two FF’s never had fire shelters
- Don’t take fusees or packs into shelters
- Wind and fire intensity & spread prevented effective fire shelter deployment
- Carrying tools & packs slowed fire escape efforts

**Storm King Mountain 2000**

*Let’s Safely Do It Again!*

**Size-Up Components**

- Get the FACTS
- Generate the PROBABILITIES
- Inventory the RESOURCES
- Make a DECISION (Strategy = IAP = Objectives = “What”)
- Implement the PLAN OF OPERATIONS (Tactics = “How”)
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Developing Facts & Probabilities
- Map fire & locate fire in relation to hazards & risks
- Determine advantage control points/locations
- Evaluate probabilities in relation to risk to FF's, civilians, property & the environment
- Evaluate current & expected resource availability
- Evaluate direct vs. indirect attack

Safety Considerations
- Determine LOOKOUT LOCATIONS
- Establish COMMUNICATIONS
- Determine & establish ESCAPE ROUTES
- Determine and establish SAFETY ZONES
- Know and keep FF accountability information

Develop Strategy-Occurrence Objectives
- DIRECT:
- INITIAL ACTION ESCAPE:
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*Develop & Implement Tactics*

- Use integrated ground & air attack
- Hit hard with air attack (air tankers & copters) before committing ground FF's to Main Ridge
- Watch tactics driven by transportation needs

*Overall Major Considerations*

- Always consider risk vs. gain
- Think risk management
- Supervisors redeem role as supervisor
- Be aware of group think mentality

*Day #3, July 4, 1200 hrs, 3 ac.*
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Third Day, July 4, 1200 hrs, 3 ac.
• Direct attack
• Air resources: one air tac, one to two AT’s, one copter w/ bucket & crew
• Ground resources: IC, one 20 person fire crew
• Contained: 7/4, 2200 hrs
• Controlled: 7/6, 1900 hrs.

Day #3, July 4, 2200 hrs, 11 ac.

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The South Canyon Fire
July 6, 1994

Third Day, July 4, 2200 hrs, 11 ac.

- Must aggressively attack on July 5
- Direct attack
- Air resources: One air tac, two air tankers, one copter w/ crew & bucket
- Ground resources: IC, Two 20 person crews
- Contain: July 5, 1800 hrs.
- Control: July 7, 1900 hrs.

Day #4, July 5th
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Day #4, July 5, 0800 hrs, 29 Ac.

Fourth Day, July 5, 0800 hrs, 29 Ac.

Fourth Day, July 5, 0800 hrs, 29 ac.

- Red Flag/winds coming Jul 6
- Must aggressively attack Jul 5
- Direct attack
- Air resources: one air tac, one lead plane, 3 to 5 air tankers, two copters w/ buckets & crews
- Ground resources: IC, two Div Sup’s, 2 to 4 fire crews
To Jim Roth and Storm King Fire Shelter Technologies:

Thank you very much. Firefighters will be much better off due to your work to improve fire shelters!