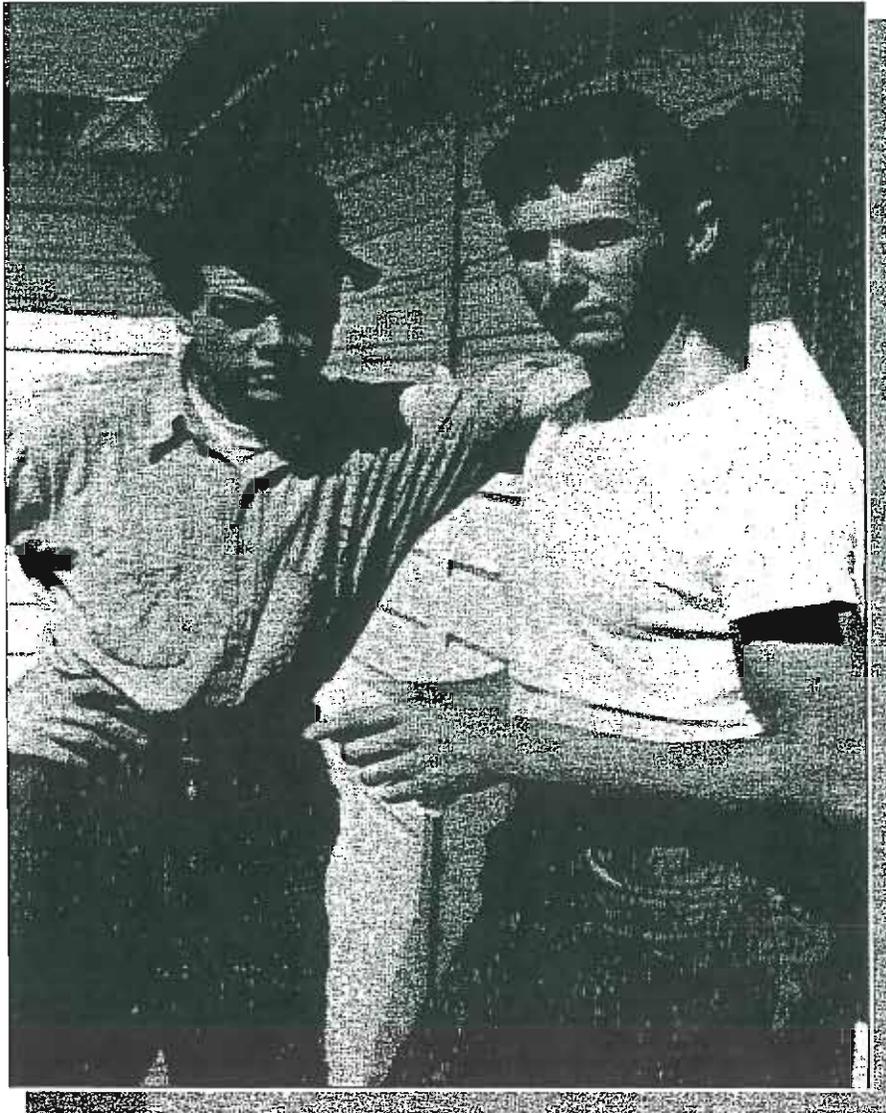


THE NORTHERN ROCKIES

PRESENTS

RE-VISITING MANN GULCH



STAFF RIDE |
READ AHEAD MATERIAL

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WILDLAND FIRE STAFF RIDES

I. BACKGROUND: WHY CONDUCT A STAFF RIDE?

A staff ride is a planned learning event that has been used effectively by various branches of the U.S. military since the early 1900's. The common purpose shared by staff rides is to further the development of leaders. Military staff rides typically discuss leadership, decision making, tactics and strategy. Staff rides on wildland fires discuss the same issues in a different context. The systematic study of wildland fire sites can help wildland firefighters and managers see how leaders' decisions and followers' behaviors influence tactical outcomes on fires, how terrain and weather influence both fire and human behavior on fires, and how technology, tactics and organization interact in a wildland fire setting at any complexity level. When these personal observations are combined with curiosity and diligence, the groundwork is laid for a lifetime of learning that produces leaders who are mentally prepared for wildland firefighting.

II. DEFINITION: WHAT IS A STAFF RIDE?

A staff ride consists of systematic preliminary study of a selected fire or other emergency operation, an extensive visit to the actual site(s) associated with the fire, and an opportunity to integrate the lessons derived from the study and visit. It envisions maximum student involvement before arrival at the site to guarantee **thoughtful analysis and discussion**. A staff ride thus links a historical event, systematic preliminary study, and actual terrain to produce fire analysis in three dimensions. It consists of three distinct phases:

1. Preliminary study
2. Field study
3. Integration.

Staff rides should not be confused with simple visits to fire sites or with other hypothetical or virtual exercises. In the military, when terrain and hypothetical scenarios (but not histories) are used as teaching vehicles, it is called a "Tactical Exercise Without Troops." Further, a visit to the site of a battle – or fire – involving little or no preliminary systematic study on the part of the student is a "historical tour," not a staff ride. Historical tours can stimulate thought and discussion, but are limited by the lack of student preparation and involvement.

There is a caution here for firefighters and managers attempting to conduct wildland fire staff rides. Many wildland fires are not well documented, especially the "success stories." Typically the wildland fires with the most documentation (i.e., the most material available for the Preliminary Study Phase of a staff ride) are our failures or tragedy fires. In the world of wildland fire, there usually has to be a death, fire shelter deployment or huge loss of property, with an ensuing investigation and media interest, in order for much written material to exist for study. Because of this lack of written pre-study materials, wildland firefighters will be tempted to shortcut the preliminary study phase of staff rides. If this is

done, the event will not be a staff ride, will not obtain the results a good staff ride can obtain, and should not be called a staff ride.

III. PURPOSES AND OBJECTIVES: WHAT CAN A WILDLAND FIRE STAFF RIDE ACCOMPLISH?

The staff ride is a unique technique for conveying the lessons of the past to present day leaders. While the sole purpose of a staff ride is to further the professional development of leaders, it may be designed to achieve one or many objectives. Depending on the fire selected, the staff ride can illuminate any principle or lesson at any chosen level. Because its mixture of classroom and field study facilitates student involvement, it ensures that any educational benefits are more likely to be retained by participants.

The goals of staff rides have varied from the specific testing of operational concepts to the general enhancement of professional and analytical skills. All staff rides, however, have one idea in common: to place students on an actual piece of terrain, confront them with an operational situation, and stimulate them to reach conclusions or derive lessons from the experience.

The professional development of wildland fire leaders can be accomplished in many ways through the use of the staff ride. Topics ranging from small unit tactics to fire behavior to principles of communication can be addressed through staff rides. Because staff rides involve a high level of personal commitment and involvement for all participants, the learning that occurs on staff rides can be deeper and more meaningful for adult learners than classroom lectures. Specific objectives for a wildland fire staff ride might be:

- To expose fire personnel to the dynamics of wildland fire, especially those factors which interact to produce accidents and disasters.
- To provide case studies in the application of fire management principles associated with logistical support, planning and operations.
- To provide case studies in the human factors of wildland fire, including leadership, cohesion, and communications at any level desired.
- To review high risk, low frequency situations and actions.
- To study/review key decision gates leading to fire management actions.
- To show the effects of weather, slope, topography and fuels upon fire management actions and their implementation.

- To encourage potential fire managers and leaders to study their profession through the use of fire history.
- To kindle or reinforce an interest in the heritage of the wildland fire agencies.

A well-planned and executed staff ride can accomplish a number of the above objectives at the same time. If you are the person in charge of organizing and conducting a staff ride, you will need to decide upon specific objectives for your staff ride and make them known to all participants well in advance of the event. Aside from the wildland fire-related objectives of a staff ride, if you are the leader of a staff ride you should have some objectives of your own. First, you need to stimulate active discussions among participants. The development of group awareness and knowledge cannot occur without discussion. Your role will be that of facilitator: getting the discussion going, keeping it on track, asking provocative questions and opening up new subjects for consideration when appropriate. You'll need to make sure that all of the participants on a staff ride are involved in the discussions, not just a few extroverts.

Excerpted from the *Wildland Fire Staff Ride Guide* obtainable at:
<http://www.fireleadership.gov/toolbox/toolbox.html>

LEVEL 1 MATERIAL – REQUIRED READING

Managing the Unexpected, from Weick and Sutcliffe's web site – University of Michigan Business School

Thoughts on Stories and Storytelling

Helena National Forest Mann Gulch Synopsis and Map

History of the Mann Gulch Fire, excerpt from the Report on the Board of Review, September 29, 1949

Young Men and Fire, Norman Maclean, Chapters 3 – 5

Managing the Unexpected

Business Organizations Must Learn to Operate "Mindfully" to Ensure High Performance

By Karl E. Weick and Kathleen M. Sutcliffe



Company managers often complain that "fighting fires all day" prevents them from concentrating on "more important matters," such as writing strategy or planning for the future. Yet, "fighting fires" is probably one of the best investments an organization can make in its own performance. What these managers fail to realize is that ignoring day-to-day issues and/or failing to deal effectively with unexpected events can lead to bigger, more serious problems that eventually erupt into a costly, full-blown crisis.

Today's headlines are full of news about companies that have announced sudden earnings shortfalls, layoffs, product failures and management irregularities. Witness the case of Enron, which skidded from its topdog status as the nation's number-one energy trader to the point of bankruptcy within the span of a few months. A host of other companies in industries ranging from automotive manufacturing, advertising and pharmaceuticals to toys, telecommunications and technology also have hit the business equivalent of a partially submerged iceberg, causing them to sink faster than the Titanic.

Is this fallout an inevitable consequence of an age of complexity and a highly volatile business climate? Not necessarily. There are ways companies can avoid being derailed by unpleasant surprises and keep their operations on track.

Research reveals that certain organizations have been highly successful in honing their abilities to act reliably and handle adversity. These are called high-reliability organizations (HROs). They include aircraft carriers, nuclear power plants and firefighting crews, which consistently deliver high performance in unpredictable situations where the potential for error and disaster is overwhelming. Although ordinary companies do not face do-or-die circumstances of the same magnitude, they can learn a great deal from HROs about managing their operations effectively under trying conditions so crises can be avoided.

To head off the disruptive escalation from issue to problem to crisis, business organizations must monitor their moment-to-moment activities continually, anticipate problems in advance and respond promptly to adverse events in a flexible rather than rigid way. When things do go wrong, companies must identify and empower those with the expertise to contain or minimize the situation, and then rely upon organizational resilience to bounce back quickly after a misstep. By operating "mindfully" and making critical adjustments in a timely manner, business organizations are better able to manage the unexpected in a challenging, highly competitive environment.

One common pitfall is rushing to make a decision before a situation is fully understood. Some business organizations are so preoccupied with decision-making they fail to pay close attention to earlier events leading up to that point. To make matters worse, they plunge into action on the basis of their first impressions and then fail to revise their assumptions and expectations as new information comes to light. These companies continue to seek evidence that supports, rather than refutes, their actions because they only want confirmation of their responses.

As a result, weak cues signaling pending disaster are ignored or discounted.

Planning further complicates matters. Mapping out a preconceived way to react to would-be problems actually discourages business organizations from viewing each occurrence as a unique event requiring an equally unique management response. Instead, the blinders come on and the brains turn off, as companies try to make the solution fit the problem rather than vice versa.

In reality, business organizations are better served by focusing on earlier, less obvious events where something out of the ordinary occurs or there is a near miss. Often these small details contain huge amounts of important information and may be indicators that everything is not going quite right in the company. By taking the time to understand a complex situation thoroughly-or "sense-making"-before jumping to a decision, managers can take steps to deal properly with an unforeseen event on an issue level, rather than a problem or crisis level. HROs constantly engage in this "struggle for alertness" and continually revise and update their information as events unfold; they often are suspicious of first impressions, which may be misleading or inconclusive.

Five key practices can help business organizations develop a state of "mindfulness." These practices must be implemented at all levels to develop a collective state of awareness of important details in companies. This can enhance their ability to be more reliable in managing the unexpected, and bolster their effectiveness in meeting customers' expectations and retaining management talent.

Five Practices for Developing "Mindfulness"

1. **Preoccupation with failure.** Encourage the reporting of errors and pay attention to any failures. These lapses may signal possible weakness in other parts of the organization. Too often, success narrows perceptions, breeds overconfidence in current practices and squelches opposing viewpoints. This leads to complacency that in turn increases the likelihood unexpected events will go undetected and snowball into bigger problems.
2. **Reluctance to simplify interpretations.** Analyze each occurrence through fresh eyes and take nothing for granted. Take a more complex view of matters and look for disconfirming evidence that foreshadows unexpected problems. Seek input from diverse sources, study minute details, discuss confusing events and listen intently. Avoid lumping details together or attempting to normalize an unexpected event in order to preserve a preconceived expectation.
3. **Sensitivity to operations.** Pay serious attention to minute-to-minute operations and be aware of imperfections in these activities. Strive to make ongoing assessments and continual updates. Enlist everyone's help in fine-tuning the workings of the organization.
4. **Commitment to resilience.** Cultivate the processes of resilience, intelligent reaction and improvisation. Build excess capability by rotating positions, creating additional sources of knowledge and adding new skills. Be mindful of errors that have occurred and take steps to correct them before they worsen. Once the fix is made, make every effort to return to a state of preparedness as quickly as possible. Be ready to handle the next unforeseen event.
5. **Deference to expertise.** During troubled times, shift the leadership role to the person or team possessing the greatest expertise and experience to deal with the problem at hand. Provide them with the empowerment they need to take timely, effective action. Avoid using rank and status as the sole basis for determining who makes decisions when unexpected events occur.

Thoughts on Stories and Storytelling

Storytelling and the Art of Teaching

Storytelling is the original form of teaching. There are still societies in which it is the only form of teaching. Though attempts have been made to imitate or update it, like the electronic storytelling of television, live oral storytelling will never go out of fashion. A simple narrative will always be the cornerstone of the art of teaching.

In dealing with stories, learners have an experience with the powerful real language of personal communication, not the usual "teacher-ese" of the foreign-language classroom. Colloquial or literary, unaffected or flowery—the full range of language is present in stories. Oral stories develop listening skills in a unique way. The listeners benefit from observing non-polished speech created on-the-spot.

While listening to stories, children develop a sense of structure that will later help them to understand the more complex stories of literature. In fact, stories are the oldest form of literature.

Through traditional tales, people express their values, fears, hopes, and dreams. Oral stories are a direct expression of a literary and cultural heritage; and through them that heritage is appreciated, understood, and kept alive.

E. Martin Pedersen

Storytelling as Brain-based Learning

Today, teachers can employ this age-old educational tool with the assurance that it still works. In fact, recent brain-based research supports intuitive belief in storytelling with empirical evidence. In *Making Connections: Teaching and the Human Brain* (Addison-Wesley, 1994), Renate and Geoffery Caine state, "There is strong reason to believe that organization of information in story form is a natural brain process... We suggest that the brain research confirms that evidence and begins to explain why stories are important."

In a nutshell, neuroscience is discovering that the brain is wired to organize, retain and access information *through story*. If that is true, then teaching through story means that students will be able to remember what is taught, access that information, and apply it more readily.

Learning Through Storytelling

<http://www.turnerlearning.com/turnersouth/storytelling/brain.html>

Launching & nurturing communities through storytelling

Communities of practice have turned out to be the key organizational arrangement for organizing knowledge sharing in large organizations. The phenomenon of communities of practice is known under different names. In the World Bank, they are called thematic groups; in Hewlett Packard they are "learning communities" or "learning networks"; in Chevron they are called "best practice teams", and in Xerox they are known as "family groups". Whatever the name, the formation of professional groupings where people come voluntarily together with others to share similar interests and learn from others' skills has become the common feature of knowledge organizations.

But how are communities launched and nurtured? How are they "integrated" to the company's strategy and its organizational structure?

Storytelling provides a natural tool, for a number of reasons:

- ***Storytelling builds trust:*** Vibrant communities operate in an environment of trust and mutual understanding which encourages learning and candid dialogue. They are safe places where people who do not know can learn from those who do know. The environment of trust and mutual understanding can be facilitated by structured storytelling by members to each other.
- ***Storytelling unlocks passion:*** Stories inherently generate feelings - interest, curiosity, fear, amusement, anger - and so the use of stories can be a channel to a key characteristic of communities. Thus contrary to the pattern of success in the industrial revolution and the modern enterprise in building wealth which has been built on a rational and mechanistic approach to problem solving, where clearly documented procedures and guidelines left little place, if any, to human emotions, the experience of knowledge management is that communities of practice only flourish when their members are passionately committed to a common purpose, whether it be the engineering design of water supply systems, the pursuit of better medical remedies, or more efficient economic techniques. This is a hard lesson for companies and executives who have spent their lives trying to keep emotion out of the workplace. Nevertheless the lesson repeatedly emerges from case studies and benchmarking of knowledge sharing programs. As a result - for reasons of sheer efficiency and effectiveness - the modern workplace is finding it necessary to provide time and space for both the head and the heart. Storytelling can be instrument handle and channel the unaccustomed emotion.
- ***Storytelling is non-hierarchical:*** Whereas abstract language tends to be inherently adversarial, with "you" being asked to accept "my" idea, storytelling is inherently collaborative, with the storyteller and listener collaborating to co-create the story. This is a key characteristic for building communities, since efforts at building communities in a hierarchical or top-down fashion are at best successful on a temporary basis. Soon they come unstuck as members refuse to contribute their time to activities which have no meaningful purpose for them. Storytelling can be an effective way to communicate in a non-hierarchical fashion.

**The Leader's Guide to Storytelling
by Steve Denning**

The Story in History

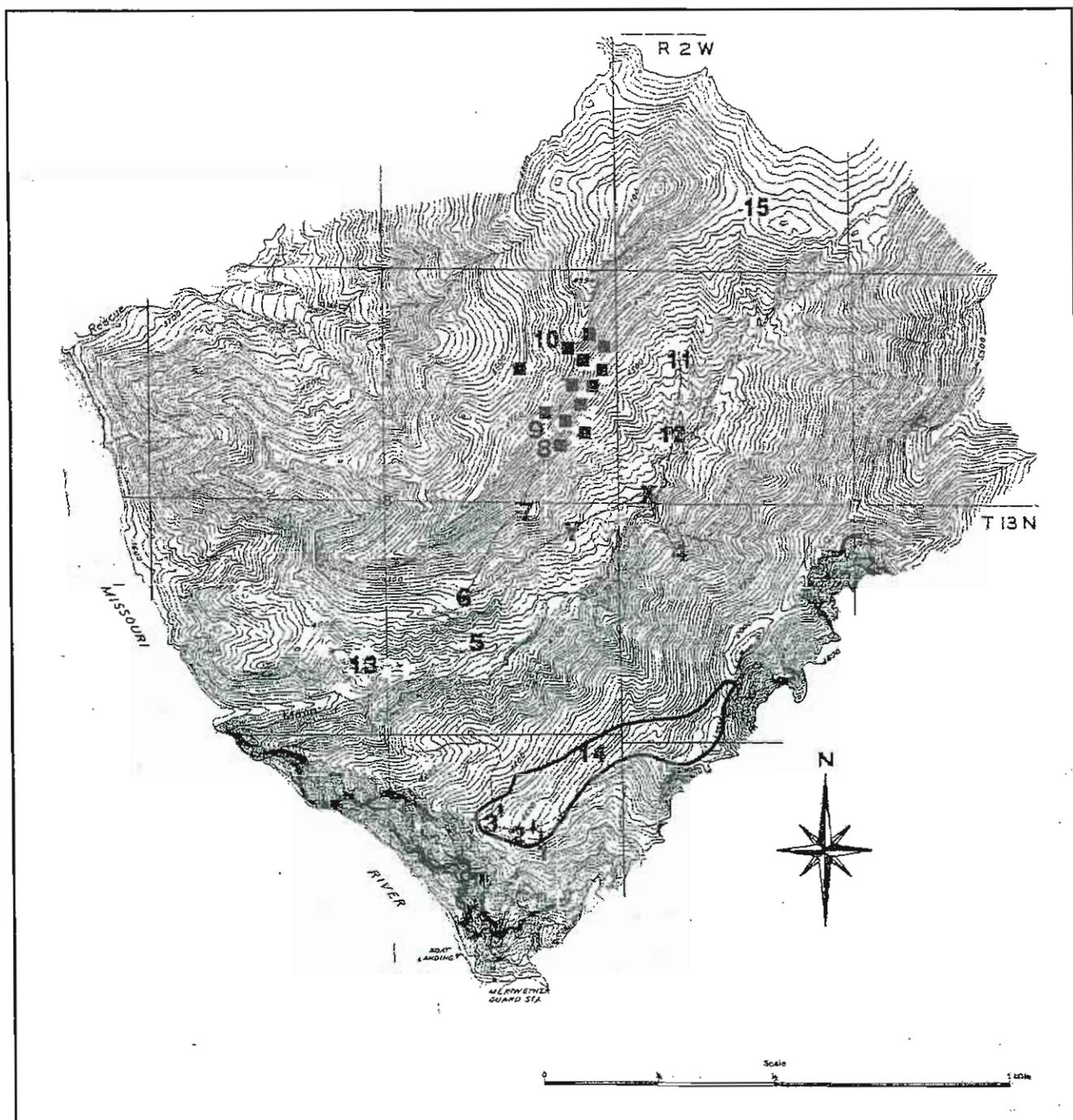
But that means admitting history told by people quite different from ourselves. Such histories can sound marvelous, unbelievable, and quite a lot like fiction. In these cases, the boundary between history and imaginative writing becomes blurred. That is partly why the use of imaginative writing in history is now so important: it helps us get inside the points of view of others, no matter how different they may be from us. In the shrinking world, such an ability may prove not only useful, but crucial.

The connections between telling history and telling a story can thus be used to enhance the writing of each. When interpreted with the techniques of creative writing, history takes on the vibrancy of lived experience. Students can imagine themselves into the past, wearing the clothing and assuming the destiny of heroes or common folk. Undistinguished players—children, servants, hobos, forgotten knitters and quilters—make a difference in the larger world when we see them not only as representatives of group experiences, but also as individuals.

A similar set of benefits enriches creative writing. As students enter their own pasts, they develop their powers of visualization. They learn to see themselves in their minds' eyes. Memory presents unexpected details—the claw-foot bathtub in grandfather's house, the smell of midnight-blue petunias by his front porch. This practice of using memory's strong imagery can also be helpful in writing about the more distant past or describing things and people in the present. Details that reach all the senses and capture the meaning and power of a place function equally well in writing about the past or the present. Writers can also begin to stretch beyond their narrow age range and explore what it feels like to be older or younger. When they do, the scope of human life opens more generously. Writers struggling to enter the experience of an historical people vastly different from themselves may appreciate how complex we all are, interacting with nature and technology, with beliefs and laws, differently gifted and full of surprises. As a result, not only will students write better fiction and poetry, they will be better students of the human condition and perhaps better citizens of our country and the world.

The Story in History
Margot Fortunato Galt

What Happened in Mann Gulch?



On August 5, 1949 about 6:00 PM, fifteen USDA Forest Service Smokejumpers and a Helena National Forest fire guard were entrapped by a wildfire in Mann Gulch that was caused by lightning struck trees **1**, **2**, and **3** (map). Ten jumpers and the forest guard perished that evening, two jumpers died later from burn injuries and three jumpers survived. The jumpers, dispatched from Missoula, MT, had parachuted into Mann Gulch to help fight a lightning caused fire burning on the ridge between Meriwether and Mann Gulch.

The jump plane arrived over the fire with the jumpers at 3:10 pm. **14.** Spotter Earl Cooley and Jumper Foreman Wag Dodge chose a jump site up canyon in Mann Gulch **11.** The fire size was estimated at 60 acres, but was still considered a routine fire. The air was quite turbulent requiring a higher than normal approach causing the jumpers and cargo to scatter widely. Also, the cargo chute for the radio failed to open, leaving the jumpers without outside communication.

By 5:00 pm, the men had gathered their gear and were eating before attacking the fire **12.** Foreman Dodge left squad leader Bill Hellman in charge and crossed to the south side of Mann Gulch to meet Meriwether Guard Harrison **4.** Dodge and Harrison returned to the bottom of Mann Gulch. There they met the crew **X.** Dodge told Hellman to take the crew toward the river on the north side of the canyon and said he and Harrison would tie in with them later after getting a quick bite to eat at the cargo spot.

Dodge and Harrison rejoined the crew around 5:40 PM **Y.** They had continued down Mann Gulch for about 5 minutes when Dodge noticed the fire had spotted to the north side of the gulch **13.** Realizing the danger, he told the men to head back up Mann Gulch **6.** The wind had increased and the fire was beginning to blow up, burning rapidly toward them in light grass and brush. At around the same time local Ranger Jansson, who had been walking up Mann Gulch from the bottom, turned around and retreated back to the river **5.**

The men had only traveled 300 yards when Dodge gave instructions to drop their gear **7.** Flames were estimated at 50'-feet high and were moving 50 yards every 10 seconds. The flame front was estimated to be several hundred feet in depth. The men quickly became exhausted due to the steep slopes, high temperature and smoke filled air.

The crew traversed another 200 yards when Foreman Dodge realized the fire was going to catch them. Dodge lit an escape fire hoping it would quickly burn out, allowing his men to get into the burned area and survive **8, 9.** For unknown reasons, the crew did not follow Dodge's instructions and continued toward the ridgetop.

Jumpers Rumsey and Sallee followed the north edge of the escape fire to the ridgetop where they escaped the flames **10.** After the blowup had subsided, they found Hellman, badly burned, but alive. Wag Dodge, who had survived inside the escape fire area, joined Rumsey and Sallee and reported he had found Jumper Sylvia alive, but badly burned. Dodge and Sallee proceeded down Rescue Gulch to the Missouri river to find help while Rumsey stayed with Hellman.

A rescue crew arrived on the scene at 12:30 AM on August 6th. At 1:30 AM, the rescue crew found Jumpers Sylvia and Hellman. The two injured men were evacuated at 5:00 AM, but both died in a Helena hospital later in the morning. Before the day was over, 11 bodies would be found. All had died within 300 yards of each other.

During the blow up stage, the Mann Gulch fire covered an estimated 3,000 acres in 10 minutes and eventually burned 5,000 acres.

The fatal smoke and flames that roared on that hot, August afternoon have long since cooled and vanished. However, the events of the Mann Gulch Fire will forever be etched in our hearts and continue to influence wildfire safety and suppression tactics. Today, firefighters nationwide analyze fire behavior from investigative conclusions and follow the Ten Standard Fire Orders that were influenced in part, by the events that occurred in Mann Gulch.

History of the Mann Gulch Fire

(This factual history is based upon a report prepared by the regional forester, supplemented and confirmed by a preliminary investigating committee headed by C. A. Gustafson, Chief, Division of Fire Control, from the Washington Office, and by testimony before the Board of Review.)

1. Name of fire: Mann Gulch Fire, Helena National Forest, Montana. August 5 to August 10, 1949

2. Location: The fire was located in the "Gates of the Mountains" wild area (roadless area) just east of the Missouri River, some 20 miles north of Helena, Montana. The fire started in the ME1/4NE1/4 Sec. 19, T. 13 N., R. 2 W, Montana Principal Meridian, at a point near the top of the ridge between Mann and Meriwether Gulches. The general area is steep and jagged on the Meriwether side and is said to be one of the roughest areas east of the Continental Divide. The exposure is generally northwest. The point of origin of the fire was accessible from the road end at Hilger Landing, just off U. S. Highway 91, thence by a 6-mile motorboat trip to Meriwether campground at the mouth of Meriwether Gulch, thence about a 1-hour hike on a trail over rough terrain.

3. Fuel type: At the point of origin the fuel type consisted of a dense stand of 6- to 8-inch diameter Douglas fir and some ponderosa pine poles. In the pole stand were occasional large Douglas fir and ponderosa pine trees. This type merged into one consisting of larger timber, mainly Douglas fir with stringers of ponderosa pine on the lateral ridges. The ground cover in the openings and in the less dense timber was a mixture of grass and weeds of medium density.

At the point of disaster the tree cover consisted of stringers of scattered young ponderosa pine trees with occasional over-mature ponderosa pine trees. The ground cover or under-story which predominated was bunchgrass with some cheatgrass.

4. Weather: The day the fire started a temperature of 97 degrees was recorded at Helena. At the Canyon Ferry Ranger Station, 20 miles from the fire, the following was recorded at 5 p.m.: humidity 22 percent, wind 16 miles per hour, fuel moisture 5.9 percent. These factors indicated a burning index of 74, with 100 as the maximum which could be measured. Reports from other locations gave wind direction and intensity as variable, which also indicated bad burning conditions about the time of the blow up. Fire danger on August 4 was 16 which indicated a very low rate of spread potential the day the fire started.

5. Manning. The planned fire organization on the Helena National Forest, as indicated by the fire danger, was in place. In addition to the lookout detection system, the forest maintained a complementary air-detection patrol. Mann Gulch was observed from the air between 5 and 7 p.m. on August 4. No fire was discovered.

6. Discovery and reporting: The fire was first reported by Don Barker, lookout on Colorado Mountain, some 30 miles away.

He reported it to the fire dispatcher in Helena at 12:25 p.m., August 5. The fire was also observed by District Ranger J. Robert Jansson at the same time. He had just returned to Helena from an air-detection patrol flight and noticed the smoke from the airport. He flew over the fire at 12:55 p.m., with Ranger Hersey and a pilot. The fire was then estimated to be about ? acres in size and smoking strongly. Another smoke, later designated as the York fire, was discovered and scouted during this flight.

It was located about 9 miles south of the Mann Gulch fire.

7. Action: Upon returning to Helena at 1:30 p.m., Jansson discussed the fire situation with Supervisor Moir. They mutually agreed to order smokejumpers because of the difficulty of getting local ground forces to the fire rapidly. Jansson, as soon as he reached the airport, also requested that 50 local firefighters be sent to the fire. The original request to the fire desk in Missoula was for 25 smokejumpers. Due to the extremely rough topography of the general area and the seriousness of the fire weather, the best overhead available was selected for this mission. Because of the lack of adequate airplane transportation, only 16 men were sent. (Planes were servicing other fires in the region and were not immediately available. A Douglas C-47 plane can carry only 16 equipped jumpers.)

They left Missoula at 2:30 p.m. and reached the fire locality at 3:10 p.m. One man became ill enroute, so only 15 men jumped. Following routine procedure, before any jumper left the ship, the spotter and foreman carefully observed the fire. The unburned fuel, the geography and fire conditions while circling the fire. The wind at this time maintained itself steadily, blowing the fire towards the top of the ridge and nearly parallel with it. It apparently had maintained this course since the fire started, as indicated by the directional spread of the fire. This was parallel to Mann Gulch. The contemplated jump was considered to be of routine nature. It was not different from the normal day-by-day action of the smokejumper organization. The jump spot was agreed upon by Spotter Cooley and Foreman Dodge as suitable and safe. The fire was then about 50 to 60 acres in size.

The personnel jump and cargo dropping were completed by 4:08 p.m. The plane was unable to contact the Helena National Forest by radio, thus making it necessary for Spotter Cooley to report the execution of the jump by telephone to the Helena office at about 5:15 p.m., after returning to Missoula.

In the meantime, Jansson had left Helena for the fire at 2:20 p.m. with 10 men. He was followed by Ranger Alternate Hersey and 9 men. Due to water transportation difficulties, these men did not reach Meriwether campground, the nearest boat landing point to the fire, until about 4:30 p.m.



From Young Men and Fire
by Norman Maclean
printed by permission
of John Maclean

3

SINCE THEIR TOOLS HAD BETTER FIT our hands if we are going to a fire, we should try them on here and see how they would have been used if the fire had been reached while it was at its present size of about sixty acres. At that size it is doubtful that the crew would have tried to hit it on its nose—it is dangerous business to attack a good-sized fire straight on.

Instead, they would have started flanking it close to its front and tried to steer it into some open ground, some stretch of shale or light grass where the fire would burn itself out or burn so feebly that it would be safe to take on directly. It's a ground fire of this size that, as suggested earlier, is brought under control by digging a fire-line around it, a shallow trench two to three feet wide scraped deep enough to expose mineral soil. All dead leaves, needles, even roots are removed so that nothing can burn across it. If any dead trees lie across it, they also must be removed and likewise any standing trees with low branches that the fire might use to jump the line. To put a fire "under control" is to establish and then hold such a line around it, especially around the part of it that is most likely to advance. What follows is called "mopping up," working back from the fire-line into the interior of the fire, digging shallow graves and dropping still-burning trees into them, and of course burying everything on the ground that smokes.

The tools that perform these two operations are, with one exception, those that have done most of the hard work of the world—axes, saws, and shovels.

Sallee says he was single-tooled and was carrying a saw,

and Navon started with the other saw, which he soon traded off to Rumsey, who was carrying the heavy water can. Power saws, of course, were already invented, but those early ones were mechanical monsters; it took a whole crew just to crank one, so they were of no use to the Smokejumpers until well into the 1950s. The crew's two saws would have been two-man handsaws, and in making a fire-line would have been used to cut trees lying across the line or standing too close to it. In mopping up, they would have been used to drop the burning snags.

The not-always-clear references to tools by the two surviving crew members indicate that besides these two handsaws the crew had two or three shovels and eleven or twelve Pulaskis. Laird Robinson, who when I first met him was information officer at the Smokejumper base in Missoula, says that number sounds about right for a crew of sixteen at that time.

Even the numbers show that the Smokejumpers' tool of tools was the Pulaski. It was the forest firefighters' one invention, primitive but effective, invented strictly for firefighting. It was even named after the Forest Service's most famous firefighting ranger, Edward Pulaski, who in 1910, when many thought the world was ending in flames, put a gunnysack around his head and led forty-two half-paralyzed men through smoke to a deserted mining tunnel that he remembered. The cold air rushed out of the tunnel and was replaced by heat so intense it set fire to the mining timbers. Pulaski kept the fire in the tunnel under control by dipping water with his hat from a little stream that went by the mouth of the shaft, and he had enough control over his men to make them lie flat with their mouths on the ground. He was badly burned and finally passed out, and from time to time they all fell unconscious. But all recovered except five men and two horses.

The Pulaski is a kind of hybrid creation, half ax and half hoe. I remember the first one I ever used, an early, handmade one, nothing more than a double-bitted ax with one bit left on and a little hoe welded to where the other ax-bit had been. Even after all these years the Pulaski is still the tool for digging

fire-lines. A little hoe goes deep enough because its job is to scrape the stuff that would burn off the surface of the ground. So the hoe makes the line; the ax-bit chops little trees or shrubs along the line that might let the fire jump across, and it has other uses, such as chopping roots. When the foreman ends his first lesson to his trainees on how to use a Pulaski, he says, "For the next couple of hours, all I want to see are your asses and your elbows."

Behind the crew with the fast Pulaskis come a couple of men with shovels, who clean out and widen the fire-line, and, of course, in the mopping-up operations, shovels are all-important in making shallow graves and burying whatever is still smoking.

The crew strung out on the trail. Those with the unsheathed saws were behind because the long teeth and rakers of the saws make them hard to carry and dangerous to follow too closely; most of the double-tooled men were carrying Pulaskis and for the second tool either a shovel or a water canteen or a first-aid kit or a rattlesnake kit. The flank of the fire was in plain view only half a mile across the gulch. Although from the cargo area its most advanced front on top of the ridge was not visible, they had seen it from the sky and remembered that on top of the ridge it was burning slowly downhill into a saddle. They had no trouble guessing what they would be doing ten or fifteen minutes from now when they caught up to their foreman and the fire. He would line them out on both the Mann Gulch and Meriwether flanks to make fire-lines that would keep the fire from spreading farther down either canyon and so limit its advance to the top of the ridge where, forced into the saddle and light grass, it would be easy to handle. Dodge would space the men with Pulaskis about ten to fifteen feet apart, depending upon the ground cover, and they wouldn't raise their heads until they had caught up to the man in front of them. Then they would tap him on the leg with a Pulaski and say "Bump." If the two men right behind had also finished their stretch, they would

say "Bump Three." To a Smokejumper, "Bump" is a musical word if he is the one who sings it out.

When Smokejumpers work next to a regular crew of Forest Service firefighters, they take pleasure in leaving them bruised with "bumps."

As the crew started for the south side of the gulch, they had it figured out before they even had an order. They would work all night establishing a line around the fire. From then on, it would depend. The Smokejumpers couldn't be touched when it came to getting a line around a fire, but they usually didn't win medals in mopping it up. They were all in the business for money—the forestry school students, the fancy M.A., M.D., and Ph.D. students, and especially the jump-happy boys who hoped to make enough money in the summer to shack up all winter in Honolulu. So there was no use putting a little fire out of its misery too soon when you would be paid overtime.



THE CREW STARTED UP THE SIDE of the gulch toward the fire. It was about five o'clock. The next day a wristwatch of one of the boys was found near his body. Its hands were permanently melted at about four minutes to six. This must come close to marking the time when it was also over for most of the others. So there were about fifty-six minutes ahead of them, time to do only a little thinking, and undoubtedly only a little is all they did.

It is not hard to imagine what was in their heads. They knew they were the best and they were probably thinking at least indirectly about being the best, sizing up the fire ahead as a kind of pushover. They thought of what they were in as a game and they were the champs and the fire didn't look like much competition. They already had developed one of the best ways of facing danger in the woods, the habit of imagining you are being watched. You picture the mountainsides as

sides of an amphitheater crowded with admirers, among whom always is your father, who fought fires in his time, and your girl, but even more clearly you can see yourself as champion crawling through the ropes. You would give this small-time amateur fire the one-two, and go home and drink beer. It was more than one hundred degrees on that open hillside, and all of them were certainly thinking of beer. If anything troubled them, it was the thought of some guy they had tangled with in a Missoula bar who they were hoping would show up again tomorrow night. And each boy from a small town such as Darby, Montana, or Sandpoint, Idaho, was undoubtedly thinking of his small-town girl, who was just finishing high school a year behind him. She had big legs and rather small breasts that did not get in the way. She was strong like him, and a great walker like him, and she could pack forty pounds all day. He thought of her as walking with him now and shyly showing her love by offering to pack one of his double-rooms. He was thinking he was returning her love by shyly refusing to let her.

The answer, then, to what was in their heads when they started for the fire has to be "Not much."



LIKE THE FRONTIER CAVALRY, the Smokejumpers didn't kill themselves off at the start of a march. They loosened up for about a quarter of a mile down gulch and then began to climb toward the fire, but they hadn't climbed more than a hundred yards before they heard Dodge call to them from above to stay where they were. Shortly he showed up with Jim Harrison, the recreation and fire prevention guard stationed at the campground at the mouth of Meriwether Canyon. Harrison had spotted the fire late in the morning while on patrol duty, returned to Meriwether Station, and tried unsuccessfully to radio both Missoula and Canyon Ferry Ranger Station

outside Helena at 12:15, ten minutes before the fire was first officially reported by the lookout on Colorado Mountain, thirty miles away. After he had tacked a sign on the station door, "Gone to the fire. Jim," he again had climbed the fifteen-hundred-foot precipice between Meriwether Canyon and Mann Gulch, and had been on the front of the fire alone until Dodge found him around five o'clock. He had tried to do what he was supposed to do—stop the fire from burning down into scenic Meriwether Canyon. Meriwether Canyon is a chimney of fifteen-hundred-foot precipices and pinnacles. In minutes it could draw flames through the length of its funnel and be heat-cracked rocks forever after. It is one of America's tourist treasures, and Harrison had fought to save it. Later, two sections of fire-line that he had scraped with his Pulaski were found burned over at the top of the ridge between Meriwether and Mann. His tracks were there too, burned over.

Harrison was known to many of this crew because he had been a Smokejumper himself the summer before in Missoula, and ironically had switched to patrol duty and cleaning up picnic grounds to please his mother, who was afraid smoke-jumping was dangerous. Now here he was with Dodge and this crew of Smokejumpers on its mission of August 5, 1949, and he might as well have run into General Custer and the Seventh Cavalry on June 25, 1876, on their way to the Little Big Horn.

In addition, as recreation and patrol guard he could not have been in as good physical shape as the jumpers—the forest supervisor's description of his job makes clear that primarily he was a "recreation guard," keeping the public grounds and facilities at Meriwether Landing tidy for the tourists, and only upon special assignment was he to get into patrol and fire prevention work. As the supervisor told the Board of Review, Harrison had made only one patrol before August 5. Realizing he was in need of exercise, Harrison would hike up to his patrol point on his days off, but he couldn't have been in shape to keep up with the jumpers if the going got tough. And yet,

that day he had twice climbed the perpendicular trail to the top of the ridge between Meriwether and Mann and fought fire alone for four hours while the Smokejumpers had done nothing but jump and walk a quarter of a mile plus a hundred yards.

Both Sallee and Rumsey record briefly the crew's meeting with Dodge and Harrison after those two had left the front of the fire. Sallee reports Dodge as saying that all of them "had better get out of that thick reproduction" because "it was a death trap" and then instructing Hellman to return the crew to the north side of the gulch and head them down the canyon to the river. Rumsey and Sallee agree Dodge didn't look particularly worried: "Dodge has a characteristic in him," Rumsey told the Board. "It is hard to tell what he is thinking." And Dodge probably wasn't yet alarmed, since he told Hellman that, while the crew was proceeding toward the river, he and Harrison would return to the cargo area at the head of the gulch and, as the others had already done, eat something before starting on the trail.

Still, it is clear Dodge hadn't cared for what he saw when he took a look at the front of the fire. He said it was not possible to get closer to the flames than one hundred feet and the "thick reproduction" he was worried about was a thicket of second-growth Ponderosa pine and Douglas fir that had sprung up after an earlier fire and was tightly interlaced and highly explosive, especially with the wind blowing upgulch. Primarily, the retreat to the river was for the safety of the crew, but if the wind continued to blow upgulch, the crew could attack the lower end of the fire from its rear or flanks to keep it from spreading, especially into Meriwether Canyon, which, like a good chimney, drew a strong updraft. If worse came to worst and the wind changed and blew downgulch, the crew could always escape into the river.

Dodge gave Hellman still another order—not to take the crew down the bottom of the gulch but to "follow contour" on the other slope, by which he meant that the crew should stay on the sidehill and keep on an elevation from which they

could always see how the main fire on the opposite side was developing.

Hellman led the crew across the gulch and started angling for the river, and, sure enough, it happened as it nearly always does when the second-in-command takes charge. The crew got separated and confused—considering the short time Dodge was gone, highly confused and separated by quite a distance. Sallee says they ended up in two groups, five hundred feet apart, far enough apart that they couldn't see each other, and so confused that Sallee's group thought they were in the rear only to have to stop and wait for the rear group to catch up. Rumsey says that part of the time Navon, the former paratrooper from Bastogne, was in the lead. He was the one really professional jumper—and professional adventurer—among them and evidently was always something of his own boss and boss of the whole outfit if it looked to him as if it needed one.

This is all that happened in the twenty minutes Dodge was gone. But instead of being just a lunch break for the boss, it also was something of a prelude to the end. At least it can make us ask ahead of time what the structure of a small outfit should be when its business is to meet sudden danger and prevent disaster.

In the Smokejumpers the foreman is nearly always in the lead and the second-in-command is in the rear. On the march, the foreman sizes up the situation, makes the decision, yells back the orders, picks the trail, and sets the pace. The second-in-command repeats the orders, sees that they're understood, and sees that the crew is always acting as a crew, which means seeing that the crew is carrying out the boss's orders. When they hit a fire, the foreman again is out in front deciding where the fire-line should go and the second-in-command is again in the rear. He repeats the foreman's orders, he pats his men on the back or yells at them, and only if he can't himself get them to do what they should do he yells to the foreman, "They're making lousy line."

Although the foreman has little direct contact with his

men, even on a friendly basis, his first job is to see that his men are safe. He is always asking himself, Where is a good escape route?

It is easy to forget about the second-in-command, who has a real tough job. He is the one who has to get the yardage out of the men, so he has to know how to pat them or yell at them and when. He has to know his men and up to a point be one of them, but he has to know where that point is. Being second in command, he will have a hard time, especially when he first takes command. A little friendship goes a long way when it comes to command, and they say Hellman was a wonderful fellow, but that may be part of the reason why, when he first took command, the outfit became separated and confused.

It could also have been partly the crew's fault. Now that they weren't going to hit the fire head on, some of the excitement was gone. Fighting a fire from its rear is not unusual, but it doesn't show how much horsepower you have. The crew, though, was still happy. They were not in that high state of bliss they had been in when they expected to have the fire out by tomorrow morning and possibly be home that same night to observe tall dames top-heavy with beer topple off bar stools. On the other hand, attacking the fire from the rear would make the job last longer and mean more money, and, in a Smokejumper's descending states of happiness, after women comes overtime. Actually, the priority could be the other way around. To the crew the fire was nothing to worry about.

Dodge felt otherwise as he and Harrison sat eating at the cargo area near the head of the canyon, from where he could see almost to the river. He told the Board of Review, "The fire had started to boil up, and I figured it was necessary to rejoin my crew and try to get out of the canyon as soon as possible."

He picked up a can of Irish white potatoes and caught up to his crew roughly twenty minutes after he had left them. It was "about 5:40," according to his testimony. Dodge had Hellman collect the crew, then station himself at the end of the line to keep it together this time while he himself took the lead and

headed for the river. Things went fast from then on but never fast enough for the crew to catch up and keep ahead of disaster.

Rod Norum, who is one of the leading specialists on fire behavior in the Forest Service and still a fine athlete, as an experiment started out where Dodge rejoined his crew and, moving as fast as possible all the way, did not get to the grave markers as fast as the bodies did. Of course, there was nothing roaring behind him.



WHEN THE CREW CROSSED BACK from the south to the north side of Mann Gulch where they had landed, they crossed from one geography into another and from one fire hazard into one they had never dealt with before. Mann Gulch is a composition in miniature of the spectacular change in topography that is pressed together by the Gates of the Mountains. Suddenly the Great Plains disappear; suddenly the vast Rocky Mountains begin. Between them, there is only a gulch or two like Mann Gulch for a transition from one world to another. Before the fire the two sides of Mann Gulch almost evenly divided the two topographical and fuel worlds between them—a side of the gulch for each world. The south side, where the fire had started, was heavily timbered. In the formal description of the *Report of Board of Review*: "At the point of origin of the fire the fuel type consisted of a dense stand of six- to eight-inch-diameter Douglas fir and some ponderosa pine on the lateral ridges."

But it was a different type of fuel on the north side, where the crew was now on its way to the river. "At the point of disaster the tree cover consisted of stingers of scattered young ponderosa pine trees with occasional overmature ponderosa pine trees. The ground cover or understory which predominated was bunch grass with some cheat grass." Essentially the north

side of Mann Gulch was rocky and steep with a lot of grass and brush and only a scattering of trees. The south side was densely timbered.

The difference between the two sides of the gulch is after all these years still clearly visible. On the south side the charred trees stood until their roots rotted. Then winds blowing upgulch from the Missouri left them on the ground, unburied but paralleling each other, as if they belonged to some nature cult ultimately joined together by the belief that death lay in the same direction. At times they look as if they had been placed there—black-draped coffins from some vast battle awaiting burial in a national cemetery on a hillside near a great river, if not the Potomac then the Missouri.

On the north side, where the crew was angling toward the river, there are white crosses with bronze plates and a few black odds and ends. Not much else. The men died in dead grass on the north slope.

Several generalizations will help with what lies ahead if we remember that they are only generalizations. A fire in dense timber builds up terrific heat but not great speed. As Harry Gisborne has said, a big run for a crown fire is from half a mile to a mile an hour. A grass fire, by comparison, is usually a thin fire; it builds up no great wall of heat—it comes and is gone, sometimes so fast that the top of the grass is scarcely burned. Sometimes so fast it doesn't even stop to burn a homesteader's log cabin. It just burns over and around it, and doesn't take time to wait for the roof to catch on fire. Even so, since the great fire catastrophe of 1910, far more men had been killed by 1949 on fast, thin-fueled grass fires east of the Continental Divide in Montana than on the slow, powerful fires in the dense forests of western Montana.

Arthur D. Moir, Jr., supervisor of the Helena National Forest, generalizing in his 1949 testimony about the Mann Gulch fire, said fires east of the Continental Divide in Montana "are smaller, and because of less fuel, are more quickly controlled." But he went on to add that to his knowledge "only

two men have been burned in forest fires in Idaho and western Montana since 1910," whereas he counted thirty-five who had burned to death east of the Divide in fast grass.

The grass and brush of Mann Gulch could not be faster than it was now. The year before the fire, the Gates of the Mountains had been designated a wilderness area, so no live-stock grazed in Mann Gulch, with the result that the grass in places was waist high. Since it was early August with blistering heat, the worst of both fire-worlds could occur—if a fire started in the deep timber of the southern side, where most fires start, and then jumped to the explosive grass and shrubs of the northern side, as this one might, and did, it could burn with the speed of one of those catastrophic fires in the dry gulches of suburban Los Angeles but carry with it the heat of the 1910 timber fires of Montana and Idaho. It could run so fast you couldn't escape it and it could be so hot it could burn out your lungs before it caught you.

Things got faster and shorter. Dodge says they continued downgulch about five minutes, Sallee says between an eighth and a quarter of a mile, which is saying about the same thing. Dodge was worried—evidently no one else was. The fire was just across the gulch to be looked at, and that's evidently what they were doing. They were high enough up the slope now that they could almost peer into its insides. When the smoke would lift, they could see flames flapping fiercely back and forth, a damn bad sign but they found it interesting.

Navon was in his element as a freewheeler, alternating between being benevolent and being boss. He had lightened Rumsey's load by trading him his saw for Rumsey's heavier water can, so Rumsey especially was watching the scenery as it went by. He observed that the fire was burning "more fiercely" than before. "A very interesting spectacle," he told the Board of Review. "That was about all we thought about it."

Of the stations of the cross they were to pass, this was the aesthetic one. On forest fires there are moments almost solely for beauty. Such moments are of short duration.



THEN DODGE SAW IT. Rumsey and Sallee didn't, and probably none of the rest of the crew did either. Dodge was thirty-three and foreman and was supposed to see; he was in front where he could see. Besides, he hadn't liked what he had seen when he looked down the canyon after he and Harrison had returned to the landing area to get something to eat, so his seeing powers were doubly on the alert. Rumsey and Sallee were young and they were crew and were carrying tools and rubbernecking at the fire across the gulch. Dodge takes only a few words to say what the "it" was he saw next: "We continued down the canyon for approximately five minutes before I could see that the fire had crossed Mann Gulch and was coming up the ridge toward us."

Neither Rumsey nor Sallee could see the fire that was now on their side of the gulch, but both could see smoke coming toward them over a hogback directly in front. As for the main fire across the gulch, it still looked about the same to them, "confined to the upper third of the slope."

At the Review, Dodge estimated they had a 150- to 200-yard head start on the fire coming at them on the north side of the gulch. He immediately reversed direction and started back up the canyon, angling toward the top of the ridge on a steep grade. When asked why he didn't go straight for the top there and then, he answered that the ground was too rocky and steep and the fire was coming too fast to dare to go at right angles to it.

You may ask yourself how it was that of the crew only Rumsey and Sallee survived. If you had known ahead of time that only two would survive, you probably never would have picked these two—they were first-year jumpers, this was the first fire they had ever jumped on, Sallee was one year younger than the minimum age, and around the base they were known as roommates who had a pretty good time for

themselves. They both became big operators in the world of the woods and prairies, and part of this story will be to find them and ask them why they think they alone survived, but even if ultimately your answer or theirs seems incomplete, this seems a good place to start asking the question. In their statements soon after the fire, both say that the moment Dodge reversed the route of the crew they became alarmed, for, even if they couldn't see the fire, Dodge's order was to run from one. They reacted in seconds or less. They had been traveling at the end of the line because they were carrying unsheathed saws. When the head of the line started its switchback, Rumsey and Sallee left their positions at the end of the line, put on extra speed, and headed straight uphill, connecting with the front of the line to drop into it right behind Dodge.

They were all traveling at top speed, all except Navon. He was stopping to take snapshots.



THE WORLD WAS GETTING FASTER, smaller, and louder, so much faster that for the first time there are random differences among the survivors about how far apart things were. Dodge says it wasn't until one thousand to fifteen hundred feet after the crew had changed directions that he gave the order for the heavy tools to be dropped. Sallee says it was only two hundred yards, and Rumsey can't remember. Whether they had traveled five hundred yards or two hundred yards, the new fire coming up the gulch toward them was coming faster than they had been going. Sallee says, "By the time we dropped our packs and tools the fire was probably not much over a hundred yards behind us, and it seemed to me that it was getting ahead of us both above and below." If the fire was only a hundred yards behind now, it had gained a lot of ground on them since they had reversed directions, and Rumsey says he could never remember going faster in his life than he had for the last five hundred yards.

Dodge testifies that this was the first time he had tried to communicate with his men since rejoining them at the head of the gulch, and he is reported as saying—for the second time—something about “getting out of this death trap.” When asked by the Board of Review if he had explained to the men the danger they were in, he looked at the Board in amazement, as if the Board had never been outside the city limits and wouldn't know sawdust if they saw it in a pile. It was getting late for talk anyway. What could anybody hear? It roared from behind, below, and across, and the crew, inside it, was shut out from all but a small piece of the outside world.

They had come to the station of the cross where something you want to see and can't shut out the sight of everything that otherwise could be seen. Rumsey says again and again what the something was he couldn't see. “The top of the ridge, the top of the ridge.

“I had noticed that a fire will wear out when it reaches the top of a ridge. I started putting on steam thinking if I could get to the top of the ridge I would be safe.

“I kept thinking the ridge—if I can make it. On the ridge I will be safe. . . . I forgot to mention I could not definitely see the ridge from where we were. We kept running up since it had to be there somewhere. Might be a mile and a half or a hundred feet—I had no idea.”

The survivors say they weren't panicked, and something like that is probably true. Smokejumpers are selected for being tough, but Dodge's men were very young and, as he testified, none of them had been on a blowup before and they were getting exhausted and confused. The world roared at them—there was no safe place inside and there was almost no outside. By now they were short of breath from the exertion of their climbing and their lungs were being seared by the heat. A world was coming where no organ of the body had consciousness but the lungs.

Dodge's order was to throw away just their packs and heavy tools, but to his surprise some of them had already thrown away all their equipment. On the other hand, some of

them wouldn't abandon their heavy tools, even after Dodge's order. Diertert, one of the most intelligent of the crew, continued carrying both his tools until Rumsey caught up with him, took his shovel, and leaned it against a pine tree. Just a little farther on, Rumsey and Sallee passed the recreation guard, Jim Harrison, who, having been on the fire all afternoon, was now exhausted. He was sitting with his heavy pack on and was making no effort to take it off, and Rumsey and Sallee wondered numbly why he didn't but no one stopped to suggest he get on his feet or gave him a hand to help him up. It was even too late to pray for him. Afterwards, his ranger wrote his mother and, struggling for something to say that would comfort her, told her that her son always attended mass when he could.

It was way over one hundred degrees. Except for some scattered timber, the slope was mostly hot rock slides and grass dried to hay.

It was becoming a world where thought that could be described as such was done largely by fixations. Thought consisted in repeating over and over something that had been said in a training course or at least by somebody older than you.

Critical distances shortened. It had been a quarter of a mile from where Dodge had rejoined his crew to where he had the crew reverse direction. From there they had gone only five hundred yards at the most before he realized the fire was gaining on them so rapidly that the men should discard whatever was heavy.

The next station of the cross was only seventy-five yards ahead. There they came to the edge of scattered timber with a grassy slope ahead. There they could see what is really not possible to see: the center of a blowup. It is really not possible to see the center of a blowup because the smoke only occasionally lifts, and when it does all that can be seen are pieces, pieces of death flying around looking for you—burning cones, branches circling on wings, a log in flight without a propeller. Below in the bottom of the gulch was a great roar without

visible flames but blown with winds on fire. Now, for the first time, they could have seen to the head of the gulch if they had been looking that way. And now, for the first time, to their left the top of the ridge was visible, looking when the smoke parted to be not more than two hundred yards away.

Navon had already left the line and on his own was angling for the top. Having been at Bastogne, he thought he had come to know the deepest of secrets—how death can be avoided—and, as if he did, he had put away his camera. But if he really knew at that moment how death could be avoided, he would have had to know the answers to two questions: How could fires be burning in all directions and be burning right at you? And how could those invisible and present only by a roar all be roaring at you?



ON THE OPEN SLOPE AHEAD of the timber Dodge was lighting a fire in the bunch grass with a "gofer" match. He was to say later at the Review that he did not think he or his crew could make the two hundred yards to the top of the ridge. He was also to estimate that the men had about thirty seconds before the fire would roar over them.

Dodge's fire did not disturb Rumsey's fixation. Speaking of Dodge lighting his own fire, Rumsey said, "I remember thinking that that was a very good idea, but I don't remember what I thought it was good for . . . I kept thinking the ridge—if I can make it. On the ridge I will be safe."

Sallee was with Rumsey. Diettert, who before being called to the fire had been working on a project with Rumsey, was the third in the bunch that reached Dodge. On a summer day in 1978, twenty-nine years later, Sallee and I stood on what we thought was the same spot. Sallee said, "I saw him bend over and light a fire with a match. I thought, With the fire almost on our back, what the hell is the boss doing lighting another fire in front of us?"

It shouldn't be hard to imagine just what most of the crew must have thought when they first looked across the open hillside and saw their boss seemingly playing with a matchbook in dry grass. Although the Mann Gulch fire occurred early in the history of the Smokejumpers, it is still their special tragedy, the one in which their crew suffered almost a total loss and the only one in which their loss came from the fire itself. It is also the only fire any member of the Forest Service had ever seen or heard of in which the foreman got out ahead of his crew only to light a fire in advance of the fire he and his crew were trying to escape. In case I hadn't understood him the first time, Sallee repeated, "We thought he must have gone nuts." A few minutes later his fire became more spectacular still, when Sallee, having reached the top of the ridge, looked back and saw the foreman enter his own fire and lie down in its hot ashes to let the main fire pass over him.

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WHEN AT APPROXIMATELY FOUR O'CLOCK that afternoon the parachute on the radio had failed to open, the world had been immediately reduced to a two-and-a-half-mile gulch, and of this small, steep world sixty acres had been occupied by fire. Now, a little less than two hours later, the world was drastically reduced from that—to the 150 yards between the Smokejumpers and the fire that in minutes would catch up to them, to the roar below them that was all there was left of the bottom of the gulch, and to the head of the gulch that at the moment was smoke about to roar.

Somewhere beyond thought, however, there was an outside world with some good men in it. There were a lot more men sitting in bars who were out of drinking money and also out of shape and had never been on a fire before they found themselves on this one. There are also times, especially as the world is blowing up, when even good men land at the mouth of the wrong gulch, forget to bring litters even though they are a rescue team, and, after having gone back to get some blankets, show up with only one for all those who would be cold that night from burns and suffering.

One good man from the outside had come close to the inside. At about five o'clock, roughly about the time the crew had tooled up and started from the head of the gulch toward the fire, one good man had started up Mann Gulch from the river, had seen the fire blow up around him, then had been trapped by it and lost consciousness while running through a whirl that had jumped to the north side of the gulch.

So about the time that Dodge and his crew were hurrying downgulch into the blowup, ranger Robert Jansson at the lower end was running from the blowup back to the river.

Jansson was ranger of the Helena National Forest's Canyon Ferry District, its station located then on the Missouri River about twenty-three miles northeast of Helena. With roads now nearly everywhere, planes and helicopters overhead, and word spread almost instantly by telephone or radio, it has become much easier and quicker to get men on fires, and, as a result, many Forest Service districts have merged and disappeared. Today, Canyon Ferry District and the Helena District are one, but in 1949 the Canyon Ferry District alone was a big piece of country, somewhere between two hundred fifty thousand and three hundred thousand acres and extending far enough downriver to include Mann Gulch. Mann Gulch at the time of the fire was the responsibility of a dedicated ranger, not easy to work for, and, like others who came close to this fire and survived, he was never to escape it. As a ranger he had always been obsessive in his dedication; as often as he could, he walked on mountains, watching and working and expecting his men to do the same. When, for instance, he should have kept only a skeleton crew on the Fourth of July and let the rest of his crew go to town, he kept all his men at work chasing fires he had faked, and he was a Methodist and did not drink or smoke. Unlike most rangers, he was a sensitive, vivid writer, and both his official position and the things in him that saw and felt compelled him to write report after report on the Mann Gulch fire, two of which should be listed in the literature of forest fires, if there is such a listing and such a literature. His reports are in official prose and depend upon reporting and not prose, and so have to be exceptionally good reporting to be good.

Jansson starts fitting together when we come to understand his love of his district, his sense that it was his protectorate, and his constant fear that it was about to blow up or already had and he didn't know where. He was constantly in the field even when the district would have been better off if he

had been in the ranger station. But he knew his district inch by inch and had made a fire plan for every gulch and every possible blowup, and he worked his men illegal hours and holidays so that the blowup would be averted or at least spotted immediately. He makes us think of ourselves as we would be if we were made responsible for two hundred fifty thousand or three hundred thousand acres of some of the roughest country anywhere on the Missouri River, and knew that, when the fire blew, our help would be mostly bums picked up in bars and college students on summer vacation. We would be trying to do everything ourselves all at once all the time and trying to get everybody else to do the same, and we would have been, as he was, chronically ill, telling his close friends that it was hereditary but never saying what "it" was.

There was a big streak in him of those old-time rangers who had 1910-on-the-brain. Rangers for decades after were on the watch for fear that 1910 might start again and right in their woodpile. Some even lost their jobs because a fire got away from them. So Jansson was part old-time ranger, part us, and part John Robert Jansson.

In fact, he had been one of the first to spot and report the Mann Gulch fire. About four o'clock the previous afternoon, August 4, a lightning storm had passed over Helena and the Gates of the Mountains while Jansson was in Helena attending a meeting with several other rangers in the office of supervisor Moir. Lightning was heavy and immediately eight fires were reported, four in Jansson's Canyon Ferry District. The rangers hurried off to get on their fires. Jansson spent the rest of that afternoon and the evening "taking suppression action on three lightning fires and one camper fire."

In addition to fires that appear almost immediately after a lightning storm, there are usually a few "sleepers" that take a day or more before they can be spotted, fires often caused by lightning striking a dead tree with only rocks and a few dead needles underneath, so that only after a time do enough ashes fall to get a ground fire started with smoke showing. Accordingly, Jansson and his supervisor agreed that Jansson should

wait until eleven the next morning before making an air patrol in order to give the dew time to dry and the sleepers to awake.

On August 4, the day the lightning storm blew by, fire conditions were not critical. On August 5 they were. At Canyon Ferry Ranger Station, the fire danger rating was 16 out of a possible 100 on August 4, but on the next day it was 74 out of 100; when questioned as to how such a rating should be classified, Jansson answered, "Explosive stage."

Jansson had tried to reach Jim Harrison, the guard at Meriwether Station, on the evening of August 4 by radio, but atmospheric conditions were bad and it was the next morning before he made contact. Harrison told him that there had been many lightning strikes north (downriver in the direction of Mann Gulch) the afternoon before, but Jansson told him he should clean up the picnic grounds first and not start on patrol until eleven o'clock so he would miss no late sleepers.

The next morning at eleven o'clock Jansson flew from Helena down the Missouri to within a mile west of where the Mann Gulch fire was to appear and on the way back flew directly over the spot. But he returned to Helena having seen only one small smoke coming from a sleeper reported earlier in the morning. He even flew low over Harrison's patrol station, hoping to get a signal from him, but Harrison by now had probably spotted the fire and was on his way back to his Meriwether camp, where, after trying unsuccessfully to radio Canyon Ferry Ranger Station, he tacked his last message on his door. He and his mother did not know it, but he was on his way to rejoin the jumpers, and they were on their way to all that she feared.

Although nothing new had shown up from the air, the moment Jansson's plane landed at Helena a smoke rose from the Missouri but seemingly farther downriver than they had flown. When Jansson reported this new smoke to the supervisor's office, he was told that the lookout on Colorado Mountain had just reported a fire in Mann Gulch, but Jansson did not take this location as gospel since Colorado Mountain was

about thirty miles from Mann Gulch. Not being sure that this new fire was even on Forest Service land, he decided to fly the Gates of the Mountains once more.

Now smoke could be seen from the river as his plane approached Mann Gulch. The fire was burning on the ridge between Mann and Meriwether but at that time entirely on the Mann Gulch side and seemingly not spreading except at its upgulch edge. He estimated it to be eight acres in extent (six acres by a later survey). When asked at the Review whether it was "an exceptional experience for a fire to be eight acres an hour after a ranger had not been able to see it," Jansson answered, "In my judgment, that was unusual."

While still observing the Mann Gulch fire from the air, Jansson had spotted another fire to the south, which was to be called the "York fire." York is on Trout Creek, which has a number of summer and even permanent homes on it, so the damage a fire in that location could do was considerably greater than what one in Mann Gulch could do. In fact, there were times during the coming day and night when it looked as if the best men and equipment should be sent to Trout Creek. In addition, the first sleeper found that morning was now starting to smoke up. Maybe men and equipment should be sent to it. Evidently it was going to be one of those days when one of the biggest problems in facing danger was to figure out the biggest danger and not to have a change of mind too often or too late or too soon.

It is hard to know what to do with all the detail that rises out of a fire. It rises out of a fire as thick as smoke and threatens to blot out everything—some of it is true but doesn't make any difference, some is just plain wrong, and some doesn't even exist, except in your mind, as you slowly discover long afterwards. Some of it, though, is true—and makes all the difference. The first half of the art of firefighting is learning to recognize a real piece of fire when you see one and not letting your supervisors talk you out of it. Some fires are more this way than others and are good practice for real life.

On the return of Jansson's plane to Helena, cloud forma-

tions were noted which the pilot said meant high and variable winds. Forest fires need high and variable winds, and can make their own updrafts once they get started. The clouds were cumulus clouds, white, uneven, and puffy, caused by updrafts from variable heat conditions on the ground. In this story about Smokejumpers, clouds and winds are to be closely observed, even to the end and even if no one can tell for sure what details are going to make a difference.



BY THE TIME THEY LANDED again in Helena, Jansson had made a tentative "man-and-equipment order." For the Mann Gulch fire, he ordered "fifty men with equipment and overhead, two Pacific pumps with three thousand feet of hose, and fifty sack lunches." Soon he added twenty-five Smokejumpers to the order, because he believed the fire to be in an almost inaccessible area and the only chance to hold it to a small fire would be to get men on it in another few hours. Supervisor Moir agreed and telephoned the fire desk in Missoula, but was told that, although enough jumpers were available at the base, all planes except one were on mission, and the one plane, a C-47, could hold only sixteen jumpers with equipment. Jansson and Moir said no to sending a second plane later in the afternoon. That would probably be too late to get the jumpers on the fire before dark. This was at 1:44. At 2:30 the one plane left Missoula.

In the meantime, Jansson ate lunch in the office while he waited for the fifty-man emergency crew to be rounded up. Which brings up again the practice the Forest Service used to make of recruiting large crews of volunteer firefighters for emergencies. In those days the Helena National Forest Service thought it had an agreement with the Bureau of Reclamation and the Canyon Constructors to send men on call. But as it turned out, it was the Bureau's understanding that the plan was to operate only when its men were off shift, and at the

time of the Mann Gulch fire practically none of them were. So when not enough Smokejumpers could be dropped on a threatening fire and there were other threatening fires to think about, the Forest Service soon would be combing the bars for stool-bums, and stool-bums, apart from not being much good on a fire, are not easy to get off their stools. Like the rest of us but perhaps more so, they would rather remain alive on a stool exposed to the possibility of being converted by the Salvation Army than be found dead on a fire-line with a Pulaski smoldering in their hands.

So after a while when nobody showed up, Jansson and alternate ranger Henry Hersey left the office and started working the bars, ending up with ten, not fifty, customers who thought they needed a breath of fresh air. The ones who were still drunk when they got to the fire may well have been better off than the ones who had sobered up and found out where they were.

Jansson located a Forest Service horse truck, loaded it with bedrolls, put the ten recruits on top of the rolls, and at 2:20 started for Hilger Landing twenty miles from Helena and nearly another six miles by boat from Mann Gulch. The owner of an excursion boat had telephoned to report the fire and had said he would hold his boat at Hilger Landing for the use of the Forest Service. Since it was 2:30 when the Smokejumpers left Missoula for Mann Gulch, Jansson and his crew were leaving Helena at about the same time, but it would be hours before they located each other.

By three o'clock Hersey had collected nine more revolving bar stools and started for Hilger Landing.

Jansson arrived at Hilger Landing only to discover that the owner of the excursion boat had left with a load of paying tourists so they could see firsthand the smoke coming out of the mouth of Mann Gulch. The ranger was sore as hell, but as a Methodist interested in working with young people he says only that he was "thoroughly peeved." There wasn't anything he could do, though, but wait. There was no road through the Gates of the Mountains in 1949, and because it is designated

wilderness, the area still has no roads. Even today you need a boat to get through the cliffs of the Gates, and the boating is fine if you can get a boat, because some nine miles below the mouth of Mann Gulch there is a big power dam that has made a small lake of the river and backed it up clear to the upper end of the cliffs of the Gates, where Jansson was waiting with a crew and no paddle.

No wonder he was "peeved"; he had already worked out his plan with Hersey, and there was nothing constructive he could do while he waited. The plan was for both him and Hersey to land at the mouth of Mann Gulch and then, since it would be getting late in the day and the crew was in poor shape, to set up camp there and wait until the next morning before hitting the fire. Hersey would take charge of the fire crew while Jansson would scout Mann Gulch, find the jumpers, and bring them back to camp, where they could put up a coordinated fight. It was a good plan, except that it did not allow for the wit of the universe and the mental lapses of man.

While Jansson waited at Hilger Landing, the recreation guard, Jim Harrison, was alone on the Mann Gulch fire. Jansson had to wait fifty minutes with his ten volunteers before the owner of a private boat, Fred Padbury, a Helena druggist, pulled up to the landing and took on Jansson and his crew and some of their equipment.

Soon after, the excursion boat returned to Hilger Landing and started down the river with Hersey, his nine drunks, and the remaining equipment. Of the total nineteen, only three had ever been on a fire before. Two were soon to be made straw bosses, an indication of what kind of fire crew they were going to be.

On the way down the Missouri now, Jansson came to a bend in the river where he could see that the fire had "slopped over" on the Meriwether side of the ridge. The "slop over" was already two or three acres, and the ranger was alarmed. The moment he saw the fire starting down the Meriwether slope he had to change plans—all would now land at Meriwether and Hersey would take the crew up the Mann Gulch—Meri-

wether trail to the top of the ridge and contain the fire on the Meriwether side. Then Jansson would continue downstream in the Padbury boat and scout the fire as originally planned. As usual, this plan left Jansson both the quarterback and the man in motion looking for trouble, and it's hard for even a good man to play two positions at once.

The excursion boat, being faster than the Padbury boat, passed Jansson and his crew before they reached the Meriwether landing, and Jansson was able to inform Hersey of his change in plans. But because the Padbury boat had to tread water while the big excursion boat docked and unloaded its equipment, Jansson had to wait some more. In the woods, as in the army, it's often a case of hurry up and wait, and Jansson did not get high marks in waiting.

The ranger told Hersey to take all nineteen volunteers and get on the fire as soon as possible, stopping only at the guard camp 150 yards up the canyon to radio an order to the supervisor's office. Hersey says he was to tell the office "that this was no training fire," "to get in gear, and give us all the support possible." Specifically, he was to order two new crews of fifty men each with "experienced overhead," one for Meriwether and one for Mann Gulch. He was also to tell Canyon Ferry Ranger Station to try to get in touch with the Smokejumpers by radio and to tell them if they were still in Mann Gulch to come down the Mann Gulch-Meriwether ridge to the slop over and join Hersey's nineteen men there. Then, before starting up the trail that comes out of Meriwether Canyon like a ladder about to topple backwards, Hersey gave his bar stools a lecture. He told them when they got to the fire they would try to hold two sides of it—the upgulch side so that the jumpers could get through and join them and the side approaching the Meriwether trail to keep their own escape route open and to save the tourist beauty of Meriwether Canyon.

They probably didn't get to the fire until nearly six o'clock. Jansson thought they should have been there sooner.

Jansson had left at about 4:35 in the Padbury boat to carry

out his plan. The scout reached the fire before the jumpers, to bring them back to Meriwether. When the boat passed the mouth of Mann Gulch, the fire was still on the upper third of Mann Gulch's north-facing slope, although heavy smoke was blowing from it across the gulch to the other side. The Padbury boat continued on downstream until it approached the mouth of Elkhorn Creek, a little more than a mile below and to the northwest of Mann Gulch. As far away as Elkhorn the air was feathered with ashes. The Padbury boat then returned upstream to the mouth of Mann Gulch, which by now was so full of smoke Jansson could not see up it. If he wanted to know what was happening there, he would have to walk. As usual, he was precise with figures. He says he started up the gulch at 5:02.

At about that time Dodge's crew had collected the cargo parachutes after their jump, had had something to eat, and then had tooled up and started for the fire. So, at approximately the same time, the fire was being approached from both its upper and its lower ends.



JANSSON WALKED UP THE BOTTOM of Mann Gulch for almost half a mile, noting that the fire was picking up momentum and still throwing smoke over his head to the north side of the gulch where farther up Dodge had rejoined his crew and was now leading them toward the river. Then right behind Jansson at the bottom of the gulch a spot fire flowered. Then several more flowered just below the main fire. Then a few tossed themselves as bouquets across the gulch, grew rapidly into each other's flames, and became a garden of wildfire.

What the ranger was about to see was the beginning of the blowup. Seemingly without relation to reality or to the workings of the imagination, the flowers that had grown into a garden distended themselves into an enormous light bulb and a

great mixed metaphor. Flowers and light bulbs don't seem to mix, but the light bulb of the mind strung itself inside with filaments of flame and flowers, bloated and rounded itself at its top with gases, then swirled upgulch to meet the Smokejumpers trying to escape downgulch. In a few minutes they met. Then only a few minutes later the blowup passed out of the gulch, blew its fuse, and left a world that is still burned out.



JANSSON WAS PROBABLY THE FIRST to walk through a blowup propelled by a fire whirl, to drop unconscious in its vortex, to revive only a few feet from its flame, and to live to record it. Afterwards, he would keep returning to Mann Gulch with tape and stopwatch to check his original recordings of distances and times, and once he returned with objective observers to check him. He struggled to determine whether what had happened really had and really had measurable boundaries on earth. But we should already know enough about him to expect that we are about to observe a rare phenomenon of nature through the eyes of an especially fine observer. Jansson was a good enough observer to have been picked in the early years of the serious study of fire behavior by Harry Gisborne as one of his select group of rangers to field-test some of the early theories of the Priest River Experiment Station. To Jansson, Gisborne was an idol, as he was to nearly all those who first approached the study of forest fires scientifically, and as he is to some of us still living.

Later in this story of the Mann Gulch fire, it won't be enough to follow along merely as observers of Jansson's observations. There are things we see now that he would not have noticed, and there are things he saw but couldn't explain that we can put together. We know now pretty much what happened, because in part it happened in Mann Gulch and made its own contribution to the greatly enlarged inventory of our present knowledge of forest fires and so of our knowledge of

many things about the woods. It did not do this immediately, and it was far from the only fatal forest fire that led to the congressional appropriations for the three great National Forest Fire Laboratories, one with its two wind tunnels right beside the Smokejumper base in Missoula. But before the Fire Labs, there had to be other fatal fires, other parents and communities sharing the same grief, and other newspapers making public records of grief. There also had to come a time when some of the most important members of Congress were from logging states and were members of just the right committees. So it came finally not in God's time but in the considerably slower time of bureaucracies, yet it came.

Even to me. It's different with me now from when I first started climbing Mann Gulch. Now I carry inside me part of the purgation of its tragedy. It is the part of me and the tragedy that knows more about forests and fires because of this forest fire. If now the dead of this fire should awaken and I should be stopped beside a cross, I would no longer be nervous if asked the first and last question of life, How did it happen?



ALTHOUGH IT WAS NOT UNTIL the 1950s that the science of fire behavior became sufficiently advanced to explain blowups, it will be helpful to store up here for later use what so fine an observer as Jansson saw as he drew near to this tragedy of winds and fire.

Jansson noted strange sights as he went up the gulch. For one thing, since he could see for only two hundred yards because of the dense smoke, he knew immediately something big was on its way. He could see and hear rocks rolling, displaced by the heat. He could see and hear dead snags break off, without causal explanation, and he could see and hear that "flames were beginning to whirl and roar." At first these flames just flapped back and forth, signs of unstable air. But

the unstable air started to spiral and the flames began to swirl like little dust devils. Soon, however, they united to become something like a tornado, caused by fire and causing fire and perfectly named a "fire whirl." What he refers to as a "holocaust" is a still later development, one that occurred when these fire whirls were starting other fire whirls that were starting still other fire whirls. Beside him, around him, and in front of him was a vast uproar trying to break the sound barrier. Behind him, sounds were tapering off and becoming silent, as sounds were turning into lights. The world behind him was becoming a circle of lights about to be turned out. Hell may have such illumination preceding such blackness.

Fire whirls both intensify existing fire and cause new fires. Their rotating action is that of a giant vortex, and, as giants, they can reach two thousand degrees in temperature. Fires that become giants are giant smoke rings with a downdraft in the center which is full of deadly gases and, what is more deadly still, heat so great it has burned out much of the oxygen; the outer ring is an updraft sometimes reaching the edge of the atmosphere.

Some fire whirls, not all of them, are flame throwers. Some pick up burning cones and branches. Some of the giants pick up burning logs and toss them ahead, starting spot fires sometimes a long way ahead. When these spot fires unite, firefighters can be trapped between two fires, as Jansson was soon to be.

A crown fire, as we know, is racing if it advances a mile an hour, but a fire whirl can go almost as fast as the wind.



ALTHOUGH JANSSON THOUGHT HE HAD put out of mind the possibility that the jumpers or anything human besides himself could be in Mann Gulch, he began to hear metallic noises that sounded like men working. That's the

sound of flames heard by those alive after the flames go by. It is the thinking of those living who think they can hear dead men still at work.

Even with the flames closing in, Jansson had to follow the sounds in his head another eighth of a mile upgulch until any possibility that men were working in Mann Gulch had been obliterated. While he walked that eighth of a mile, the crown fire on the north-facing slope behind him had burned to the bottom of the gulch and the spot fires that had jumped to the opposite slope had converged behind him into one fire coming upgulch at him.

This fire front on the south-facing slope was in a few minutes to become the blaze only seventy-five yards behind the Smokejumpers after they dumped their heavy tools to run faster, and the crown fire which Jansson saw moving into the bottom of the gulch was to become the roar the Smokejumpers heard below them at almost the same time. At almost the same time everything was closing in on them and Jansson.

At 5:30 Jansson turned back and started to get out of there quick but still walking. Then the fire began to whirl continuously. When a streamer from it swept by, he realized after a couple of whiffs that the whirl could "cook out his lungs." He began to run. Now, he says, the whirl "was practically upright. My position was in the vortex, which was rapidly narrowing. I held my breath as I crossed the wall. There was no flame, just superheated air and gases and a lot of reflected heat from the crown fire. I conked out from a lack of oxygen, fell on my left elbow, causing a bursitis which later caused my arm to swell."

When he came to, "the black creep of the fire" was only a few feet behind him. He had fallen victim for a few seconds to the two major enemies that threaten fighters of big fires— toxic gases, especially carbon monoxide, and lack of oxygen from overexertion and from hot air burning out the oxygen.

When he finally reached the boat, at 5:41, he placed himself in the bow next to Mrs. Padbury and watched the whirl for a few minutes. He thought again about the sound of men

working that he imagined he had heard and again put it out of mind. Then he smelled his own vomit, apologized to Mrs. Padbury, and moved off to the side.

At the Board of Review, he was asked this question, to which he gave a short answer:

GUSTAFSON: In looking back up Mann Gulch draw . . . what was the picture as to the fire at that time?

JANSSON: A blowup.

Before the Padbury boat reached Meriwether Landing, superintendent Moir was in midriver in a speedboat preparing to go downstream. When the two boats met, Jansson transferred to the speedboat, and they landed where they could climb to an observation point giving them a complete view of Mann Gulch. Jansson says, "At that time it was apparent that all of Mann Gulch had burned out, but it appeared that the big blowup in Mann Gulch was over."

"At that time" can only be estimated, but it was shortly after six o'clock. When all is said and done, we still accept the hands of Jim Harrison's watch, which were melted permanently at about four minutes to six, as marking approximately the time that the fire was catching up to the crew.

About twenty minutes had passed between the time that Jansson left the mouth of Mann Gulch and the time he turned to view the whole of it. Near at hand, trees still exploded from the heat of their own resin, at a distance vast sounds were being converted into silent lights and the lights were being turned off, and nowhere were there any longer noises as of men working.

For a time the Mann Gulch fire was to become extinct in the minds of the world outside Mann Gulch. Jansson and Moir returned upriver to the Meriwether camp, planning the next day. The newly discovered York fire took on even greater importance after Jansson heard someone on the York fire radio calling frantically for additional help. When Jansson was un-

able to get through on the radio to ascertain the facts, the assistant supervisor, Favre Eaton, was sent from Meriwether to take charge of the York fire. Too many fires were going in too many directions for anyone to think of the Smokejumpers. Jansson says that "during the three-way conference between Moir, Eaton, and myself at Meriwether I am positive that there was nothing said about the Smokejumpers." For some time the Smokejumpers even passed out of existence on radio, no one noticing that their whereabouts were unknown, everyone assuming that Smokejumpers were infallible firefighters and were taking care of themselves wherever they were. For some time after Eaton left for the York fire and the superintendent with him, Jansson's main concern was why his crew of drunks hadn't returned from the cliffs before it got dark and they fell off.

IN THIS STORY OF THE OUTSIDE WORLD and the inside world with a fire between, the outside world of little screwups recedes now for a few hours to be taken over by the inside world of blowups, this time by a colossal blowup but shaped by little screwups that fitted together tighter and tighter until all became one and the same thing—the fateful blowup. Such is much of tragedy in modern times and probably always has been except that past tragedy refrained from speaking of its association with screwups and blowups.

This story some time ago left the inside world at its very center—Dodge had come out of the timber ahead of his crew, with the fire just behind. He saw that in front was high dry grass that would burn very fast, saw for the first time the top of the ridge at what he judged to be about two hundred yards above, put two and two together and decided that he and his crew couldn't make the two hundred yards, and almost instantly invented what was to become known as the "escape fire" by lighting a patch of bunch grass with a gofer match. In so doing, he started an argument that would remain hot long after the fire.

At the time it probably made no sense to anyone but Dodge to light a fire right in front of the main fire. It couldn't act as a backfire; there wasn't any time to run a fire-line along its upgulch edge to prevent it from being just an advance arm of the main fire. Uncontrolled, instead of being a backfire it might act as a spot fire on its way upgulch and bring fire from behind that much closer and sooner to the crew.

Dodge was starting to light a second fire with a second match when he looked up and saw that his first fire had already burned one hundred square feet of grass up the slope. "This way," he kept calling to his crew behind. "This way." Many of the crew, as they came in sight of him, must have asked themselves, What's this dumb bastard doing? The smoke lifted twice so that everyone had a good chance to ask the question.

The crew must have been stretched nearly all the way from the edge of the timber to the center of the grassy clearing ahead, where Dodge was lighting his fire. Rumsey and Sallee say that the men did not panic, but by now all began to fear death and were in a race with it. The line had already assumed that erratic spread customary in a race where everything is at stake. When it comes to racing with death, all men are not created equal.

At the edge of the timber the crew for the first time could have seen to the head of the gulch where the fire, having moved up the south side of the gulch, was now circling. From the open clearing they also could see partway toward the bottom of the gulch, where it was presumably rocks that were exploding in smoke. They didn't have to look behind—they could feel the heat going to their lungs straight through their backs. From the edge of the clearing they could also see the top of the ridge for the first time. It wasn't one and a half miles away; to them it seemed only two hundred yards or so away. Why was this son of a bitch stopping to light another fire?

For the first time they could also see a reef twelve to twenty feet high running parallel to the top of the ridge and thirty yards or so below it. This piece of ancient ocean bottom keeps the top of the ridge from eroding, as the rock lid on the top of a butte on the plains keeps the butte from eroding into plains. But no one was thinking of geology or probably even of whether it would be hard to climb over, through, or around. At this moment, its only significance was that it seemed about two hundred yards away.

When the line reached its greatest extension, Rumsey and

Sallee were at the head of it—they were the first to reach Dodge and his fire. Diettert was just behind them, and perhaps Hellman, although these two stand there separately forever and ask the same question, What did Rumsey and Sallee do right that we did wrong? For one thing, they stuck together; Diettert and Hellman went their separate ways.

The smoke will never roll away and leave a clear picture of the head of the line reaching Dodge and his burned bunch grass. Dodge later pictured the crew as strung out about 150 feet with at least eight men close enough together and close enough to him so that he could try to explain to them—but, without stopping them—that they could not survive unless they got into his grass fire. At the Review, he made very clear that he believed there was not enough time left for them to make it to the top of the hill, and events came close to supporting his belief. In the roar and smoke he kept "hollering" at them—he was sure that at least those closest to him heard him and that those behind understood him from his actions. In smoke that swirled and made sounds, there was a pause, then somebody said, "To hell with that, I'm getting out of here," and a line of them followed the voice.

The line all headed in the same direction, but in the smoke Dodge could not see whether any of them looked back at him. He estimated that the main fire would hit them in thirty seconds.

In the smoke and roar Rumsey and Sallee saw a considerably different arrangement of characters and events from Dodge's. Indeed, even the roommates differ from each other. Both agree with Dodge, however, that the line was stretched out, with a group at the head close to Dodge, then a gap, and then the rest scattered over a distance that neither could estimate exactly but guessed to be nearly a hundred yards. In fact, when in the summer of 1978 Rumsey, Sallee, Laird Robinson, and I spent a day together in Mann Gulch, the two survivors told Laird and me they were now sure some of the crew had fallen so far behind that they were never close enough to Dodge to hear whatever he was saying. The implication of

Dodge's account is that they all passed him by, but Rumsey and Sallee believed that some of them hadn't. As to the head of the column, Sallee limits it to three—himself and Rumsey plus Diettert, who was also a pal and had been working on the same project with Rumsey before the two of them were called to the fire. To these three, Rumsey adds Hellman, the second-in-command, and indeed suggests, with Dodge agreeing, that it was Hellman who said, "To hell with that, I'm getting out of here," and so furnishes the basis for the charge that Hellman was doubly guilty of insubordination by being near the head of the line after Dodge had ordered him to the rear and by encouraging the crew to ignore Dodge's order to remain with him and enter his fire. Rumsey's testimony, however, will never settle Hellman's place in the line and hence his role in the tragedy, for Sallee was positive and still is that Hellman was at the head of the line when Dodge ordered the men to drop their tools but that he then returned to the tail of it, repeating Dodge's order and remaining there to enforce it. So direct testimony leaves us with opposite opinions of Hellman's closing acts as second-in-command of Smokejumpers on their most tragic mission. Either he countermanded his superior and contributed to the tragedy or, according to Sallee, being the ideal second-in-command, he returned to the rear to see that all the crew carried out the foreman's orders and to keep their line intact.

An outline of the events that were immediately to come probably would not agree exactly with the testimony of any one of the survivors or make a composite of their testimony, as might be expected, but would be more like what follows, and even what follows will leave some of the most tragic events in mystery and litigation.

Rumsey, Sallee, and Diettert left Dodge as one group and took the same route to the reef; two of them survived. Some of the crew never got as high up the slope as Dodge's fire. Hellman reached the top of the ridge by another route and did not survive. The rest scattered over the hillside upgulch from the route taken by the first three, and none of those who scattered

reached the top. As Sallee said the summer we were together in Mann Gulch, "No one could live who left Dodge even seconds after we did."

In fact, the testimony makes clear that Diettert, Rumsey, and Sallee scarcely stopped to listen to Dodge. As Rumsey says, "I was thinking only of my hide." He and Diettert turned and made for the top of the ridge. Sallee paused for only a moment, because he soon caught up with Diettert and Rumsey, and actually was the first to work his way through the opening in the reef above. When asked at the Review whether others of the crew were piling up behind while he stood watching Dodge light his fire, Sallee said, "I didn't notice, but I don't believe there were. Rumsey and Diettert went ahead—went on—I just hesitated for a minute and went on too."

In the roar of the main fire that was now only thirty seconds behind them they may not even have heard Dodge, and, if they did hear words, they couldn't have made out their meaning. Rumsey says, "I did not hear him say anything. There was a terrible roar from the main fire. Couldn't hear much."

It probably wasn't just the roar from without that precluded hearing. It was also the voice from inside Mount Sinai: "I kept thinking the ridge—if I can make it. On the ridge I will be safe. I went up the right-hand side of Dodge's fire."

Although Sallee stopped a moment for clarification, he also misunderstood Dodge's actions. "I understood that he wanted us to follow his fire up alongside and maybe that his fire would slow the other fire down." Like Rumsey, Sallee interpreted Dodge's fire as a buffer fire, set to burn straight up for the top and be a barrier between them and the main fire. And like Rumsey, Sallee followed the right edge of Dodge's fire to keep it between them and the fire that was coming up the gulch.

The question of how Hellman reached the top of the ridge after leaving Dodge at his fire cannot be answered with certainty. What is known is that he made his way from where Dodge lit his fire to the top of the ridge alone, that he was

badly burned, that he joined up with Rumsey and Sallee after the main fire had passed, that he told Rumsey he had been burned at the top of the ridge, and that he died the next day in a hospital in Helena. The most convincing guess about how he reached the top of the ridge is Sallee's. When he and I stood on the ridge in the summer of 1978, I asked him about Hellman's route to the top and he said that naturally he had thought about it many times and was convinced there was only one explanation: while he, Rumsey, and Diettert followed the upgulch (right) side of Dodge's fire and so for important seconds at least used it as a buffer protecting them from the main fire coming upgulch, Hellman must have followed the opposite, or downgulch, side of Dodge's fire and so had no protection from the main fire, which caught him just before he could get over the ridge.

Sallee talks so often about everything happening in a matter of seconds after he and Rumsey left Dodge's fire that at first it seems just a manner of speaking. But if you combine the known facts with your imagination and are a mountain climber and try to accompany Rumsey and Sallee to the top, you will know that to have lived you had to be young and tough and lucky.

And young and tough they were. In all weather Sallee had walked four country miles each way to school, and a lot of those eight miles he ran. He and Rumsey had been on tough projects all summer. They gave it everything they had, and everything was more, they said, than ever before or after.

As they approached the reef, its significance changed for the worse. They saw that the top of the ridge was beyond the reef, and unless they could find an opening in it, it would be the barrier keeping them from reaching the top. They might die in its detritus. The smoke lifted only twice, but they saw a crevice and steered by it even after it disappeared again. "There was an opening between large rocks, and I had my eye on that and I did not look either way," Sallee says.

Halfway up, the heat on Rumsey's back was so intense he forgot about Dodge's buffer fire, if that is what it was, and,

having spotted the opening, headed straight for it. It was not only upslope but slightly upgulch and to the right. In the smoke nothing was important but this opening, which was like magnetic north—they could steer toward it when they couldn't see it. Rumsey was in the center. Sallee was even with him on his left; Diertert was just a few steps behind on his right.

The world compressed to a slit in the rocks. Rumsey and Sallee saw neither right nor left. When asked at the Review whether they saw pincers of fire closing in on them from the sides, they said no; they saw only straight ahead. Ahead they saw; behind they felt; they shut out the sides.

To them the reef was another one of those things—perhaps the final one—that kept coming out of smoke to leave no place to run from death. They can remember feeling sorry for themselves because they were so young. They also tried not to think of anything they had done wrong for fear it might appear in the flames. They thought God might have made the opening and might take it away again. Besides, the opening might be a trap for the sins of youth to venture into.

Beyond the opening and between it and the top of the ridge they could see no flames but there was dense smoke. Beyond the opening in the smoke there could be fire—beyond, there could be more reefs, reefs without openings. It could be that beyond the opening was the end of God and the end of youth. Maybe that's what Diertert thought.

Rumsey and Sallee felt they were about to jump through a door in a plane and so had to steady themselves and believe something was out there that would hold them up. It was as if there were a tap on the leg. Sallee was in the lead and was first through the crevice. It was cooler, and he believed his faith had been confirmed. He stopped to lower the temperature in his back and lungs. Rumsey was through next. As a Methodist, he believed most deeply in what he had been first taught. Early he had been taught that in a time of crisis the top of a hill is safest. It was still some distance to the top, and he never stopped till he got there.

Diertert stopped just short of the opening. On his birthday, not long after his birthday dinner and just short of the top of the hill, he silently rejected the opening in the reef, turned, and went upgulch parallel to the base of the reef, where for some distance there is no other opening. No one with him, neither Rumsey nor Sallee, saw him do this—it is known by where his body was found. Diertert, the studious one, had seen something in the opening he did not like, had rejected it, and had gone looking for something he did not find. It is sometimes hard to understand fine students. Be sure, though, he had a theory, as fine students nearly always have.

While Sallee was cooling his lungs, he looked down and back at Dodge and the crew and for the first time realized why Dodge had lit his fire.

I saw Dodge jump over the burning edge of the fire he had set and saw him waving his arms and motioning for the other boys to follow him. At that instant I could see what I believe was all the balance of the crew. They were within twenty to fifty feet of Dodge and just outside the burning edge of the fire Dodge had set. The last I recall seeing the group of boys, they were angling up the slope in the unburned grass and fairly close to the burning edge of the fire Dodge had set

When Dodge first set the fire I did not understand that he wanted us boys to wait a few seconds and then get inside the burned-out grass area for protection from the main fire.

Dodge's description of his fire is mostly from inside it.

After walking around to the north side of the fire I started as an avenue of escape, I heard someone comment with these words, "To hell with that, I'm getting out of here!" and for all my hollering, I could not direct anyone into the burned area. I then walked through the flames toward the head of the fire into the inside and continued to holler at everyone who went by, but all failed to heed my instructions; and within seconds after the last man had passed, the main fire hit the area I was in.

When asked at the Review if any of the crew had looked his way as they went by, he said no, "They didn't seem to pay any attention. That is the part I didn't understand. They

seemed to have something on their minds—all headed in one direction.”

He wet his handkerchief from his canteen, put it over his mouth, and lay face down on the ground. Whether he knew it or not, there is usually some oxygen within fifteen inches of the ground, but even if he knew it, he needed a lot of luck besides oxygen to have lived, although Rumsey and Sallee were to say later that the whole crew would probably have survived if they had understood and followed Dodge’s instructions.

It is doubtful, though, that the crew had the training and composure to interpret Dodge’s instructions even if some of his words reached them over the roar. The close questioning Rumsey and Sallee received later at the Review revealed that their training in how to meet fire emergencies consisted of a small handful of instructions, four to be exact and only one of which had any bearing on their present emergency. The first was to backfire if they had time and the right situation, but they had neither. The second was to get to the top of the ridge where the fuel is usually thinner, where there are usually stretches of rock and shale, and where the winds usually meet and fluctuate. This is the one they tried, and it worked with only seconds to spare. The third instruction was designed to govern an emergency in which neither time nor situation permits backfiring or reaching a bare ridgetop. When it’s that tough, the best you can do is turn into the fire and try to work through it, hoping to piece together burned-out stretches. The fourth and final warning was to remember that, whatever you do, you must not allow the fire to pick the spot where it hits you. The chances are it will hit you where it is burning fiercest and fastest. According to Dodge’s later testimony, the fire about to hit them had a solid front 250 to 300 feet deep—no one works through that deep a front and lives.

Even if the crew’s training had included a section on Dodge’s escape fire, it is not certain that the crew would have listened to Dodge, would have entered the fire and buried their faces in the ashes. When asked at the Review if he would

have gone into Dodge’s fire had he received previous instruction about it, Rumsey replied, “I think that if I had seen it on a blackboard and seen it done and had it explained so that I understood it I think I surely would have gone in—but of course you never can tell for sure.”

Dodge survived, and Rumsey and Sallee survived. Their means of survival differed. Rumsey and Sallee went for the top and relied on the soul and a fixation from basic training. The soul in a situation like this is mostly being young, in tune with time, and having good legs, an inflexible destination, and no paralyzing questions about what lies beyond the opening. When asked whether he had “ever been instructed in setting an escape fire,” Dodge replied, “Not that I know of. It just seemed the logical thing to do.” Being logical meant building one fire in front of another, lying down in its ashes, and breathing close to the ground on a slight elevation. He relied on logic of a kind and the others on time reduced to seconds. But no matter where you put your trust, at a time like this you have to be lucky.

The accounts that come down to us of the flight of the crew up the hillside nearly all conclude at this point, creating with detail only the happenings of those who survived, if only for a day, as Hellman did, or, like Diettert, at least reached the reef. Counting these two, only five are usually present in the story that goes on up the ridge. Only a sentence or two is given to those who, when last seen by Dodge, were all going in one direction and when seen finally by Sallee were angling through openings in the smoke below him as he looked down from the top of the ridge. Although they are the missing persons in this story, they are also its tragic victims. There is a simple aspect of historiography, of course, to explain why, after last seen by the living, they pass silently out of the story and their own tragedy until their tragedy is over and they are found as bodies: no one who lived saw their sufferings. The historian, for a variety of reasons, can limit his account to firsthand witnesses, although a shortage of firsthand witnesses probably does not explain completely why contemporary ac-

counts of the Mann Gulch fire avert their eyes from the tragedy. If a storyteller thinks enough of storytelling to regard it as a calling, unlike a historian he cannot turn from the sufferings of his characters. A storyteller, unlike a historian, must follow compassion wherever it leads him. He must be able to accompany his characters, even into smoke and fire, and bear witness to what they thought and felt even when they themselves no longer knew. This story of the Mann Gulch fire will not end until it feels able to walk the final distance to the crosses with those who for the time being are blotted out by smoke. They were young and did not leave much behind them and need someone to remember them.



THE FOREMAN, DODGE, ALSO must be remembered, as well as his crew, and it is again the storyteller's special obligation to see that he is. History will determine the direction or directions in which the storyteller must look for his enduring memories, and history says Dodge must live or die in his escape fire. Ordinary history says he lived by lying in the ashes of his escape fire until the main fire swept over him and cooled enough to let him stand up and brush himself off. The controversial history that was soon to follow and has lasted ever since charges that Dodge's escape fire, set in front of the main fire, was the fire that actually burned some of the crew and cut off others from escaping. Historical questions the storyteller must face, although in a place of his own choosing, but his most immediate question as he faces new material is always, Will anything strange or wonderful happen here? The rights and wrongs come later and likewise the scientific know-how.

The most strange and wonderful thing on the hillside as the escape fire swept up it, shutting it out of sight in smoke and heat, is that a spot of it remained cool. The one cool spot

was inside Dodge. It was the "characteristic in him" that Rumsey had referred to when Dodge returned from the head of the fire with Harrison and muttered something about a death trap. It was the "characteristic" he was best known by, the part of him that always kept cool and aloof and believed on principle in thinking to-itself and keeping its thoughts to itself because thinking out loud only got him into trouble. It was this characteristic in him that had started him to lead the crew downgulch to safety, then didn't like what it saw ahead and turned the crew back upgulch trying to outrun the fire without his ever explaining his thoughts to the crew. His running but not his thinking stopped when he saw the top of the ridge, for he immediately thought his crew could not make the top and so he immediately set his escape fire. When he tried to explain it, it was too late—no one understood him; except for himself, they passed it by. Except to him, whom it saved, his escape fire has only one kind of value—the value of a thought of a fire foreman in time of emergency judged purely as thought. The immediate answer to the storyteller's question about the escape fire is yes, it was strange and wonderful that, in this moment of time when only a moment was left, Dodge's head worked.

To see how Dodge's life as a woodsman shaped his thoughts in an emergency and to follow his thoughts closely, one more tick must be added to the tock of his makeup. In an emergency he thought with his hands. He had an unusual mechanical skill that helped him think, that at least structured his thoughts. It was a woodsman's mechanical skill—he liked to work with rifles, fix equipment, build lean-to's or log cabins. He wasn't fancy, he was handy. And in fact that spring he had been excused from training with the Smokejumpers so that he could be maintenance man for the whole Smokejumper base—no doubt part of the cause of the tragedy he was about to face with a crew only three of whom he knew. The foreman, then, was facing this tragic emergency alone, withdrawn as he often was into his own thoughts, which were the thoughts men

and women have who are wired together in such a way that their brains can't start moving without their hands moving at the same time.

The present question, then, in its purest form is, How many brains, how much guts, did it take in those fiery seconds to conceive of starting another fire and lying down in it? In its maximum form, the question would be, Did Dodge actually make an invention when 250 or 300 feet of solid flames were about to catch up to him?

Two of the Forest Service's greatest fire experts, W. R. ("Bud") Moore and Edward G. Heilman, Moore's successor as director of fire control and aviation management for the Forest Service's Region One, have told me they never heard of this kind of escape fire before Dodge's use of it, and their experience corresponds to my own, which, though limited to summers when I was young, goes back to 1918. Rumsey and Sallee say under oath that in 1949 nothing like it had been mentioned in their training course, and, as Rumsey adds, even if it had been explained to him and he had seen it work, it seemed crazy enough so that he wasn't sure he would have stepped into it if it had been for real.

A lot of questions about the woods can't be answered by staying all the time in the woods, and it also works the other way—a lot of deep inner questions get no answer unless you go for a walk in the woods. My colleague at the University of Chicago Robert Ferguson pointed out to me that James Fenimore Cooper had something like Dodge's fire burning in his favorite of his own novels, *The Prairie*, first published in 1827. Cooper's eastern readers are held in suspense throughout most of chapter 13 by the approach of a great prairie fire from which the old trapper rescues his party at the last moment by lighting a fire in advance of the main one and having it ready for human occupancy by the time the sheet of flames arrives. He stepped his party into the burned-off grass and moved them from side to side as the main fire struck.

Cooper's readers clearly were not expected to know of this device or there would be no justification for the prolonged

suspense which the chapter is supposed to create, but the escape fire on the prairie is no literary invention.

Mavis Loscheider of the Department of Anthropology at the University of Missouri, an outstanding authority on the life of the Plains Indians, sent me evidence showing that something like this kind of fire was traditionally set by Plains Indians to escape from grass fires and that pioneers on the plains picked up the invention from the Indians.

In his second volume of *The American Fur Trade of the Far West*, Hiram M. Chittenden describes how the prairie escape fire worked in the early 1800s:

The usual method of avoiding the danger of these [prairie] fires was to start one in the immediate vicinity of the person or company in peril. This fire, at first small and harmless, would soon burn over an area large enough to form a safe asylum and when the sweeping cohorts of flame came bearing down upon the apparently doomed company, the mighty line would part as if by prearrangement and pass harmlessly by on either side.

There are still good grounds, however, to believe Dodge "invented" his escape fire. Why doubt his word before the Board of Review that he had never heard of such a thing before? Even if it was known to mountain men, it could not have been much used in timbered country, if for no other reason than that it would seldom work there. The heat of a timber fire is too intense, and the fire is too slow and prolonged and consumes too much oxygen to permit walking around in it. Chances are Dodge's fire wouldn't have worked (wouldn't even have been thought of) if Dodge had been caught on the other, timbered side of Mann Gulch where the fire started. Moreover, Dodge's escape fire differs in important ways from the escape fires used by Indians and pioneers. Dodge's fire was started so close to the main fire that it had no chance to burn a large "asylum" in which the refugee could duck and dodge the main fire. Not being able to duck and dodge and remain alive, Dodge lay down in the ashes, where the heat was least intense and where he was close enough to the ground to find some oxygen.

Of course, Dodge had a Smokejumper's knowledge that if you can't reach the top of the hill you should turn and try to work back through burned-out areas in the front of a fire. But with the flames of the fire front solid and a hundred yards deep he had to invent the notion that he could burn a hole in the fire. Perhaps, though, his biggest invention was not to burn a hole in the fire but to lie down in it. Perhaps all he could patent about his invention was the courage to lie down in his fire. Like a lot of inventions, it could be crazy and consume the inventor. His invention, taking as much guts as logic, suffered the immediate fate of many other inventions—it was thought to be crazy by those who first saw it. Somebody said, "To hell with that," and they kept going, most of them to their deaths.

Dodge later told Earl Cooley that, when the fire went over him, he was lifted off the ground two or three times.

"This lasted approximately five minutes," he concludes in his testimony, and you and I are left to guess what the "this" was like. His watch said 6:10 when he sat up. By that time, death had come to Mann Gulch.

Dodge himself was allowed to live a little over five years more, what then was thought to be about the maximum time one who had Hodgkin's disease could live. However, he would never jump again. His wife knew when he entered the hospital for the last time that he knew it was for the last time. Like many woodsmen, he always carried a jackknife with him in his pants pocket, always. She told me that when he entered the hospital for the last time he left his jackknife home on his bedroom table, so he and she knew.



WHEN RUMSEY AND SALLEE REACHED the crevice, the main fire had reached the bottom of Dodge's escape fire. They were ahead of the flames, or at least thought they were, but couldn't be sure because of the rolling and unrevealing smoke. Rumsey fell into what he thought was a juni-

per bush and would not have bothered to get up if Sallee hadn't stopped and coldly looked at him. In the summer of 1978, when Rumsey and I were where he thought the juniper bush must have been, he said to me, "I guess I would be dead if he hadn't stopped. Funny thing, though, he never said a word to me. He just stood there until I said it to myself, but I don't think he said anything. He made me say it." They ran upgulch on the top of the ridge for a hundred yards or so and staggered down the slope on the other side of the ridge. There they stumbled onto a rock slide "several hundred feet long and perhaps seventy-five feet wide." The dimensions hardly seem large enough, but there weren't any other rock slides around. Within five minutes, the fire, coming down from the top of the ridge, had reached them.

Although Rumsey says they were both "half hysterical," they were objective enough to see that the fire as it approached them was following the patterns of a fire coming over a ridge and starting down the other side. At the top of the ridge it burned slowly, veering back and forth in the way fires do as winds from opposite sides of a ridge meet each other. It flapped, sometimes it turned downhill toward them, and once it turned sideways and jumped a draw with a spot fire and, well started there, it jumped back again. Once below the fluctuations at the top of the ridge it settled down and burned straight toward them. It burned with such intensity that it created an updraft, sucking in its center so that it was now a front with two pincers. It hit the rock slide on two sides. Rumsey and Sallee, like the early prairie pioneers, tried to duck and dodge in their asylum, but there wasn't much room for running. Rumsey says the fuel was thinner near the top of the ridge. "The flames were only eight to ten feet high."

A form like a solidification of smoke stumbled out of the smoke ahead and died in the rocks. It was a four-point buck burned hairless except for the eyelashes.

After the fire passed the rock slide "it really started rolling" downhill, replacing trees with torches.

Soon they heard someone calling from far off, but it

turned out to be "only thirty yards away." It was Bill Hellman. His shoes and pants were burned off, and his flesh hung in patches. When asked at the Review, "Did Hellman at that time seem to be suffering tremendously?" Sallee answered, "Yes." To the next question, "Did he make any statement to you?" Sallee's reply was, "He just said to tell his wife something, but I can't remember what it was."

They laid him on a long, flat rock to keep his burns out of the ashes. As Rumsey says, "There wasn't much else we could do," having thrown away all their first-aid supplies on their flight from the fire.

Suddenly, there was a shout and a form in the smoke. It was Dodge answering the shouting that had gone on between them and Hellman. He "didn't appear excited," but he "looked kind of—well, you might say, dumbfounded or shocked." His eyes were red from smoke and his clothes black with ashes. He obviously was not his fastidious self, but he still had a characteristic about him.

They didn't say much about anything, least of all about whether the missing were alive. Dodge, in coming over the hill, had seen one alive and couldn't remember his name except that it began with "S" (Joe Sylvia). When Dodge sat up in his own fire he heard someone "holler" faintly to the east and, after a long time, found him only 150 to 200 feet upgulch and, oddly, below him, perhaps 100 feet. He was badly burned and euphorically happy. Dodge moved him to the shelter of a big rock and cut the shoes off his swollen feet, but there was no use in Dodge leaving his only worldly gift with him, his can of Irish white potatoes, since Sylvia could not feed himself with the charred and useless remains of his hands. In the hours to come, he would be without water because he could not lift his canteen.

Evidently Dodge hadn't seen any others as he came up the hill or crossed to the other side, and, as he said at the Review, by the time he reached Rumsey, Sallee, and Hellman he "didn't think any of [the others] were still alive."

Rumsey and Sallee had come to a more hopeful conclu-

sion once the fire passed them by in the rock slide—after all, they had made it, and, besides, once they understood the intention of Dodge's fire, they believed it would work and assumed at least some of the crew behind them had understood Dodge's fire and crowded into it. But Dodge's arrival eliminated that possibility, so there was very little they dared to talk about. After a while Dodge and Sallee left Hellman in Rumsey's care and started back uphill through the ashes without saying just why. Since none had been saved with Dodge, the assumption now was that any survivors would have made it over the hill, as Rumsey and Sallee had, so their search was a short one. Besides, the heat was still so intense it soon drove them back. They didn't have to explain why they didn't have anything to say when they returned.

It was getting dark. Hellman already had drunk most of their water, even though it made him sick. He could see the glare of the Missouri a mile and a half below, and it inflamed his thirst, but he was not allowed to think of walking. He did revive enough to become talkative. It was here that he told Rumsey he had been burned at the top of the ridge, and it was partly on the basis of this remark that Sallee formed his assumption that Hellman had reached the top of the ridge by following the downgulch side of Dodge's fire and so had had no buffer between him and the main fire raging upgulch. Once burned, though, like a wounded deer, he had started downhill for water but had collapsed after a few hundred yards. He was told to lie still on the rock and keep talking to forget the pain. Rumsey stayed with him, and at dusk Dodge and Sallee started for the river, Dodge leaving with them his canteen of water and his can of Irish white potatoes.

Dodge and Sallee had a tough time getting down to the river. They had to go half a mile or more before they could find a weak spot in the fire front through which to work their way. They had no map or compass, and when they reached the river they went the wrong way.



David R. Navon



Robert J. Bennett



Leonard L. Piper



Silas R. Thompson, Jr.



Henry J. Thol, Jr.



Newton H. Thompson



William J. Bellman



Philip R. McVey



Eldon E. Diettert

THESE MEN DIED AS A RESULT OF THE MARIQUETA FIRE ON THE HELMUT MTS. FOREST ON AUGUST 10, 1949. TWELVE OF THE MEN WERE JUNIORS AND ONE WAS A DISTRICT FOREMAN, AND A PREVIOUS JUNIOR.



James O. Harrison



Marvin L. Sherman



Joseph H. Sylvia



Stanley J. Reba



LEVEL 2 MATERIAL – OPTIONAL READING (PROVIDED)

Tragedy at Mann Gulch, Chapter from Trimotor and Trail, Earl Cooley

What Business Can Learn from High Reliability Organizations – first chapter of Managing the Unexpected, Weick and Sutcliffe

From Trimoter and Trail
by Earl Cooley



Tragedy at Mann Gulch

ON AUGUST 5, 1949, at 1:50 p.m., Jack Nash, our loft dispatcher at Hale Field, received a smokejumper request from the Helena National Forest. The fire was believed to be a 50-man fire at the time. The order was for 25 smokejumpers. The only plane available was a DC-3, with a payload of 16 jumpers and gear. It was decided to send 16 jumpers immediately. Fred Stillings, our air operations officer, requested that I go along as spotter and bring back information on the fire. We were instructed to land at the Helena airport if we could not jump, so our crew could be used as overhead on the fire. Fred Brauer, our project foreman, got the crew together, and the squad leaders on duty loaded jumpgear and equipment on the plane.

We took off from Hale Field at 2:30 p.m. with the following

crew: R. Wagoner Dodge as foreman, William Hellman as squad leader, and jumpers Robert J. Bennett, Eldon E. Diettert, Phillip R. McVey, David R. Navon, Leonard L. Piper, Stanley J. Reba, Marvin L. Sherman, Joseph B. Sylvia, Henry J. Thol, Jr., Newton R. Thompson, Silas R. Thompson, Robert Sallee, Walt Rumsey, and Merle Stratton.

Elmer Bloom, Forest Service photographer, went along to shoot some film for a movie he was working on. Kenneth Huber was the DC-3 pilot and Frank W. Small was the copilot. Jack Nash was assistant spotter. This made up the full DC-3 load. Because it was only a short trip to Helena, we started suiting up jumpers right after takeoff. Jack and I had just finished getting everyone ready as we neared the fire. The pilot had been radioing our location back to Missoula, but he could not pick up anyone on the Helena Forest radios. The air was extremely rough and some of the men got sick.

As I was helping Diettert on with his gear, he mentioned that this was his 19th birthday. He had been called away from a birthday dinner at home. I also helped Henry Thol, Jr., with his gear. These two men were special to me. Eldon often worked in his dad's garden adjoining our backyard in Missoula. Henry had been working as a bull cook around the base, where I became well acquainted with him.

When we reached the vicinity of the fire, we could see two fires burning about ten miles apart. I went to the cockpit to talk to the pilots and properly locate the specific fire that we were dispatched to. We soon determined the location and arrived over Mann Gulch at approximately 3:10 p.m. I estimated the fire to be 50-60 acres.

The Mann Gulch fire had burned to the top of the ridge between Meriwether Gulch and Mann Gulch, with considerable fire backing down the slope toward Mann Gulch. The wind was to the northeast, carrying the fire along the top of the ridge between Meriwether Gulch and Mann Gulch. The fire did not appear dangerous to me because fires usually cool down at this time of day with these conditions. The fire was confined, with no indications of spotting or crowning at that time. I concluded that the fire had run its course but would continue to back

down the hill against the wind toward the bottom of Mann Gulch.

In selecting the jump spot on the first pass, we considered open, sparse timber on the ridge ahead of the fire. After some discussion with Dodge, this idea was rejected because wind was carrying smoke over that spot. I told the pilot to fly down Mann Gulch into the wind, so we could select another jump spot. Some open grassy slopes in the bottom of Mann Gulch looked ideal. This spot was across Mann Gulch and a good half mile and about 500 feet lower than any part of the fire. It was also out of the smoke. Two drift chutes indicated about 300 to 400 yards steady drift straight up Mann Gulch Canyon.

This spot was O.K. with Dodge. On the next pass we let the first four men out. They drifted back up the canyon 300 to 400 yards. The rest of the men were dropped at this approximate point. All drifted back into the jump spot, which indicated a steady wind at the time the jumps were made.

The first four-man stick landed a little on the northwest side of Mann Gulch; the three succeeding sticks landed toward the bottom of the gulch. The men all landed safely and put out orange streamers in a double L, indicating they had landed O.K. Only three men jumped in the last stick, Merle Stratton being too airsick to jump.

The pilot asked me to decide when to drop the cargo. Jack Nash, Elmer Bloom, and I got the cargo to the door, and upon my signal, Jack was to kick it out. The pilot could not fly at normal drop height because of rough air in the canyon. The radio free-fell to the ground because the static line broke off in the plane and did not open the chute. The static line used to drop cargo was not the one used to drop jumpers.

I expected that as soon as the fire cooled, the men would line the fire on the main ridge between Meriwether Gulch and Mann Gulch and stop further spread. I expected the fire to be controlled by 10 a.m. the next day. The jump spot I selected, and that Dodge had approved, seemed particularly safe because the northwest side of Mann Gulch was mainly grass, with few trees. The fire had to roll down to the bottom of Mann Gulch and burn back up on the southeast exposure to pose any

threat, and the general wind direction did not favor this possibility. The depth of the dry grass was difficult for me to evaluate from the air.

We circled the fire twice and noted that the men were gathering equipment. I told the pilot to head for Missoula and noted the time as 4:10 p.m. En route to the Missoula base we tried to radio the Helena Forest, to no avail. We were able to contact the Missoula radio. The pilot reported a routine jump, our location, and also that we were returning to Missoula with one man who had not jumped.

Upon reaching the loft at 5 p.m., I reported to Fred Fite, regional dispatcher. The fire was 50 to 60 acres and had burned to the top of the ridge. It did not look as if it would spread further that evening. Fred told me to report to the Helena Forest. Upon calling the Helena office about 5:15 p.m., I was told that they had an order for 70 more men and that they were going to hit the head end of the fire that night. This request was originally thought to have come from Dodge, but further information disclosed that it had come from another source, because the jumper radio had been destroyed during the drop.

Late the night of August 5, we received word in Missoula that the Mann Gulch fire had blown up and that our jumpers were in trouble. We were told that two jumpers, Hellman and Sylvia, were badly burned and that Sallee, Rumsey, and Dodge were O.K. Sallee was to lead District Ranger Jansson, two doctors, and a rescue crew to the injured men. Fred Stillings, regional air operations officer, told us not to release any information regarding the fire nor any of the jumpers' names until all details were known and the next of kin notified. Any information had to go directly through Sid MacLaughlin, our regional personnel officer.

The night of August 5 and early August 6, the Mann Gulch fire had become a project fire, one that requires large crews for control. At that time the regional office stepped in. Regional Forester Pete Hanson, Fire Control Chief Clayton Crocker, and two assistants, Clarence Strong and Monk DeJarnette, reported to the Helena National Forest at 3 a.m. Hanson took over search and rescue activities, which were still the number

one priority on the fire. Crocker assigned Strong the north and east side of the fire. DeJarnette was in charge of the Helena fire headquarters. Crocker immediately began to mobilize large, organized fire crews and experienced supervisors and the fire fighting gear it would take to support them.

At 7 a.m. on August 6, Dodge called the Missoula base and requested a helicopter, litter bearers, radios, ambulances, and doctors. Dodge hoped that the equipment would arrive in about two hours. Unfortunately, the copter and its special crew of smokejumpers were stationed at Moose Creek. Slim Phillips was immediately sent to Moose Creek in a Trimotor to pick up Mike Hardy, project leader, Art Pritzl, mechanic, and the copter crew, which consisted of Herb Oertli, Francis Anywaush, Jack Dougherty, and Ed Ladendorff. This was the first season that a copter had been used in Region 1; these were the only men who knew what the copter could do. Jack Hughes flew the copter to the Helena airport, where he picked up Dr. Amos Little, the man who had been trained by the smokejumpers for rescue missions, and fastened litters to the sides of the copter.

When the copter crew arrived at Hale Field in the Trimotor, they picked up squad leader Skip Stratton and five more smokejumpers. They loaded all equipment requested by Dodge and flew to the Helena Airport, where they were to be transported to Hilger landing on the Missouri River, and then boated to Mann Gulch.

After Dodge's call the morning of August 6, the jumper base in Missoula was in deep gloom. We waited for more information about the Mann Gulch crew and tried to answer calls from parents and relatives. The tragedy was on every radio station and was beginning to show on the front page of every newspaper in the nation. Much of the information was wrong. Some stories had the parachutists caught by flames before they could free themselves from their jump gear. Other stories said they were burned alive while hanging in trees or trapped by cliffs. These reports brought a deluge of phone calls and telegrams from friends, relatives, parents, and concerned citizens. Because I was better informed than anyone else about the whereabouts of various jumpers, I had to answer most of the calls.

Even after assurances that a jumper was not involved in the Mann Gulch fire, the caller might want to talk to him, personally, to make absolutely certain he was O.K.

It was difficult for me to remain in Missoula and not know what was going on in Helena. All we knew was that Hellman and Sylvia had been injured and were in the hospital, and that Dodge, Rumsey, and Sallee were O.K. Soon afterward we learned that both Sylvia and Hellman had died by noon. The evening newspaper reported that district fireguard Jim Harrison had died in the fire and his body had been positively identified. Harrison had been a smokejumper the previous summer but had taken the fireguard job at Meriwether Campground because his parents thought jumping too dangerous. He had joined the jumpers shortly after their landing. The newspaper reported that the bodies of three jumpers had been recovered but would not be identified until notification of next of kin. The headlines read "4 fire fighters die in blaze, 6 hurt, 6 missing."

About 11 p.m. on August 6, Stillings told me to round up the personnel files on the Mann Gulch crew and to report to the Helena National Forest to confirm identity of the bodies. Jack Nash and Al Cramer were to assist me. We arrived at the supervisor's office at 3 a.m. Here we learned the full extent of the tragedy. There was little hope that any of the missing jumpers would be found alive. The bodies of Harrison, Bennett, and Reba had been tentatively identified and were being brought to the copter landing. Thol's body was already in the morgue, positively identified, and sealed in a casket.

Shortly after daylight, more bodies came into the morgue. We identified the men by little peculiarities that we recalled, which made the job all the more emotional. McVey, for example, tied his shirt tails in a knot around his stomach. Reba and Sylvia were buddies who shared a car. They had duplicate sets of keys in their pockets. When the bodies of Hellman and Sylvia were brought in from the hospital, 12 corpses lined one side of the morgue. It was hard to believe that these were the same young men I had joked with while helping them into their jump gear less than two days before. The last body was brought in

shortly after noon. The two funeral homes now bickering over how this grisly business should be shared added to our sorrow.

The evening of August 7, Henry Thol came into the funeral home to personally confirm the identity of his son. Thol was a retired district ranger from Kalispell. He said that he could not tell his wife that the body in the casket was his son unless he had a look at it. Two undertakers, Thol, and I started to open the casket, which was bolted together at 3/4-inch intervals. After the first few bolts were removed, the undertakers found other things to do, which left Henry and me to do the job. Henry confirmed that this was indeed his son. Mercifully, his son's face, hair and upper body were not so badly burned as the other bodies. Nevertheless, this was an awful sight for any father. I have often marveled at the courage of this man on that tragic day.

Personnel officer Sid MacLaughlin had another unpleasant job. He had to notify next of kin, prepare news releases, and work with Bill Beaman in disposition of the bodies. MacLaughlin had offered to fly Mrs. Hellman to Helena to see her husband, but before a plane became available, Bill Hellman died. MacLaughlin called forester Carter Helseth, a friend of the Hellman family, who then personally notified Hellman's parents of their son's death. When MacLaughlin learned that all but two of the bodies had been recovered, and those two jumpers were not expected to have survived, he began informing next of kin. He wired the families in the West, but sent night letters to those in the East, so they would not receive this terrible news in the middle of the night. Smokejumper squad leader Bob Manchester was assigned to collect all personal effects. He visited banks, post offices, laundries, and so on to collect belongings of the deceased jumpers. He then arranged to ship the property to next of kin.

Of course, not all of the contacts with next of kin were by mail or phone. We met many of the parents face-to-face. Sometimes in tears, we tried to explain this tragedy. Regional Forester Hanson, Clayton Crocker, and Wagner Dodge visited families in Missoula and Kalispell. Dodge and other jumpers attended the funeral of McVey, near St. Ignatius, Montana. The regional

forester sent a letter of condolence describing what happened at Mann Gulch to all next of kin he could not personally visit. An uncle of Silas Thompson flew from Charlotte, North Carolina, to Missoula, arriving August 8, to personally talk with Dodge and Hanson. The Forest Service later received letters from both Thompson's mother and the uncle, stating that they in no way held the Forest Service or Dodge responsible for the death of Silas Thompson. The uncle, favorably impressed with Dodge, said he would be glad to work for the smokejumper foreman at any time.

Jumpers based in Missoula collected money to help the families of the dead. They raised about \$1,600 right away, and more money trickled in. A share of the fund was sent to the parents of Silas Thompson. They returned not only the contribution but also enough additional money to set up a \$500.00 scholarship, the Silas Thompson Award, at the University of Montana School of Forestry. This award is still active today.

The federal government was far from generous with the families of the jumpers. It took considerable agitation to obtain enough money just to cover burial expenses. Only \$200 was allowed for unmarried men. Jumpers with dependents fared little better. The \$200 maximum burial expense had probably been in force since the 1910 forest fires.

Surprisingly, the Mann Gulch tragedy did not hurt the morale of the remaining jumpers. Only one or two quit early because of it. As for the survivors, Sallee and Rumsey made several more fire jumps. Shortly after he returned to Missoula, Sallee flew back to Mann Gulch to show where to drop cargo to the rescuers.

MacLaughlin had a tough time with the news media while trying to notify next of kin. He was having a particularly difficult time in contacting McVey's parents in Babb, Montana, and Navon's parents in California. But as soon as he convinced the reporters that he could not and would not release names until all next of kin had been notified, and he explained his difficulties, the press became more cooperative.

With the aid of a light rain, the spread of the Mann Gulch fire was stopped on Sunday, August 7. The fire was surrounded by

fireline on August 10, five days after the start. The burned area totaled an estimated 5,000 acres.

It took a massive effort to corral this killer fire. The U.S. Air Force base in Spokane contributed five transport planes. Two hundred trained firefighters were called from Lewiston, Coeur d'Alene, and Moscow, Idaho, and flown to Helena. Firefighters were recruited at Helena and were trucked in from other points. Farmers and ranchers volunteered. The U.S. Reclamation Service, Montana State Highway Patrol, and the U.S. Air Force base at Great Falls, Montana, sent men to lend a hand. Virtually every national forest in western Montana contributed firefighters and experienced supervisory personnel. A ten-mule packstring was trucked in from the Forest Service Remount Depot near Missoula. Eventually, five fire camps ringed the Mann Gulch fire: Meriwether Gulch, Elkhorn Gulch, Willow Creek, Kennedy Springs, and Willow Mountain. A total of 450 men worked on the fire. The camps communicated by radio. The State of Montana, the Montana Power Co., and the Forest Service supplied the radio facilities.

The Mann Gulch fire created considerable ill will between the public and the Forest Service, especially after the many erroneous stories. One of the main questions was why we risked lives and spent many thousands of dollars to save scrubby timber and cheatgrass. That was a good question then and a good question today. Some ranchers near Helena criticized Forest Supervisor Moir for setting aside Mann Gulch as a wilderness area where livestock was banned. They charged that the ungrazed grass was especially thick and heavy, which contributed to the speed and intensity of the fire.

To quiet the rumors and criticism and to find out what really happened at Mann Gulch, Forest Service Chief Lyle Watts ordered Carl Gustafson, chief of the division of fire control, to investigate the matter and to arrange for a board of review. On August 9, Gustafson and Seth Jackson, safety officer from the chief's office, inspected the Mann Gulch fire. Accompanying them, among others, were a writer and a photographer from *Life* magazine. Ironically, for two months the journalists had been working with the parachute project on a feature story on

aerial firefighting. Gustafson had little trouble persuading *Life* to run a factual story in the August 22 issue, which certainly helped clarify the situation. Nevertheless, a terribly erroneous story appeared in the prestigious *Saturday Evening Post* on October 29. Written by William Worden, the article was entitled, "When the Forest Burns." On page 89 the article states: "Near Helena, Montana, two particularly vicious fires broke out in territory reachable only by Missouri River boat or plane. Here thirteen men died—eleven parachutists caught by flames before they could free themselves from their jump gear. Flames backed desperate fighters against high ramparts, up which there was no escape. More than 6,000 acres burned."

The board of review convened in Missoula, September 26-29, 1949. The board was chaired by C. M. Granger, assistant chief of the Forest Service, in charge of national forest administration. Other members were as follows: H. D. Cochran, chief of the division of personnel management, office of the chief; Jay H. Price, regional forester, Region 5; Lawrence K. Mays, assistant regional forester, division of operation, Region 6; J. Malcolm Loring, forest supervisor, Chelan National Forest, Region 6. The board was assisted by technical advisors C. A. Gustafson, chief, division of fire control, office of the chief; and Francis Lufkin, smokejumper foreman, Chelan National Forest.

The board was seeking the answers to the following questions:

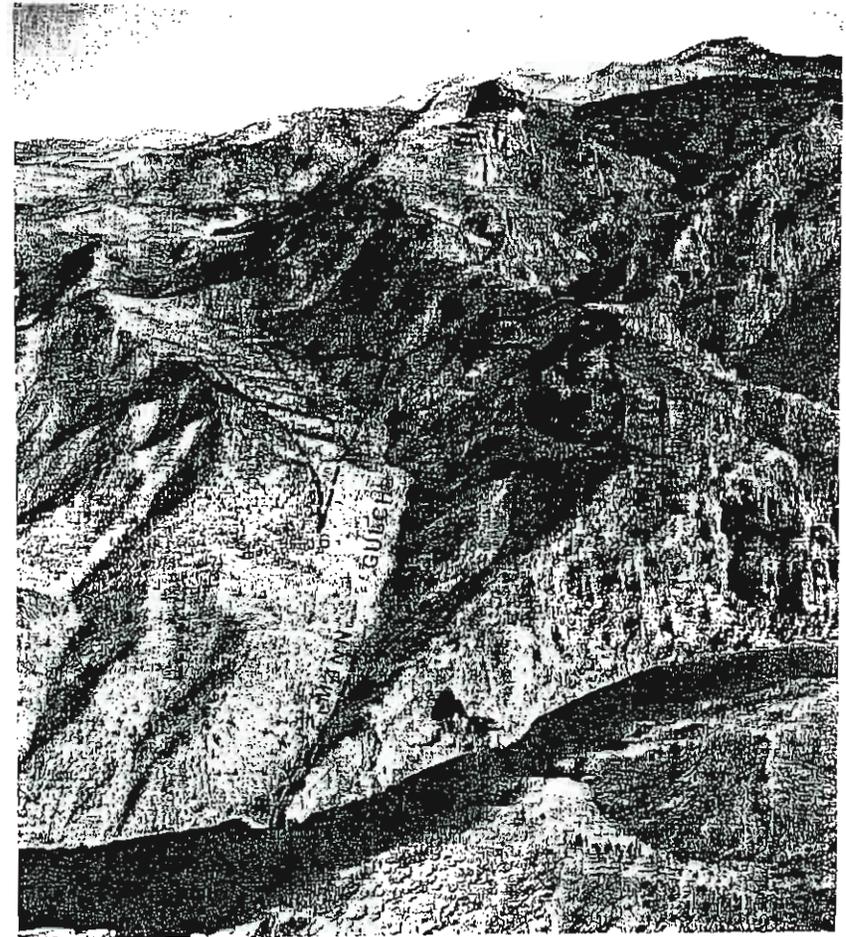
1. Were the weather conditions on August 5 unusually hazardous for the employment of smokejumpers?
2. Was there a safe jumpspot near the fire and was such a jumpspot selected?
3. Did the terrain, fuels, and fire behavior at the time of the jump pose a clear danger to the jumpers at the site they were 'dropped'?
4. Were supervisors delinquent in not warning the crew of "known impending danger?"
5. Did the foreman fail to exercise leadership or judgment due to insufficient training or otherwise? Had the crew members been trained in various phases of firefighting, including escape training?

On September 26, the board and its technical advisors and key witnesses flew over Mann Gulch and reviewed the smokejumper drop from the air. Then the board landed in Helena and traveled to the site by boat. Here they walked the blackened slopes and listened to the testimony of Foreman Dodge, Ranger Jansson, and Regional Forester Hanson.

On September 27, the board questioned some 18 witnesses. The full testimony consumes 202 pages, far too much to offer here. Moreover, much of the questioning is repetitious, as the board checks the testimony of various witnesses. Sometimes the questions wander from the main issue—why thirteen firefighters were overrun by a forest fire—to the management of the fire itself.

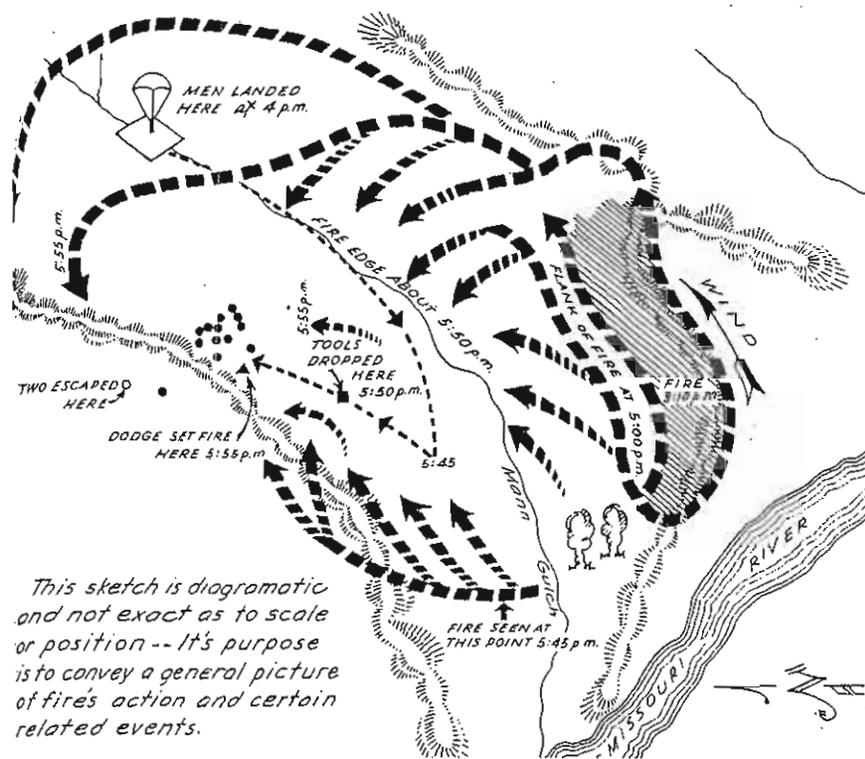
Two years after the board of review had convened, the Forest Service, perhaps fearing lawsuits, took sworn statements from the survivors and from key witnesses. The sworn statements are in fact condensed versions of the testimony before the board of review and focus on the main concerns of the Mann Gulch disaster—the movements of the smokejumper crew and the decisions of foreman Dodge. For these reasons I will cite the sworn statements, not the testimony, while attempting to reconstruct what happened after the jumpers were dropped. The statements of Dodge, Rumsey, and Sallee are verbatim. That part of Ranger Jansson's statement beginning with the evening of August 5 is used to describe the rescue attempt that night and the morning of August 6. The statement of Dr. T. L. Hawkins is included to describe the condition of the two jumpers who later died and the circumstances surrounding the rescue.

To help the reader follow the movements of the smokejumpers and the fire, I have included an aerial photo of Mann Gulch, and a map depicting the movement of the fire. The testimony of the survivors and the illustrations will enable the reader to understand the testimony and form his own conclusions about what happened that fateful afternoon some 35 years ago. Much has been written about Mann Gulch. A motion picture "Red Skies Of Montana," loosely based on the tragedy, was made in the early fifties and is even today seen on T.V. Undoubtedly



Movements of smokejumpers, Mann Gulch, Helena National Forest, August 5, 1949. Adapted from figures 3 and 4, Report of Board of Review, Missoula, Montana, September 29, 1949.

1. Drop zone. (4 p.m.)
2. Dodge meets smokechaser Harrison at fire. (5 p.m.)
3. Dodge and Harrison meet crew; Dodge sends crew toward river.
4. Dodge and Harrison return to drop zone.
5. Dodge and Harrison rejoin crew and continue toward river. (5:40 p.m.)
6. Dodge sees fire ahead, retreats up ridge. (5:45 p.m.)
7. Dodge sets escape fire. (5:55 p.m.)
8. Eleven smokejumpers and Harrison overrun by fire. (5:57 p.m.)
9. Rockslide where Rumsey and Sallee took refuge. (6:05 p.m.)
10. Hellman found severely burned. (6:30 p.m.)
11. Route of Ranger Jansson, turned back by spot fires. (5:25 p.m.)



This sketch is diagrammatic and not exact as to scale or position -- Its purpose is to convey a general picture of fire's action and certain related events.

Map of fire action at Mann Gulch, August 5, 1949.

Original map from Report of Board of Review,
Missoula, Montana, September 29, 1949.

more will be written about Mann Gulch. But to me, nothing captures the stark reality of this disaster so well as the testimony of the men who were there, particularly the three smokejumpers who survived it.

Let's begin with the statement of Wagner Dodge, the 33-year-old foreman selected to lead the crew. Dodge had nine seasons of general Forest Service work, which included firefighting. In addition, he had eight seasons as a smokejumper, having started jumping in 1941. After serving

about eight months with the Coast Guard in 1942, he received a medical discharge and returned to the smokejumper project. He had been a smokejumper foreman since 1945. For three seasons he had been in charge of aerial attack on fires along the Continental Divide. Here, he became familiar with firefighting conditions similar to Mann Gulch. He had 41 jumps and was considered one of the most competent and experienced of the smokejumper foremen.

Statement of R. Wagner Dodge

I took off from Missoula, Montana, at 2:30 p.m., August 5, for Mann Gulch Fire, Helena National Forest, with the following men: Robert J. Bennett, Eldon E. Diettert, Philip R. McVey, David R. Navon, Leonard L. Piper, Stanley J. Reba, Marvin L. Sherman, Joseph B. Sylvia, Henry J. Thol, Jr., Newton R. Thompson, Silas R. Thompson, and William J. Hellman as my squad leader; also Robert Sallee, Walter Rumsey, and Merle Stratton with Earl Cooley as spotter, Jack Nash as assistant spotter and Elmer Bloom, photographer.

We arrived over the fire, which was about 60 acres in size, at 3:10 p.m. Jack Nash called my attention upon sighting the fire in Mann Gulch. I took position in the door of the plane to observe the terrain and characteristics of the fire. The first tentative jump spot on top of the ridge between Mann Gulch and Meriwether Creek northeast of the patrol point was not considered suitable because of its position in the path of the fire. Another spot was picked in the bottom of the gulch in the vicinity of the head of Mann Gulch. I was concerned over this choice for reasons that if any injuries occurred, it would be almost impossible to get the injured person out. I related this to the spotter, who was Earl Cooley, but I also okayed the spot as suitable to jump to, which was about one-half mile north of the fire.

The fire at this time gave indications that its rate of spread would considerably reduce throughout the evening and night. It was approximately 3:50 p.m. when I looked at my watch upon landing in the jump area. I had an extremely hard landing, and

Rumsey came down the hill and helped me off with my jump gear, and I remained there until the rest of the jumpers were down. Hellman reported to me that all the men were okay that had jumped, and we accounted for 13 other jumpers. Merle Stratton did not jump.

Our cargo was dropped to us from approximately the same elevation that we jumped from, and upon landing, was scattered over a considerable area. The chute with the radio failed to open.

It was approximately 5:00 p.m. when all the cargo was retrieved and camp established below the jump area. At that time, I could hear someone hollering over on the fire across the canyon. I left Hellman with the crew to pick up some subsistence and water before starting down the canyon and left instructions for him to follow me over to the far side of the canyon with the crew. I contacted Harrison, the prevention guard, up on the head of the fire and brought him back to join our crew, and told Hellman that he should take the crew and return to the northwest side of Mann Gulch and start toward the river grading out of the canyon as he went. Harrison and I returned to our camp area, from where I could see that the fire had started to boil up, and I figured it was necessary to rejoin my crew and try to get out of the canyon as soon as possible.

I caught up with the crew about 5:40 p.m. and had Hellman stop and see that all the crew was together and to remain on the end of the group. We continued down the canyon for approximately five minutes of travel before I could see that the fire had crossed Mann Gulch and was coming up the ridges toward us. I then reversed our direction and started to return to the north, up the northwest side of Mann Gulch, climbing as we went. After traveling approximately 1,000 to 1,500 feet, I instructed the crew to drop all heavy equipment. (I did not know until later they had discarded shovels and pulaskis.) After returning to approximately above our camp area to the west of Mann Gulch, the fire was too close, in my estimation, to continue farther. At this point, I stopped the crew and explained to those nearest me (at least eight men) that we would have to burn off a section of the light fuel and get into the inside in order to make it through. In my opinion all my men were still with me or very close and no stampeding was occurring.

After setting a clump of bunch grass on fire, I made an attempt to start another, but the match had gone out and upon

looking up, I had an area of 100 feet square that was ablaze. I told the men nearest to me that we would wait a few seconds to give it a chance to burn out inside, and then we would cross through the flames into the burned area, where we could make a good stand and chances of survival were more than even.

Upon walking around to the north side of the fire I started as an avenue of escape, I heard someone comment with these words, "To hell with this, I am getting out of here!" and for all my hollering, I could not direct anyone into the burned area. I then walked through the flame towards the head of the fire into the inside and continued to holler at everyone who went by, but all failed to heed my instructions; and within seconds after the last man had passed, the main fire hit the area that I was in. Prior to this I heard some of them say they thought they could reach the top of the ridge and they all started up the side of the mountain. They started off walking and did not seem panicked. The nearest point of the fire at this time was about 100 yards below and behind us. After the men left me, I walked into the burned off area and continued calling at the top of my voice for the men to come back and join me. This was about 5:55 p.m. When the main fire reached my area, I lay down on the ground on my side and poured water from my canteen on my handkerchief over my mouth and nose and held my face as close to the ground as I could while the flames flashed over me. There were three extreme gusts of hot air that almost lifted me from the ground as the fire passed over me. It was running in the grass and also flashing through the tree tops. By 6:10 p.m. the fire had passed by and I stood up. My clothing had not been scorched and I had no burns. At that time, I heard someone holler to the east of me. Upon investigation, I found Sylvia approximately 100 feet below and 150 or 200 feet to the east of my location. He was badly burned, and I moved him to the shelter of a large rock and made him as comfortable as possible by removing his shoes, clearing an area of rocks, and retrieving his canteen. Then I told him I would start out for some help. Upon reaching the top of the ridge and starting down the other side, I met Sallee and he told me that they had Hellman down below on a rock and that he was badly burned and Rumsey was okay and was staying with him. I went down with Sallee, and we decided there wasn't anything we could do for Hellman, so we left our water, my coat and some other gear, and Sallee and I started for help.

We had to travel through the burn for approximately $\frac{3}{4}$ mile before we got to the fire's edge and about $\frac{1}{2}$ mile more before we reached the Missouri River. As we were not in possession of maps, compasses, or any means of locating ourselves, we were in doubt as to which direction would bring the closest and soonest help. Previous to leaving Missoula we were instructed to make contact with the ground crew, which made maps, etc. unnecessary. Therefore, we placed our shovel upright on the shore nearest the canyon we came down and tied a bandana handkerchief around the handle. Then we both took up for Elkhorn Creek, as we had noticed a ranch approximately three or four miles up the creek. Upon starting up Elkhorn Creek, we decided to leave the road and go up on the edge of the bench so we would be more noticeable if a search party had been sent out.

About this time, we sighted two motor boats off the mouth of the gulch we came down. We started toward the river, signalling with our flashlight as we went, but could not attract attention of either one. This gave us indications that there must be a boat club or some other source of transportation from where we were. I was sure that we could not travel too far up the river because of rock ledges descending into the water but was fortunate enough to hear a dog bark across the river, just below Mann Gulch, and we hollered and signalled across and got a response from a party that was observing the fire from that point. We requested the operator, Eugene Naegle, to take us to the nearest point of communication and by approximately 9:00 p.m. we were at Meriwether station where my information was relayed to the outside and Ranger Jansson.

About 11:00 p.m. I directed four boats from Meriwether to the gulch above the mouth of Elkhorn Creek and returned to Meriwether. The next day (August 6) was spent in locating the bodies of the men in the burned area. August 7 was a continuance of this work since three bodies remained unlocated. They were located late in the morning.

R. Wagner Dodge.

Another key witness was Robert W. Sallee, of Samuels, Idaho. Sallee had two seasons of general Forest Service experience before becoming a smokejumper. Mann Gulch was his first fire jump. At the time he appeared before the board of

review he had made two additional fire jumps. On his smokejumper application forms, Sallee had given his age as 20 years old; actually, he was 17.

Statement of Robert W. Sallee

On Friday, August 5, 1949, at about 3:30 p.m. we left Johnson's Airport in a C-47 plane to go to a fire near Helena, Montana. There were 16 men including myself with Wag Dodge as foreman and Bill Hellman as squad leader.

We suited up on the way over and everyone was ready to jump when we arrived over the fire. Due to the extremely rough air, several of the fellows were sick. Merle Stratton became so ill he couldn't jump.

After the jump spot had been chosen, I started to get in the first stick as I was almost sick myself by then, but I was a little late. I jumped first man in the second stick.

The jump spot seemed to be a good one as it was on an open hillside with very little timber and a good grass cover. I hung up in a lodgepole pine but my feet were on the ground.

I retrieved my chute and sacked my gear while the plane was dropping cargo. I finished about the same time the plane finished dropping cargo. I had noticed that one of the cargo chutes hadn't opened and it hit the ground with a terrific impact. It turned out to be our radio. I believe the cargo was dropped from about the same height that we jumped. This resulted in the cargo being badly scattered and in it taking a good deal of time to gather it. The air was the roughest I have ever seen it that day so I guess the plane just couldn't take the chance of getting down any lower to drop our cargo.

I took my gear up to the pile where Wag was and put my tags on it. I believe this was approximately 4:15 p.m. Then I went to help retrieve cargo. I took a look at the fire and decided it wasn't bad. It was burning on top of the ridge and I thought it would continue on up the ridge. It was my opinion that it probably wouldn't burn much more that night because it was getting near the end of the burning period for that day and it looked like it would have to burn down across a little saddle before it burned uphill any more. I don't recall any particular change in the fire behavior during the time we were gathering the cargo.

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After the cargo was collected I helped Newt Thompson and Bill Hellman fix a bad cut on Wag's elbow. We then broke the tool and food packages open and began eating a lunch. About that time Wag Dodge started up toward the head of the fire to contact the ground crew since we had heard someone calling from up that direction. Dodge instructed Hellman to tool the crew up and bring them up to the fire as soon as we finished eating a lunch. Within 10 to 15 minutes we tooled up and with food and water packs proceeded down and across the gulch and then started climbing the steep slope toward the head end of this fire. After traveling about ¼ mile down the gulch and then crossing to the south side of the gulch and climbing 100 yards or so up the slope the fire was on, we met Dodge and the smoke-chaser (Harrison) coming down. I heard Dodge say something to the effect that we had better get out of that thick reproduction because that was a death trap and he instructed Hellman to take the crew back across to the north side of Mann Gulch and head down the gulch toward the river. He said he and the smoke-chaser were going to return to the cargo spot and get some food and water and that they would catch up with the crew later.

Hellman then led the crew back across to the north side of the gulch and we started angling along the sidehill toward the river, grading up out of the bottom of the gulch as we traveled. Within five minutes or so, Dodge and the smokechaser caught up with the crew and Dodge took the lead toward the river. When Dodge came down from the fire he didn't seem to be worried or excited about the fire, but when he caught up with us again he started the crew hurrying down the gulch as though he was somewhat worried about the behavior of the fire and our safety. It seems to me that we didn't travel down the gulch more than a couple hundred yards after Dodge caught up with us until Dodge reversed our direction and started back up Mann Gulch in the general direction of where we had jumped, but angling quite strongly up grade as we went. When Dodge turned the crew back up the gulch, Walt Rumsey and I were the two last men in the line. We were traveling in that position because we were each carrying an unsheathed saw. As I recollect Hellman was traveling right in front of Rumsey and I. When the head of the line switched back, Rumsey and I cut across and dropped right in behind Dodge and I believe Hellman did the same. At any rate Hellman was up toward the head end of the line very soon after

we turned back because I recall him being there when he gave the crew orders to drop their packs.

Prior to the time Dodge turned the crew back up the gulch, I hadn't noticed that the fire was any worse than when we left the cargo assembly spot. When Dodge turned the crew back up the gulch was the first warning I had that there might be danger of the fire trapping us. I couldn't see any flames on our side of the gulch but I could see a heavy smoke indicating quite a fire had just started right ahead of us and on our side of the gulch. I still didn't notice any particular difference in the appearance of the fire across the gulch. In other words, the main fire still appeared to be confined to the upper third of the slope on the south side of Mann Gulch. By the time we dropped our packs and tools the fire was probably not much over 100 yards behind us and it seemed to me that it was getting ahead of us both above and below. We were traveling as fast as we could and were just about holding our own with the fire directly behind us. When we broke out into the opening where Dodge was, I could see fire considerably ahead of us in the bottom of the gulch where we had jumped and where we had assembled our cargo.

There was four or five of us boys right with Dodge or right behind him when he set the grass on fire. I saw Dodge light the grass on fire and heard him say "Up this way." At that time I recall seeing the last men in our crew line coming out of the timber into the grass area and the fire just about reaching the edge of the timber. The fire that Dodge set in the grass burned straight up the hill very fast to the ridge top to our left. I got the impression that Dodge had set this fire as a buffer to the fire that was directly behind us and that we should head for the ridge top along the right hand edge or east side of the fire he had set. The east edge of the fire Dodge had set was just about a straight line up the slope to the ridge top. It was just blazing up two or three feet high and just spreading slowly sideways on the slope. Rumsey, Diertert, and I hurried as fast as we could practically straight up the slope and close along the burning edge of the fire Dodge had set. When we came to a crevice in the rock ledge, Rumsey and I climbed up through the crevice while Diertert swung along under the rock ledge to the right. When I got above the rock ledge and while I was waiting for Rumsey to climb up to where I was, I looked back down in the direction in which I had last seen Dodge. I saw Dodge jump over the burning edge of the

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fire he had set and saw him waving his arms and motioning for the other boys to follow him. At that instant I could see what I believe was all the balance of the crew. They were within 20 or 50 feet of Dodge and just outside of the burning edge of the fire Dodge had set. The last I recall seeing the group of boys, they were angling up the slope in the unburned grass and fairly close to the burning edge of the fire Dodge had set. Up to that time the east edge of the fire Dodge had set had only spread sideways of the slope. I went on over the ridge out of sight of Dodge and the crew feeling that all the boys except Diertert, and possibly Navon, had probably joined Dodge and were safe. I had noticed Navon cut off up the hill away from the crew just before we broke out of the timber and hadn't noticed him rejoin the crew. As I recall I also heard Dodge shouting at the boys at the same time I saw him waving his arms, but I couldn't understand what he was saying.

When Dodge first set the fire, I did not understand that he wanted us boys to wait a few seconds and then get inside the burned out grass area for protection from the main fire, but when I looked back from near the ridge top it was then obvious that he wanted the crew to join him inside the burned out grass area. However, since Rumsey and I had practically made the ridge top then, we elected to continue on over the top and along the opposite hillside rather than return back down the slope to join Dodge.

After making the ridge top, Rumsey and I then ran along the ridge and opposite sidehill which was not on fire, until we found a section of slide rock where we believed we would be safe. Rumsey and I were on the slide rock a good five minutes or longer before the fire burned down to us directly from the Mann Gulch direction. The first flames we saw after reaching the slide rock area were directly above or slightly more east of us which would indicate that the fire came out of the head of Mann Gulch or about from the area where we had jumped. There apparently was quite a high wind blowing straight up the slope at the time Dodge set the fire because that fire spread very rapidly straight up the slope and only slowly sideways to the slope. Judging by what I saw I am positive that the fire Dodge set had nothing whatever to do with burning the boys. I also feel just as positive that the group of boys which I could see near Dodge, just before I went over the ridge, understood that Dodge wanted them to join

him inside the burned out area but for some reason elected not to do so. I feel certain that it was the fire that I had noticed in the gulch bottom and ahead of us which swept up the slope and caught the boys.

After the fire had burned out around us and the smoke had cleared we yelled to see if anyone else had made it. We heard an answer off to our right (west) about 30 yards. We found Bill Hellman badly burned. I went for the first aid kit, but the area on the other side of the ridge was too hot to go into. When I got back to Walt and Bill we decided we'd need help fast. About that time I heard Dodge yell up on the hill. I went up and met him about halfway down. He hadn't been burned at all. Dodge and I went for help and left Rumsey with Bill Hellman. We went about ½ mile to where we crossed the fire line and went on down to the river. We didn't have a map so were uncertain of what direction to go for help. After reaching the river, we started for the mouth of Elkhorn Creek after leaving our shovel sticking upright in the sand with a bandana tied to it. When we got up there a ways we saw two boats coming down the river. We tried to make it back and hail them but failed to attract their attention. We then decided we had better go that way (back up the river) instead.

We went up the river about a mile and a half till we heard a dog barking across from us. We called across and some sight-seers came over and took us to Meriwether Station where the ranger ordered help over the radio.

When help came I went back with them to where Hellman and Rumsey were. After the doctor had fixed Hellman up we went and found Sylvia. The next morning I helped carry Sylvia to the boat.

When Rumsey and I first found Hellman he told us the fire had caught him just as he hit the top of the ridge. He said he believed he was going to die and wanted us to do away with him. He was obviously in very severe pain. The only time that I am positive of in connection with this whole affair is that Rumsey's wrist watch showed 6:05 while we were sitting in the slide rock getting our wind. I don't recall that we were given any training relative to setting escape fires such as Dodge set in this case but I do recall that we were told to always follow the leader and to do what the boss told us to do at all times. I believe the boys understood what Dodge wanted them to do but either followed Hellman or just went on their own ideas.

The third survivor was Walter B. Rumsey, Garfield, Kansas, age 21. Rumsey had served a year in the Navy Air Corps and was a forestry student at Montana State University. He had two years of general experience with the Forest Service prior to becoming a smokejumper, both of them as a firefighter or as a lookout-fireman. Like Sallee, Mann Gulch was Rumsey's first fire jump. At the time of the hearing he had made three additional fire jumps.

Garfield, Kansas
January 7, 1952

Statement of Walter B. Rumsey

We left Missoula in the C-47 around 2:30 p.m. I didn't see the fire until shortly before I jumped in the first stick, third man, around 3:45 p.m. The jump spot appeared to be about ¼ mile northeast of the fire. From the few short looks I had, I saw only one hot spot that looked bad. I remember thinking that this fire would be mostly mop-up work. The possibility of a blow-up never entered my head. The fire seemed to be mostly on the ridge but down somewhat on the Mann Gulch side. The smoke was drifting up the ridge. I noticed the fire burning intensively in only one small place.

There was little choice about a jump spot. The likely place seemed to be on the grassy slope toward the upper end of the gulch some distance from the fire. I landed hard but safely. Dodge landed a few yards from me and did not get up. I removed my harness and went to help him. He seemed dazed. I helped him off with his suit and looked at his elbow which he had complained about. There was a puncture wound right at the joint. The bone was visible but there was very little bleeding.

We watched the other boys come down. Two of the boys got tangled and came down together. They were Eldon Diettert and Newton Thompson. I retrieved a water can and helped the other boys move the cargo to a central place some distance below my landing spot. The air was extremely rough that day. This re-

sulted in the cargo being dropped from quite a high altitude and being quite widely scattered. It probably took between 20 to 30 minutes to drop the cargo and about 45 minutes to gather it all to one central spot. We broke out the canteens and Dodge instructed us to fill one apiece and also to get a bite to eat from the rations.

We heard a shout from the fire across the gulch which later proved to be Harrison, the smokechaser. He was evidently the only other man on that end of the fire. Dodge went to locate him and told Hellman to bring the crew and follow him as soon as we got our water, food, and tools. I believe it was then about 5 p.m. I carried a water can on a pack board. We were all double tooled as we followed Hellman down into the bottom of the gulch and up the other side toward where Dodge had gone. We did not go all the way up to where Dodge had gone. He shouted down and told us to stay where we were, which was about 100 yards slope distance up from the gulch bottom. He came back with the smokechaser and talked to Hellman but do not recall the conversation. The time must have been close to 5:20 p.m. by then. We all turned around and went back down across the gulch and up the other side. We did not go straight up. We angled out in a westerly direction toward the river and the mouth of Mann Gulch. Somewhere along the line part of the crew got separated from the balance. I was in the front half. Shortly before the separation Navon asked to relieve me on the water can and I took his saw and pulaski. At this time I noticed the fire had picked up considerably and I especially noticed the air currents which whipped the flame first one way and then another. However, I still felt no apprehension at this time. As I recall, Dodge expressed the idea that it would be best and safer to work on the lower side and back end of the fire instead of the front end where he had found the smokechaser.

Soon after this we became concerned over our separation so we shouted. I thought that the other boys got ahead of us when I gave Navon my water can, and so was much surprised to see them come up from behind. Soon after that Dodge and the smokechaser caught up with the crew and we switched back and Dodge led the line up toward the ridge almost in an opposite direction from which we had been going. I did not realize why Dodge had practically reversed our direction of travel. About this time or soon afterwards I saw Navon and another boy

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taking pictures of the fire across the canyon. I did not observe that there was any fire on the north side of Mann Gulch at that time. We were still angling up the side slope as well as traveling back up Mann Gulch. The going was difficult as it was steep and rocky. I can only guess at the time—5:40 p.m. We continued up toward the ridge in an orderly manner. We reached a rocky place and Dodge told us to get rid of the saws and packs. We also shouted to the rest of the boys to ditch their equipment. Somewhere along the line I remember Dodge saying something about "getting out of this fire trap." As far as I remember there were three men ahead of me, Dodge, Hellman, and Diettert. I was getting nervous as I could hear and see the flames behind us and on our side of the gulch. Diettert was directly ahead of me with a shovel and pulaski. I took the shovel from him. Shortly afterwards I leaned it against a large pine. I was beginning to realize the danger about this time. We could see flames across the gulch but could see no fire on our side. However, we could hear a loud roar below and behind us. Before Dodge set his fire I saw no fire to my left.

Looking up from my climbing I noticed Dodge had stopped and had lighted a fire in the grass. It immediately spread straight up the side hill toward the ridge top on our left. There was a small group around him at the time. Diettert, Sallee and Hellman. I believe. I remember thinking that that was a very good idea but I don't remember what I thought it was good for. I can remember no conversation. I continued up the right side of Dodge's fire on towards the ridge. I could see a large rock sticking up and I thought if I could make it there I would be safe. Sallee was on my left and Diettert on my right slightly below me. I was very tired and winded. I didn't see to the right or left but only the rocks on top. It seems as if I went between two large rocks on top of the ridge. I was much cooler there. I started down the other side and tripped, falling into a juniper bush. I got up and sat down for a few seconds before running on down the other side. Sallee was still to my left but we had lost Diettert. We continued running until we ran into a large rock slide. There we stopped and the fire burned around us.

The first flames reaching us came from the ridge top directly above us. We moved to the bottom of the slide to avoid the heat from above. Later, as the area below burned we moved back to the top of the slide. While Sallee and I were in the rock slide we

discussed the situation. We felt sure Dodge had made it O.K. and believed the other boys had too. We chastised ourselves for being so stupid and not getting inside of Dodge's fire. I remember looking at my pocket watch and it was 6:05. I am reasonably sure that the watch was correct.

The right or east edge of Dodge's fire was practically straight up and down the slope and the flames were burning about waist high. This fire edge was not spreading rapidly. I can recall thinking, as I went practically straight uphill along the edge of Dodge's fire, that I could run through the flaming front to the inside of the grass fire and be safe if it got too tough. However, as I got nearer the ridge top I gave up the idea. Dodge did not appear to be excited. He always seemed to know what to do and was very deliberate about doing it. When Dodge first set the fire, I don't believe I understood the purpose for which he had set it but, as I went up along the edge of it, I began to realize that it was a buffer between me and the main fire and that I could seek shelter in the burned out grass area if necessary. I feel positive that the fire set by Dodge did not burn the boys. It was a protection to Diettert, Sallee, and myself as we climbed the slope to the ridge top and I do not see how it could have been any hindrance to anyone. I believe the fire that burned the boys came up from directly below them. I also feel positive that none of the boys would have been burned had they joined Dodge inside of the grass fire he had set. I believe it was just after I left Dodge and started up the hill along the edge of Dodge's fire when I heard someone say "to hell with that, I'm getting out of here." (*Editor's note: In his testimony before the board of review Rumsey said, "I am positive that it was Bill Hellman that said that."*) I do not know whether that influenced the other boys in not staying with Dodge and seeking shelter inside his fire because I don't know how many boys heard that remark. I don't recall that we had had any special training on what to do in case of an emergency such as this. We had instructions and training in fire fighting and were told to always follow the leader and to do what the boss told us to do.

After it had burned away we gave a shout in the direction from which we had come. It was then around 6:30 p.m. There was an answering cry for help. We went to the sound and found Hellman sitting on a large rock. His shirt was gone as was the seat from his pants. All we had was water which we gave him.

He was in terrible pain. Sallee went up the ridge to see if there was any chance of retrieving our first aid kit. There was no chance. As he came back down he met Dodge and they came back to me together. He left his coat, water and a can of Irish potatoes and a pulaski with me and then he and Sallee went for help. I remained with Hellman and tried to make him comfortable. He was very thirsty all the time and I could not give him enough water to satisfy him. At midnight there was no water left so we decided that I should go to the river and get some. I left him and headed for the river but heard someone call. I waited there until they got to me. It was Ranger Jansson, Sallee, two doctors, and several men with two stretchers. We went back to Hellman and gave him plasma, etc. Jansson and Sallee and a crew went to look for more men. I remained with Hellman. When it got light we started carrying him down. He was in good spirits and I figured he had a very good chance. It was around 5:30 a.m. when we got him to the river. At 6 a.m. I was at Meriwether. At noon I went back to Hilger landing with Sallee.

I was with Hellman from about 6:30 until midnight when I went down the slope toward the river for water. Hellman had no hope for himself at first but as we talked he seemed to regain some confidence. He asked about the other boys but I couldn't tell him anything about them. He said he had been burned just as he got to the ridge top. After the fire passed him he crawled and walked down the gully toward the river. He said he could see the water and so headed for it. He said he couldn't make it any further than the rock where we found him.

We talked about his family and he told me about his new baby and his wife. He indicated he was a Catholic and said his parents had wanted him to be more religious, and he wished he had. He gave me a short message for his wife. We prayed together and talked about God. I don't remember what was said. Later on we talked about water. He wanted to have more water but I was trying to ration it to him since we had very little. We ran out of water about midnight and we finally decided I should go down to the Missouri River for more. I met the rescue party coming up as I went down.

Next let's consider the testimony of Robert Jansson, ranger on the Canyon Ferry District. Jansson had spotted the fire from a patrol plane around noon and had called for jumpers. By 4:30

p.m. he had boated down the Missouri from Hilger landing, set up a fire camp at Meriwether Gulch, and had dispatched Alternate Ranger Hersey and a small crew to attack the lower flank of the fire. He then landed at Mann Gulch and attempted to locate the jumpers so he could tell them to join his crew. Jansson was forced back to the river when the fire blew up around him. From a vantage point along the Missouri he saw the fire take out the gulch in a firestorm. Jansson returned to his camp, momentarily expecting a radio call from the jumpers.

Jansson's Report on Rescue

Between 8 and 9 p.m., August 5. With the help of the Missoula Radio I found out the jumpers had landed but couldn't make out the location. We tried to contact them in hopes they had pulled off and were setting up camp in Willow Creek or Elkhorn. I still hoped to hear from their radio. We were in this process when Dodge and jumper Sallee walked into the Guard cabin at Meriwether and Dodge reported that he had two injured men. This was approximately 8:50 p.m.

Dodge was pretty badly busted up and I couldn't believe my ears or get the facts straight. Too many men were trying to crowd into the radio shack, so I pulled Dodge up the trail, the men followed so I chased them away. I finally got his story—he felt the eleven missing had outrun the fire. (I did not know, yet, that Harrison was with him.)

Immediately after being advised by Dodge regarding the two seriously burned jumpers, I ordered one doctor, two litters, and blood plasma from Helena through the Canyon Ferry radio. I then proceeded to question Dodge and Sallee further in an attempt to ascertain what the full situation was. I then directed Foreman Roos to organize a rescue party to accompany the doctor to the two injured men and to bear the litters. Dodge informed me that both injured men had water and were being cared for by Jumper Walter Rumsey and that there was nothing to be gained by anyone attempting to contact them before the doctor could arrive. Dodge advised me that the men burned were Bill Hellman and another man he didn't know the name of. One was on one side of the ridge and the other on the opposite side.

Robert Sallee was also uninjured and accompanied Dodge out of fire. They were picked up by Eugene Naegles in a boat cruising down the river.

With Hersey long overdue, I was the only man who knew the country intimately. I had no experienced overhead. All kinds of rumors were running through camp. After radioing for medical assistance, I attempted to formulate a plan of action. The rumors along with the fire glaring closely overhead were making a tense situation. Since we could do the injured no good until the doctors arrived, I refused to let any men start out. Several men heatedly told me we had to do something right now. Others wanted to crawl up on the rocks with the fire hose and wet down the fire. This would be extremely dangerous and foolhardy in the dark. I refused. Since the fire wasn't cooling down very much overhead because of the strong updrafts, I had Padbury stand by in case we had to evacuate the camp by boat. Men were worried about getting burned. I told them they were safe enough and could always wade out into the river. I was about to send Assistant Ranger Olsen up the Mann Gulch trail to see if he could find any trace of Hersey as he walked in at 10:10 p.m. I walked up to him and pulled him away from his men and asked if he was okay and had all his men. He said they were all okay but he was sure Jimmy was burned up. We then learned that Jim was with the missing jumpers and that one jumper hadn't jumped. Hersey's arrival helped ease the tension because it looked then like men could stand up to the fire and come off okay. We felt sure we would locate the missing men somewhere down river and when the rumor was reported to me as a fact that there were additional men injured down river, I said I would go check on the report. I instructed Hersey to take over, allow no one to leave the camp area and to keep track of everyone until I got back. Roos and the rescue party were to meet me at the mouth of Rescue Gulch. The report of other jumpers along the river turned out to be a rumor.

Men were agitated at the apparent inaction while waiting for the speed boat to get the litters. (The two doctors forgot the litters at Hilger landing.) Some suggested that we start out and have the litters sent up the hill when they came. This I refused to do for the following reasons as I told them. This was going to be a tough assignment. We were going to have to walk through the fire area. There was danger from rolling rocks and snags. We

couldn't afford to injure anyone else or take the chance of killing a man. We were going to have to be cautious, stay together in single file, limited the number of men, sent the excess back to Meriwether and had one boat stay at the mouth of Rescue Gulch to act as messenger and to remove the injured. About 11:30 p.m. we got started up the hill. The rescue crew consisted of 12 men, Gransville Edgmond, James H. Taylor, Frank L. Holland, Marvin Simmons, Jack H. Diamond, Martin L. Wostein, Stanley Grudisher, Doctor Hawkins, Doctor R. S. Hains, Don Roos, myself and smokejumper Sallee who directed us up the hill until we ran into Rumsey on his way to the river for water. Rumsey led us up to Bill Hellman who was propped up against a rock about 200 yards below the ridge separating Rescue Gulch and Mann Gulch.

Rumsey, Sallee and I arrived at Hellman at about 12:35 a.m., 8/6/49, in advance of main party by about 10 to 15 minutes. Bill was hollering for water. Bill's condition was bad—his face, arms, legs and back were severely burned. He complained of the cold and was very thirsty. We let him rinse out his mouth and drink a little water. When the doctors arrived they gave Bill a hypo, one quart of plasma, applied salve, transferred him to the litter, covered him with blankets, etc. After the doctors had the situation under control, I suggested to Don Roos that we hunt for the other injured man on the Mann Gulch side so we could give him a drink and guide the doctors to him. Accordingly, at 1:20 a.m. the three of us started out and crossed the ridge. On top we ran into a 12-foot rim rock breaking off onto the Mann Gulch side and had difficulty in finding a pass to drop over the ridge. We then split and started to comb the ridge top for several hundred yards each way. At about 1:50 a.m. we heard a faint cry below us and to our right. Roos and I went toward the cry. I sent Sallee back for the doctors as I felt he was weary enough without having to climb down in the hole.

When Roos and I reached the second man, he said, "Gee, it didn't take you long to get here. Please don't look at my face; it's too awful. Have you got any water? What time is it?" He was standing on a big rock which slanted down hill so sharply that he could hardly keep from sliding off down hill. He also said, "Say, fellows, I don't think I'll be able to walk down out of here." We told him his walking was over, he was going to get a free ride out. I looked at my watch and told him, "It's 2 a.m. on the nose."

We then got him to sit down and gave him some water. Since his hands were badly burned, I peeled an orange and fed it to him section by section. He said his name was Joe Sylvia and that after the fire swept over him, Wag Dodge had found him, cut off his shoe laces and pulled off his boots. Wag then cached him under the rock and said he would go for help. Joe said that if he had followed Dodge's instructions when the fire blew up he would not have been hurt. This was what Rumsey stated also. Sallee agreed.

Joe complained of the cold, Roos had given his jacket to Rumsey who had given Hellman his jacket and shirt. I had no jacket with me, so the best we could do was to give Joe our thin shirts which weren't much help. We then cuddled up to him one on each side and tried to keep him warm by our body heat. About 2:20 a.m. the doctors arrived and administered similar aid to Joe. Doctor Hawkins said Joe was all right and we could wait for daylight before starting out. He assured me the wait wouldn't endanger Joe's life so I felt it was better to wait until dawn to start out since the side hill was steep and rocky and litter-bearing in the dark would be extremely hazardous. Joe was worried about his shoes so I combed the hill side with a flashlight until I found them. I also found a half-filled canteen about ten feet from where we found Joe. I set Joe's shoes beside him since the knowledge that he had recovered his shoes gave him some comfort. Since only one blanket had been brought in with the litter by the doctors, all men stripped off their jackets and some their shirts and undershirts to wrap around Joe to keep him warm.

At daylight, before the light was good enough for travel, I spread out the six of us who were to carry out Joe's litter, along the hill side to search for the others. We had yelled at various times during the night and made several short trips looking for others. Joe said that early in the evening he thought he had heard voices below him and had shouted but got no answer.

At 4:30 a.m. I ran onto the first body which I identified as Jim Harrison by his glasses, Catholic emblem, Forest Service key #18 and the remains of the snake bite kit I had given him when I first assigned him to Meriwether. All clothing but his shoes were burned off. He was laying face down, pointed up hill. His body was 100% burned as were all bodies I found. Death had been instantaneous for all but the two injured. There was no

sign of suffering on any body but Reba's.

The ground appearance was that a terrific draft of superheated air of tremendous velocity had swept up the hill exploding all inflammable material causing a wall of flame (which I had observed from below at about 5:30 p.m. the previous evening) 600 feet high to roll over the ridge and down the other side and continue over ridges and down gulches until the fuels were so light that the wall could not maintain heat enough to continue.

This wall covered 3,000 acres in ten minutes or less. Anything caught in the direct path of the heat blast perished.

About 4:35 a.m. another man discovered another body and I had Sallee identify him as Robert Bennett. I tagged his body with a note weighted with a rock by his hand stating that Sallee had identified him as Bennett and signed my name. This was the procedure I used throughout my search.

We started down Mann Gulch with Joe at about 4:40 a.m. Unfortunately there were but six of us besides the doctors and Sallee had to help carry Joe out. Lower down, we ran onto body #3 which was tentatively identified as Reba. This man had broken his leg and rolled down hill where he was caught in the fire.

We got Joe out to the mouth of Mann Gulch at about 6:00 a.m. where we hailed Stan Mercer in a speed boat. He took Joe out to Hilger and the ambulance, dropping the rest of us off at Meriwether.

I then got involved in action on control of the fire. Clarence Strong arrived shortly and I never was so glad to see an old hand in all my life as we were short handed on overhead. Clarence agreed to take over the organization of the north and east sides of the fire. We figured the river would hold the west side and Hersey could organize the Meriwether Division since I had transmitted orders previously. This temporarily relieved me so I could organize the rest of the search.

Wagner Dodge thought the helicopter could be used to good advantage. Since I was unfamiliar with the details of what could be done with this outfit, I asked him to get in touch with Missoula by the radio and write his own ticket. I would do whatever he thought advisable and would stay with him until the finish.

Dodge ordered what he wanted by 7:00 a.m. which was immediately confirmed by Fire Control. We figured two hours to

get the supplies.

At 9:00 a.m., Dodge and I took ten gallons of water and 24 lunches to mouth of Elkhorn to wait for the egg-beater. The egg-beater arrived about 12:40 p.m. I was getting extremely impatient, and if my feet hadn't been so blistered, I would have set out afoot again but it seemed foolish when I might pull out and in a few minutes the helicopter arrive.

I was landed in the pass at about 1:00 p.m., the first passenger on the shuttle and took off for where we had found the three bodies, earlier that morning. Before reaching them, I found a body which I tagged 'Unidentified #1.' I searched up hill for personal effects and gathered all I could find in a pile by the body and next to my note. This I did in all cases but I didn't spend too much time hunting for effects.

The terrific blast of heat burned all clothing off, releasing non-flammable effects which if not pinned down by the body were carried as high as 100 feet further up the hill. The blast just ripped anything loose or light away. In some cases, I had to move parts of the bodies to release such things as watches, silver money, remains of wallets, etc.

I then found a body which I identified as Phil McVey. Then body #6 which was tagged 'Unidentified #2,' then #7 which I tagged 'Unidentified #3.' In the meantime Doctor Little landed in the pass and waited until Wag Dodge landed and together proceeded toward me.

I then found #8 and #9. Down below Reba, I saw a charred stump of a man with the legs burned completely off which I hated to go down to see after again looking at them all. So I didn't count him and didn't actually go close enough to determine if it was really a remains. Consequently, I didn't report this body but it was later verified by Frank Perkins.

I then met Little and Dodge who were coming up behind me and went once more to Harrison's body. Then Dodge showed Little and me where he set the fire and where they first abandoned their tools. Since Dodge thought the missing two might be on the ridge they came up the night of the fire, he and Little went further over the rocks. Since my feet were pretty raw and I was having a hard time walking, I told them that I'd work down hill back toward the bodies. I thought I might go to the charred stump but on the way I decided (with the help of my feet) I couldn't stomach it any longer and pulled on down Mann Gulch

to the mouth where I met Little and Dodge. We hailed a boat at about six and went back to Meriwether.

Finally, we come to the testimony of Dr. Hawkins, a practicing doctor at St. Peters Hospital in Helena. He was called to accompany the rescue party the night of August 5.

Statement of Dr. T. L. Hawkins

Forest Dispatcher Murphy called me about 9 p.m. Friday evening, August 5, 1949 and told me they needed a doctor at the Gates of the Mountains fire. He said he knew they had two injured at that time and there may be more. He asked me to also get the ambulance and stretchers. Dr. R. E. Haines, Phoenix, Arizona, (Lois Grunow Clinic), was visiting me at the time. He volunteered to join me on the trip. I called the Highway Patrol because I thought they could get me down there quicker than I could drive myself.

In the meantime, I called St. Peters Hospital and asked them to get some blood plasma ready for me to take. Also called one of the Ritz brothers and asked them to take a couple of stretchers and ambulances to the Hilger landing.

By that time Dr. Little called me and I told him that Dr. Haines and I would go and I told him to rustle some supplies for me at St. Peters Hospital. By that time the Highway Patrol car came and picked us up and we started out for the fire. Went by car to Hilger boat landing. There was a boat waiting for us. It must have been after 10 p.m. by the time we got to the boat landing. Went down the river to the Meriwether landing, picked up Ranger Jansson there, went on to the mouth of Mann Gulch but failed to meet the jumper there that was to guide us to the injured boys. Continued on down the river to the next gulch. We waited just a few minutes there for our guide and the stretcher bearers and to assemble everything. We then started up Rescue Gulch where Sallee and Dodge had come down.

In the meantime the fire had swept through and on beyond that gulch. We climbed to the top, or nearly to the top, and had no trouble finding Hellman and the uninjured jumper that had stayed with him. We got him onto a stretcher and gave him

plasma and morphine. He didn't seem to be suffering too much. It took quite a while (probably a half hour) to get the plasma into him. (The lights were not good—that slowed us up some.)

In the meantime, Ranger Jansson, Sallee and Foreman Roos went over the hill to where Sylvia was. The night was not a bit cold, it was a hot night. When we finished with Hellman we wrapped him in blankets and left him with some of the boys. We then went over to where Sylvia was on a big rock. We leveled off a place there near the rock and put him on a stretcher. We gave him morphine and plasma and made him quite comfortable. Sylvia went right to sleep after we gave him the hypo. We put burn ointment on all the exposed surfaces but didn't undress the boys. Believe it was about 3:15 a.m. by that time.

We then decided that it would be best to wait until daylight to move the boys. It got daylight a little after 4 a.m. While we were waiting for daylight, we all scattered out and searched for any other injured boys. We didn't find any more injured boys, but we did find two or three bodies.

As soon as it was light enough we started for the river with both injured boys on stretchers. Brought one (Sylvia), to the mouth of Mann Gulch and don't believe we waited there more than five minutes until a boat came by and picked up Sylvia and took him up to the Hilger landing where an ambulance was waiting and he was taken to St. Peters Hospital. That was a fast boat that took Sylvia. Then shortly afterward another boat came and picked up Hellman. By the time we got to Hilger the ambulance had not returned from Helena yet but did return within about a half hour after we got to Hilger landing. Both the boys were reasonably comfortable on the trip out, were very dry and wanted a lot of water all the time. They stood the trip down off the mountain in good shape. They were attended immediately upon their arrival at the St. Peters Hospital by Dr. Little.

When we first got to the boys neither of them were in a terribly lot of pain. The reason for this is that their burns were so deep and hard that the nerve ends were destroyed. Both Dr. Haines and I recognized this condition as soon as we looked them over. It was immediately obvious to both of us that the condition of both these boys was extremely critical. I am also sure that the lungs of both these boys were burned as a result of intense heat which they had inhaled. I am satisfied that practi-

cally all of the boys who died suffocated and undoubtedly died very quickly and then they burned afterward. The fire had used up all the oxygen and they were all winded from climbing up the hill so it was just a case of them running completely out of oxygen very quickly. Death results very quickly in cases like that. The attitude in which the bodies were found did not indicate struggling or delayed suffering or slow death. Parts of the bodies of both Hellman and Sylvia were actually charred and burned very deep. Sylvia had bad burns in the lower extremities and his hands and arms were burned to a crisp. Hellman's burns were mostly on his face, neck, head, and hands and arms and not so bad on his feet and legs. The clothes were not burned off of either of them badly except Sylvia had a lot of holes burned in his pants. It is my opinion that both of those boys would have most certainly died even if they had been gotten to a hospital and under doctors' care immediately. It was a very nice warm night—the night exposure on the mountain should not have been any contributing factor at all to their death.

Although the board heard some 18 witnesses and technical experts in the two-day review, the testimony of the three survivors will always remain the most illuminating.

The board had invited relatives of the victims to appear. Only one did so—Henry Thol, retired district ranger from the Flathead National Forest. He had lost his 19-year-old son, Henry Thol, Jr., at Mann Gulch. Like Rumsey and Sallee, this had been Thol's first season as a smokejumper and his first fire jump.

Ranger Thol was extremely critical of the whole Mann Gulch operation. He had twice been to Mann Gulch on his own investigation and he totally disagreed with statements made by various Forest Service witnesses. Among other things, he charged Chief Lyle Watts and others with a coverup. He charged Foreman Dodge with incompetence. In a sometimes rambling, emotional statement that occupied the final hour of the hearing, the retired ranger made the following accusations:

- Because of the terrain, fuel conditions, and weather the men in charge of the operation should have known a blowup was imminent and should not have dropped the jumpers in Mann Gulch.

- Dodge's route to the river and his plan to attack the lower flank of the fire were foolish and incompetent.
- Dodge's escape fire overran some of the jumpers as they headed for the ridge top and also cut others off from safety.
- Thol challenged the idea that the crew were seasoned firefighters. He charged that most of them, including his son, had experience only on small fires that posed no threat.
- Thol contended that, contrary to the witnesses' testimonies, the jump spot was ahead of the fire, not on its flank, and that the fire was spreading rapidly at the time of the drop.

Chairman Granger helped Thol shape his emotion-charged accusations into specific charges and included them as part of the record.

Early in October the board of review issued a 23-page report reviewing the Mann Gulch disaster and stating its findings. The conclusions and recommendations are reproduced from the report.

Conclusions

1. Fire conditions in that locality, the character of the country, and the location and behavior of the Mann Gulch fire at the time of the jump presented no indications of dangerous conditions beyond those often encountered by suppression forces which should have ruled out placing the smokejumpers in the area.
2. The jumper crew was headed by experienced and capable men, Dodge and Hellman. A statement covering the kind and length of experience of Dodge and Hellman in fire work is in the Appendix. [Editor's note: Appendix not included]
3. The jump area was carefully selected by Cooley and Dodge, and there was nothing to indicate more than average hazard, either with relation to the safety of the jump or proximity to the fire. A statement covering the kind and length of experience of Cooley in fire work is in the Appendix. [Editor's note: Appendix not included.]
4. The jump, cargo-dropping operation and the assembly of the crew and cargo on the ground were carried out in normal manner

except for the loss of the radio which was destroyed when the parachute failed to open.

5. Dodge's decision, after contacting Harrison and rejoining his crew, to proceed with the crew to the river in order to put his crew in a safe place, and to provide a means of safe retreat if it appeared feasible to attack the fire on the Mann Gulch flank nearest the river, was logical as was also his choice of the route taken by himself and crew along the slope on the north side of Mann Gulch, from which they could watch the action of the fire on the opposite slope, while proceeding toward the river. The sudden explosive runs of the fire from the upper slope of the ridge between Mann Gulch and Meriwether Canyon across the lower end of Mann Gulch could not reasonably have been expected.
6. There is no evidence of confusion until the time of failure to heed Dodge's efforts to get men to go into the escape fire area.
7. The evidence is not conclusive as to how many of the crew understood Dodge's purpose in setting the escape fire and heard his directions to join him inside the burned area. The situation was complicated by the noise of the main fire and possibly by the remark of one victim, as heard by some of the men, "To hell with this, I am getting out of here." Evidently each individual followed either his own instincts at this point or the example of those ahead of him who were making their way up or across the slope.
8. Dodge showed coolness and good judgment in setting the escape fire. Both survivors and Sylvia said they believed that all the men would have been saved if they had followed Dodge's lead in getting into the area burned by the escape fire.
9. All evidence available to the Board indicates that the escape fire in no way impeded the progress of the men seeking to attain the ridge, or was otherwise instrumental in causing or contributing to any of the deaths.
10. Ranger Jansson, upon learning from Dodge of the injuries to Hellman and Sylvia, displayed good judgment and fortitude in the rescue operations.
11. Regional Forester Hanson and various members of his staff ably directed or conducted the search for and removal of the bodies, notification of relatives, assistance in funeral arrangements, giving out information, and handling related matters.

12. It is the over-all conclusion of the Board that there is no evidence of disregard by those responsible for the jumper crew of the elements of risk which they are expected to take into account in placing jumper crews on fires. However, the Board feels that there are elements of this catastrophe which indicate the need for intensified study and training in fire behavior, and in the training of men in meeting fire emergencies. The Board makes the following specific recommendations:

Recommendations

1. The Board recognizes that training of jumpers and other regular fire suppression personnel has included instructions on how to recognize dangerous conditions and the importance of following leaders in emergencies, but feels that even greater emphasis could profitably be given in firefighter training to both of these factors.
2. The Board recognizes that the system necessarily employed of rotating jumpers and the varying size of the crews makes it difficult to maintain close acquaintanceship between leaders and jumpers, but feels it important to develop such acquaintanceship as fully as possible, as one means of establishing confidence in the leaders, so essential in emergencies.
3. Include in training the use of escape-fire method of avoiding catastrophe, even though occasions for and opportunity to use this method are relatively rare.
4. Continue and intensify efforts in the study of fire behavior to furnish more dependable basis for anticipating and predicting blow-ups, and intensify training of firefighting overhead in this respect.

By authority of the Board:

Approved: October 6, 1949

C. M. GRANGER
Assistant Chief, Forest Service

Lyle F. Watts
Chief, Forest Service

And so the Mann Gulch inquiry was officially closed. Unofficially, of course, it will never rest; particularly among those who experienced it personally or among those who lost a son or a relative there. All sorts of analyses have been made of the fire and undoubtedly more analyses will be made in the future. Naturally, I have my own opinions, developed over some 35 years of reliving that day.

When Dodge and I first saw the fire at 3:10 p.m., the fire had burned to the top of the ridge between Mann Gulch and Meriwether Canyon. There was no crown fire, nor was the fire spotting downwind. Both Wag and I and the jumpers agreed that it was a big mop-up job. The thought of a blowup never entered our minds. The typical fire usually slowed down at that time of day, with the cooler, quieter night air. The wind was favorable and we had an excellent jump spot.

Forest Service policy at the time was to put out any and all fires as soon as possible after detection—with reasonable concern for safety. To Wag and I this looked like a routine jump. If we had turned this one down, we would have turned down about 90 percent of our jumps. Yes, the second-guessers say that we should not have jumped this fire. But we had jumped countless fires that looked like this one and had stopped them cold.

Some critics charge that Dodge's biggest mistake was not heading directly to the fire as soon as he assembled the crew. They say that if he had done so he and the crew could have worked into the burned-over area and escaped the blowup. That was precisely what Dodge intended to do, but about the time he met Harrison the fire started to roll. The jumpers left the jump spot at about 5 p.m. A patrol plane overhead noted spot fires beginning to pop out ahead of the main fire at 5:10 p.m. Dodge doubted that he could hold fireline in the face of a run. He was also afraid that he and his crew with heavy packs would be caught floundering toward the fire through the thick timber and reproduction, where they surely would have perished to a man. So, being the cautious, methodical person that he was, he turned toward the open north slope and the river. There he could link up with the district firefighters and

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make an effective flank attack on the fire. This is precisely what Ranger Jansson would have told him to do had the radio been working.

After Wag caught up with his crew, grading out toward the river was indeed the best route out of the canyon. He could watch the fire across the canyon and avoid the heavy fuels in the bottom of the gulch. Unfortunately, the fire spotted across his escape route and cut him off. My theory is that a ground wind entirely different from the winds aloft was blowing down the river. The main fire, backing down the hill and spreading by means of rolling embers, caught this downstream wind and spotted across Mann Gulch. These are the spot fires that turned Jansson back at about 5:20 p.m. Catching up canyon drafts, the fire then raced up Mann Gulch, practically encircling the jumpers. Dodge did the only thing he could do, he turned back up the ridge, hoping to reach a rockslide, or a ridgetop where the typical fire would slow to a crawl or stop.

When Dodge realized that he and the crew could not outrun the fire, he set fire to the grass to burn off an area that would provide a refuge. Critics ask why he hadn't briefed his men beforehand, or why he didn't do it sooner. Remember, to the best of our knowledge no firefighter in Region 1 had ever used this technique before or, for that matter, since. Considering that the fire was about 30 seconds behind the jumpers, the wonder is that Dodge had the presence of mind to set an escape fire at all. Both Sallee and Rumsey testified that if they had gone into the burn they would have been safe. They definitely could see Dodge waving and yelling to the jumpers, trying to bring them into the burn with him. Why the jumpers ignored Dodge's efforts and ran for the ridgetop is the central mystery of the Mann Gulch disaster. Was it the remark "To hell with that, I'm getting out of here!" later attributed to Hellman? Was it the fact that Dodge had never worked with most of the men before and therefore did not have their full confidence? Was it the fact that having trained with Hellman, the jumpers elected to follow his example rather than Dodge's? Was it the fact that the ridgetop seemed only a stone's throw away? Or was it the fact that these men did not realize the speed and the intense

heat of the fire when they decided to go for the ridgetop? Those who could have answered these questions are gone. My one regret is that I did not ignore orders and go to Mann Gulch the night I learned of the disaster. If I had talked to Hellman and Sylvia before they died, many of these questions could have been answered.

The smokejumper crew that was dropped on the Mann Gulch fire was a good one, led by two of the most experienced leaders in the organization at the time. They may not have been as seasoned as the jumpers of today. But those were different times. The experienced men had at most three seasons of jumping, and one of these was 1948 when most of them didn't make a single fire jump. Nevertheless, with their previous Forest Service experience and the month of intensive fire training and jump training, they were far superior to the typical crew of firefighters. As for the high percentage of the first-year jumpers on the Mann Gulch fire, high turnover in those days forced us to train 50 to 80 new jumpers every year. Therefore one could reasonably expect the typical crew to be about half first-year men. We tried to prepare new jumpers to deal with every hazard they might encounter. Because most fires were small, and even the large ones seldom posed any threat, we did not train the men in the setting of escape fires like the one Dodge used. Until the Mann Gulch fire occurred, we simply saw no need for it. This crew was mainly forestry students because they were part of a special career-development program.

I knew Dodge as well as anyone had ever known him. He worked for me for eight years, five years as project foreman. Wag liked to build things. He was meticulous about his work. He always knew exactly what he was doing, as jumpers Rumsey and Sallee testified before the board of review. I mainly used Wag for special projects because he was so dependable. For this reason he probably did not have as much contact with the average jumper as some of the squad leaders assigned to training. The fact that the Mann Gulch crew knew Hellman better than they knew Dodge may have influenced them to head for the ridgetop rather than walk into the escape fire with Dodge.

I think Sallee, Rumsey, and Diertter had already decided to go to the top of the ridge before they heard Hellman's remark. They were so close to the ridge that they were sure they could make it. They did not realize that the fire would spare neither the ridge nor the leeward side and they certainly did not anticipate the explosive wall of fire that caught them so quickly.

Several times I have put myself in Wag's position and have wondered just what I would have actually done. If I had never been trained to escape this sort of fire, possibly I would have been one of those who ran for the ridge top. Nevertheless, I did not anticipate that this open, grassy country would carry a dangerous crown fire; it never entered my mind that a crew would get overrun in this kind of fuel. But it happened then and it can happen again if firefighters are not trained for this hazard and all the hazards involved in fighting fires. I wonder how many of our foremen would have had the presence of mind to do what Wag did.

Hellman was an excellent squad leader. He worked with all of the jumpers through training and was very decisive and persuasive. If he indeed said, "To hell with that, I'm getting out of here," he was probably just saying what was on his mind—the ridgetop. I doubt that many of the men heard the remark. When a man's life is at stake, he is definitely going to follow his own instincts. To me, the decisions made by Dodge and Hellman are perfectly understandable. I believe that Hellman reached the top of the ridge at the same spot as Rumsey and Sallee, but that he stopped and was unexpectedly overrun by the fire as he waited for the rest of the crew. Because Hellman's father worked for the Forest Service, Bill had been brought up amid discussions of forest fires. I believe that under these circumstances most firefighters would have gone for the ridge top when they only had a second or two to decide.

The behavior of the Mann Gulch fire will always remain a mystery to me. It was totally different from any fire that I had ever seen or that I could even imagine under the circumstances. The sudden blowup, which amounted to a firestorm, the fire's burning in several directions simultaneously, the incredible speed of travel, literally defy comprehension. From a

vantage point along the Missouri, Ranger Jansson saw the fire burn northwest and due north, simultaneously. The jumpers saw the fire come toward them from three directions, as shown by the map submitted with the investigative report. Was this unforeseen behavior due to cyclonic conditions or due to the fires being drawn together by a forced draft? Whatever the reasons, the jumpers had no prospect whatever of outflanking or outrunning the fire. Their only alternatives were to either find a fuel-free area like the rockslide where Rumsey and Sallee took refuge or to burn off an area, as Dodge elected to do. When judging the Mann Gulch fire, one must remember one fact, this was no ordinary forest fire. No one can recall a fire like it even today.

The past 35 years have taken their toll of those who experienced the Mann Gulch fire. In May 1951, Wag Dodge learned that he had Hodgkin's disease. He therefore applied for and received a transfer to Powell Ranger District where he served as fire dispatcher during the summer. In the winter he worked as an instrument repairman for the division of fire research. His file contains many compliments on his work. Dodge died on January 12, 1955.

Both Sallee and Rumsey finished the 1949 fire season as smokejumpers, each making several fire jumps after Mann Gulch. Neither man returned to the smokejumper project the following year, which certainly had nothing to do with their courage. In August 1978, both men returned to Mann Gulch in the company of a writer who was working on a book about the affair. Shortly thereafter Rumsey was killed in an airplane crash. Robert Sallee remains the sole living survivor of the crew that dropped into Mann Gulch that fateful day—August 5, 1949.

Although the board of review found no serious fault with those responsible for the Mann Gulch operation, the lessons of this fire, as freakish as it was, were not lost. I personally took pains to see that all supervisors got to know their men by rotating training assignments and work projects. We held frequent general meetings and bull sessions where we could get to know each other. The whole idea was to weld the supervisory

personnel and jumpers closer together.

During our fire training, we cited the Mann Gulch fire and other large blowups as a warning against being taken by surprise. We stressed the importance of sizing up the fire from the air and having definite avenues of escape in mind before dropping on any fire that offers any threat at all.

Although it was not the only reason for its construction, the Mann Gulch fire undoubtedly contributed to the building of the Northern Forest Fire Laboratory, next door to the smokejumper base in Missoula. Fire behavior is one of the main subjects of research. The Forest Service now holds annual schools in fire behavior. Fire behavior officers are found in most field units down to forest supervisors' offices and are routinely assigned to the larger fires.

The Mann Gulch disaster probably had much to do with the expansion of the Forest Service Equipment Development Center in Missoula. Among other programs, the center continually seeks new and better tools and protection for firefighters. Today's firefighters are clothed in fire-resistant clothing and carry a lightweight heat reflecting shelter that, if properly used, could save firefighters' lives in situations like Mann Gulch.

Despite the fact that the Mann Gulch fire has been extensively studied and analyzed, in many respects it remains as much a mystery in both human behavior and fire behavior as it was in 1949. On November 9, 1949, Harry T. Gisborne, chief of fire research in Region 1, accompanied Ranger Jansson to Mann Gulch to try to figure out what caused the blowup and to look for evidence to confirm some of his fire behavior theories. Gisborne had a chronic heart condition, but he assured Jansson that with frequent rests he was in no danger. From 11 a.m. until dusk the ranger and the scientist prowled the scene of the disaster, with Gisborne taking notes on fuels, fire patterns, and various actions of the jumpers.

A Jansson memorandum recalls some of Gisborne's comments as he walked the blackened ground: "Greatest freak I ever studied—know less about what happened now, than before I came."

In examining Dodge's escape fire—"Impossible to have caused trouble to other victims, only one direction fire went and that was straight up the slope."

Gisborne finally consented to head for the truck parked near Rescue Gulch, so named that terrible night in August, 1949. About ¼ mile from the truck he sat down on a game trail to rest. "Here's a nice rock to sit and watch the river," he said. "I made it good. My legs might ache a little though tomorrow." Those were Harry Gisborne's last words. At that instant he died of a heart attack. Ranger Jansson once more had to arrange for the evacuation of a Mann Gulch casualty.

A few days after the Mann Gulch disaster, Gisborne had reviewed the fire's behavior with eyewitnesses and in a letter to Clayton Crocker had summed it up as follows, "May have to characterize this Mann Gulch fire as an inexplicable act of God." Some 35 years later little has been learned to dispel that conclusion.

The 1950 fire season was another wet one, and the jumpers spent most of their time on project work on national forests.

One highlight was helping 20th Century Fox film "Red Skies of Montana," loosely based on Mann Gulch. This motion picture was started in the fall of 1950, with Victor Mature and John Lund playing the leads. Most of the filming was done north of Lolo Hot Springs near the old Warm Springs lookout. Two ridges were selected as possible settings for the picture. One had a variety of snags and dead timber on it; the other ridge was bare. The production staff picked the bare ridge for the setting, then told us they wanted 200 snags planted on it. The entire smokejumper crew was hired by 20th Century Fox so we could use all the men and equipment to prepare the scene. Regardless of the number of jumpers and equipment available, it was an awful job to dig 200 snags out by the roots and set them up on the next ridge in time for the filming. Logging trucks could haul only two or three snags at a time. I didn't think we could get the snags up in time, so I advised sawing the snags off at the ground and planting them again, putting papier-mache around the base to simulate roots. This went much faster. In the rush, one of the snags was planted bottom

side up, but the planting crew said no one would notice and left it that way. I notice it every time I see the film.

A large rock was built for a special scene. The frame was built by carpenters and smokejumpers on regular time. But in the plastering of it 20th Century Fox took a beating.

The plasterers in Missoula said they could work only on Saturdays and Sundays. This meant double time for Saturday and triple time for Sunday. The crew traveled from Missoula and back each day on 20th Century Fox time, so they were getting 16 to 18 hours a day at either double or triple time. The rock was huge—200 to 300 feet across.

Foreman Art Cochran had been doubling for Victor Mature on a motorcycle. All was going well until Victor himself rode the motorcycle. He flipped the motorcycle over on himself and ended up in the hospital with an injured leg and bruises. Lund, working in the staging area at Fort Missoula, was stung by a bee. His eyes swelled shut and he was laid up for a while. Then it began to rain. The picture was postponed and the jumpers terminated.

About 3 p.m. word was passed that the filming was folding up. By nightfall everybody and everything was off the hill. The film company left all their staging equipment at the fort through the winter. They returned the next year to complete the film, with Richard Widmark replacing Victor Mature, and a completely new cast.

On November 7, 1950, Jerry Verhelst of the Montana Aeronautics Commission was killed in an airplane crash near Butte, Montana. Jerry was formerly the senior pilot for Johnson Flying Service. Jerry's leaving Johnson may have been prompted by an incident in a Trimotor when we dropped some jumpers near Sheep Hill on the Nezperce Forest. Turbulent air over Sabe Creek turned the old Trimotor up on its side. Jerry had to fight to keep the plane from turning completely over. Things looked so rough to me, I left the copilot seat and headed for the door, planning to jump if Jerry lost control in that narrow canyon. When he eventually got control, I went back to the copilot seat. Jerry's face was white as a sheet. He then mentioned this might be his last year flying for Bob Johnson.

Managing the Unexpected

What Business Can Learn from High Reliability Organizations

One of the greatest challenges any business organization faces is dealing with the unexpected. For example, a leading manufacturer of integrated circuits expects to boost competitiveness by dramatically improving quality and doubling capacity, but it unexpectedly finds its share price falling as customers switch to the new products being offered by its competitors. A premier forest products firm continues production during a normal trough in the business cycle, only to be surprised by a deeper and more long-lasting trough than they ever expected. The responsible manager of the largest corporate division of a consumer products firm suddenly realizes that his market has been conquered by a certain competitor—a development that his

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Managing the Unexpected

subordinates suspected had been building steadily for several years. As these examples show, the unexpected doesn't take the form of a major crisis. Instead, it is triggered by a deceptively simple sequence in organizational life: A person or unit has an intention, takes action, misunderstands the world; actual events fail to coincide with the intended sequence; and there is an unexpected outcome.¹ People dislike unexpected outcomes and surprises. Because of that, they sometimes make situations worse. That's the tragedy that motivates this book.

We suspect that the inability to manage the unexpected lies behind a number of the pressing problems that executives face. Problems, after all, occur either when something that we expected to happen fails to happen or something that we did not expect to happen does happen. For example, consider the chief concerns of today's business professionals reported in the first annual (2000) University of Michigan Business School Pressing Problems survey. The second most frequent problem executives reported was "thinking and planning strategically"; the third most pressing problem was "maintaining a high-performance climate." From our perspective, both these problems are variants of one that is the focus of this book, *dealing with unexpected events*. Whether the issue is strategy or performance, problems become more pressing when expected strategy and performance outcomes fail to materialize or when unexpected impediments to strategy and performance materialize. Either scenario is a brush with the unexpected. And in either case people often take too long to recognize that their expectations are being violated and that a problem is growing more severe. Moreover, once they belatedly recognize that the unexpected is unfolding, their efforts at containment are misplaced.

In general, people can manage unexpected events poorly, in which case the events spiral, get worse, and disrupt ongoing activity; or they can manage them well, in which case the events

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shrink and ongoing activity continues. How you can improve your organization's management of the unexpected is the subject of this book.

What does it mean to manage an unexpected event well? Good management of the unexpected is *mindful* management of the unexpected. That answer comes from careful study of organizations that operate under very trying conditions all the time and yet manage to have fewer than their fair share of accidents. These organizations, which are referred to collectively as *high reliability organizations* (HROs), include power grid dispatching centers, air traffic control systems, nuclear aircraft carriers, nuclear power generating plants, hospital emergency departments, and hostage negotiation teams. The better of these organizations rarely fail even though they encounter numerous unexpected events. They face an "excess" of unexpected events because their technologies are complex and their constituencies are varied in their demands—and because the people who run these systems, like all of us, have an incomplete understanding of their own systems and what they face.

We attribute the success of HROs in managing the unexpected to their determined efforts to act *mindfully*. By this we mean that they organize themselves in such a way that they are better able to notice the unexpected in the making and halt its development. If they have difficulty halting the development of the unexpected, they focus on containing it. And if some of the unexpected breaks through the containment, they focus on resilience and swift restoration of system functioning.

When we call this approach *mindful*, we mean that HROs strive to maintain an underlying style of mental functioning that is distinguished by continuous updating and deepening of increasingly plausible interpretations of what the context is, what problems define it, and what remedies it contains. The key difference between HROs and other organizations in managing the



unexpected often occurs in the earliest stages, when the unexpected may give off only weak signals of trouble. The overwhelming tendency is to respond to weak signals with a weak response. Mindfulness preserves the capability to see the significant meaning of weak signals and to give strong responses to weak signals. This counterintuitive act holds the key to managing the unexpected.

This book is grounded in the assumption that high reliability organizations enact on a larger scale what all of us try to do well on a much smaller one. We can all get better at managing the unexpected if we pay more attention to those who have no choice but to do it well. In this first chapter we will illustrate this argument by taking a close look at how the Union Pacific Railroad mismanaged the unexpected during its merger with the Southern Pacific Railroad and ended up gridlocking significant portions of its transportation system. We argue that Union Pacific got into trouble because it failed to use any of the five processes that enable HROs to manage the unexpected mindfully. The five processes are previewed briefly in this chapter; linked with expectations, blind spots, and mindfulness in Chapter Two; described in fuller detail in Chapter Three; formatted as an organizational audit for use by executives and managers in Chapter Four; interpreted as the infrastructure of a safety culture in Chapter Five; and translated into a set of practical guidelines for action in Chapter Six.

■ Union Pacific Mismanages the Unexpected

"An old brakeman faces his ultimate test." This breathless headline in the October 6, 1997, issue of *Business Week*² signaled the failure of Union Pacific CEO Richard Davidson to manage the unexpected when Union Pacific (UP) merged with Southern Pacific (SP). The Surface Transportation Board had unanimously



approved the merger in August 1996 because it promised to bring the vaunted expertise of UP to bear on the badly deteriorating SP. Not long after the formal acquisition on September 11, 1996, the vaunted "expertise" of the UP began to unravel. Unexpected events came in waves. And the responses only made things worse.

Mismanaging the People

The expectation that safe operation would continue on the merged system proved to be unfounded. In the first eight months of 1997, four employees were killed in railyard accidents. Between June 22 and September 11, 1997, the railroad experienced six major collisions that killed another five employees and two trespassers.³ Sixty federal regulators started riding the trains and watching dispatchers as a result of these accidents.⁴ Among other findings, they found that crews were on duty longer than allowed by law, equipment had not been maintained, and dispatchers were unfamiliar with regions to which they had been assigned. These conditions were due in large part to swift cuts in personnel shortly after the merger. As a result of these cuts, fatigue, poor maintenance, and slow dispatching had become issues because management underestimated the number of people needed to run the merged railroad. For example, on October 29, in Navasota, Texas, a southbound freight from North Platte, Nebraska, moving at twenty-five miles per hour, smashed into the rear of a stopped unit rock train. There were no serious injuries, but evidence suggested that the engineer and conductor on the North Platte train had gone on duty after only eight hours of rest and had fallen asleep.⁵

Equally surprising was the dramatic shift of sentiment on the part of shippers, particularly in the Gulf Coast area. Those who had endorsed the merger now found themselves confronted by delays that got worse and worse, shipments that were



lost altogether and couldn't be traced, and expensive truck transportation as their only remaining option. Shippers were badly hurt when the average speed of trains dropped from nineteen to twelve miles per hour. This is a severe drop because it equates to a loss of 1800 locomotives, or about one-fourth of the UP fleet.⁶ The dramatic loss of speed was often a moot point since growing numbers of trains didn't move at all. They were stuck in sidings without locomotives, which had been removed to solve power shortages elsewhere.⁷ For example, at one point the Bailey Yard in North Platte, Nebraska, found itself 161 locomotives short of the number needed to power the trains that were expected to leave that yard in just the next twenty-four hours. Trains that did have locomotives still couldn't move because they were manned by crews whose duty time had expired while they waited for clearance to move the train. "On the morning of October 8, systemwide, 550 freights stood still for lack of engines or crews."⁸ Since all the sidings were full with backed up trains, movement on the single track mainline was possible in only one direction. There was no place where a train going in one direction could pull over into a siding and allow a train moving in the opposite direction to pass. Since most of the trains on the mainline were pointed toward Houston, they could not move aside to allow movements in the opposite direction away from Houston. The system was gridlocked as far away as Chicago.

Mismanaging the Operations

Much of this meltdown could be traced to one spot, the Englewood classification yard in Houston.⁹ When SP ran this facility, they kept it moving at its capacity of 3,500 cars by workarounds that involved moving some of the classification to satellite yards at Strang and Beaumont, and by sorting some cars down line, away from yards, by a technique called block-swapping. This tac-



tic involved sending trains with cars for mixed destinations "in the same direction in close order. Down the line they swapped blocks of cars to form solid trains for three destinations—for East St. Louis, Memphis, and Pine Bluff."¹⁰ When UP took over the operation of Englewood, they moved all this satellite classification back to the Englewood yard, where it could be centralized and "done in the right way."¹¹ Trains began backing up the very next day. On October 27, Englewood locked up with 6,179 cars in the yard.¹² UP sent more managers and more engines to break the logjam, but all this did was plug up the system even more.

What makes all this so puzzling is that it occurred on the watch of a self-proclaimed "operations guy." Davidson had been a railroader all his life. He had been vice president of operations for Union Pacific in 1982 when the UP merged with the Missouri Pacific Railroad. Davidson had been courted by the Burlington Northern in 1994 to straighten out its operations problems. And yet here is Davidson, finally the top person at the railroad, and he can't get the trains to run on time. Why not?

You begin to get a clue if you examine the list of reasons given by top management to explain why service had become so rotten. The postmerger problems were variously attributed to blizzards in the Midwest, customs backups at the Mexican border, unexpected track work, flash floods, derailments, a surge in plastics traffic, Hurricane Danny, poorly maintained SP equipment, and inherited labor agreements. In the eyes of top management, UP and its system were the victims, not the culprits. Not a good sign.

But not a rare sign either.¹³ Executives often manage the unexpected by blaming it on someone, usually on someone else. This happens with sufficient frequency that it qualifies as a pressing problem in its own right. But there are other issues in managing the unexpected that are visible in the Union Pacific example.

Mismanaging the Strategy

The Union Pacific clearly had a growth strategy in place. Just two years before formalizing the SP merger, it had acquired the five thousand mile-long Chicago and North Western Railroad (CNW). Even though that earlier consolidation had big problems, top management ignored the early warning signs that the strategy was flawed, and used that same strategy to fold in the SP operations. The fact of poor implementation was not that hard to see. A veteran railroad observer, quoted in the *Wall Street Journal* just nine months before the SP merger, described the UP-CNW merger this way: "It has been about the ugliest operational situation I have seen since I have been around railroads."¹⁴ In a pattern that would be repeated with the SP merger, UP did not listen to the locals when those people described what had worked for them.¹⁵ For example, the Midwestern location of CNW meant that a sizeable portion of their business was grain shipments. To keep operations moving during harvest, CNW moved large quantities of grain to Gulf ports by barge. When UP took over the CNW, management abandoned this practice, used rail to move the grain to the Gulf, and promptly congested the rail lines. Shipments throughout the system were delayed and complaints soared. Ironically, in support of their application to acquire SP, UP executives argued that they had "learned a lot about how to do it right the next time" from their experience with CNW.¹⁶ In an even stranger twist of logic, they also argued that their problems with CNW would be solved if they were allowed to merge with SP. This reasoning fairly reeks of potential for trouble to escalate.¹⁷ Hence, there were early and ample signs that the UP did not understand either itself or its environment. And with less understanding, there should be more surprises and less adequate coping with any of them.

The more general point—and one that is crucial to those seeking effective ways of managing the unexpected—is that



strategic goals contain a subtle trap. The trap is this. Strategic goals explicitly describe how the organization wants to position itself. But they do not describe the important mistakes people should guard against in pursuit of these goals.¹⁸ It is the failure both to *articulate* important mistakes that must not occur and to *organize* in order to detect them that allows unexpected events to spin out of control. If an organization has an inflated view of its capability, there is little incentive to think about important mistakes simply because people assume there won't be any. A less charitable way to state this point is to say that arrogance and hubris breed vulnerability. UP, by many accounts, was the poster child of arrogance. This was true both internally, where its culture was described as militaristic and intimidating,¹⁹ and externally, where shippers were given take-it-or-leave-it deals and where acquired railroads were viewed as inept.

What, then, would a less arrogant style of management look like? How do people act when they are mindful that important mistakes can scuttle the most luminous strategy? Those questions are the focus of this book. We draw our answers to those questions from a neglected body of work, namely, studies of organizations that operate under trying conditions yet have less than their fair share of accidents. Even though high reliability organizations such as aircraft carriers and nuclear power plants may seem unique, that impression is misleading. These organizations provide important lessons about managing the unexpected because of what they do on the input side, not because of what they generate on the output side. That people can be killed on an aircraft carrier but not at Silicon Graphics matters less than that people in both organizations make an effort on the input side to complicate rather than simplify their processes of attention. People who maintain complex sets of expectations (that is, have complicated mental models of how events unfold)²⁰ experience fewer unexpected events. And when unexpected events do occur, complex models enable people to



"read" those anomalies earlier in their development and to resolve them with smaller interventions. Those are the kinds of similarities we are after.

■ Hallmarks of High Reliability

In this book we focus on five hallmarks of organizations that persistently have less than their fair share of accidents. Together, these characteristics of HROs make up what we have termed *mindfulness*. They are

- Preoccupation with failure
- Reluctance to simplify interpretations
- Sensitivity to operations
- Commitment to resilience
- Deference to expertise

Here we briefly describe these key characteristics of high reliability organizations and how failures in these areas caused problems for Union Pacific.

Preoccupation with Failure

Even though high reliability organizations are noteworthy because they avoid disasters, they do not gloat over this fact. Just the opposite. They are *preoccupied with their failures*, large and mostly small. They treat any lapse as a symptom that something is wrong with the system, something that could have severe consequences if separate small errors happen to coincide at one awful moment (for example, the disastrous release of poisonous chemicals from the Union Carbide plant in Bhopal, India, in 1984). HROs encourage reporting of errors, they elaborate experiences of a near miss for what can be learned, and they are

wary of the potential liabilities of success, including complacency, the temptation to reduce margins of safety, and the drift into automatic processing.

Against this background what stands out about the Union Pacific is its preoccupation with success and its denial of failures. It is the classic case of top management being buffered from bad news, a pattern that was repeated at all levels of the hierarchy. For example, in November 1995, during the horrendous shipping delays of the CNW merger, then CEO and president Ron Burns wrote a letter of apology to shippers. Burns, a nonrailroader (he came to UP from Enron in August 1995), was praised by the shippers for this act, but he was also severely criticized internally for his admission that UP had failed.²¹ He lost his job ten months after the letter was sent.²² Persuaded by their own rhetoric of competence that they had used in Washington to influence regulators, UP executives neither looked for failures nor believed that they would find many if they did. This message was not lost on those at the operating level. As a result, slow-downs were underreported and allowed to incubate until they were undeniable and close to irreversible.

Reluctance to Simplify

Another way HROs manage for the unexpected is by being *reluctant to accept simplifications*. Success in any coordinated activity requires that people simplify in order to stay focused on a handful of key issues and key indicators. HROs take deliberate steps to create more complete and nuanced pictures. They simplify less and see more. Knowing that the world they face is complex, unstable, unknowable, and unpredictable, they position themselves to see as much as possible. They encourage boundary spanners who have diverse experience, skepticism toward received wisdom, and negotiating tactics that reconcile

differences of opinion without destroying the nuances that diverse people detect.

Union Pacific presents a somewhat different picture. UP has a dominant logic that simplifies how railroads work. Trains are made up in central locations called classification yards, not in dispersed locations called shipper yards, satellite yards, or mainline tracks. Freight shipped by railroaders is moved by rail, not barge. The problems caused by these simplifications are overlooked until the central location or excessive grain shipments become a bottleneck. Simplification, in the case of UP, is encouraged by the preference for staffing top management positions with railroad people. Some of the more innovative moves at UP were made by outsider Michael Walsh, who was chairman and CEO of the railroad in the late 1980s. In fact, Walsh's innovations were featured in a Tom Peters documentary about how the tradition-bound railroad industry finally found its way into the twentieth century. Walsh's era was not a popular period for veteran railroaders. And when Walsh moved on to Tenneco, Davidson assumed the CEO portion of Walsh's job, while Drew Lewis assumed the chairman's duties.²³ Both these moves ensured that UP was once more back in the hands of insiders. The subsequent short interval during which outsider Ron Burns attempted to run a more customer-focused railroad only served to confirm the belief that the Union Pacific was in the best hands if those hands belonged to veteran railroaders. That belief is understandable. It makes for a cohesive top management team. But that team is of one mind simply because the minds that compose it are redundant. Everyone sees the same warning signals and is blind to the same unexpected warnings. That kind of homogeneity can encourage people, under the guise of consensus, to misread local innovations and workarounds as signs of inefficiency rather than as adaptations that make the difference between profit and loss.



Sensitivity to Operations

An additional characteristic of HROs, *sensitivity to operations*, points to their ongoing concern with the unexpected. Unexpected events usually originate in what psychologist James Reason calls “latent failures.” Latent failures are “loopholes in the system’s defenses, barriers and safeguards whose potential existed for some time prior to the onset of the accident sequence, though usually without any obvious bad effect.”²⁴ These loopholes consist of imperfections in features such as supervision, reporting of defects, engineered safety procedures, safety training, briefings, certification, and hazard identification. Many of these latent failures are discovered only after the fact of an accident. But that need not be the case. Normal operations may reveal deficiencies that are “free lessons” that signal the development of unexpected events. But these lessons are visible only if there is frequent assessment of the overall safety health of the organization.

This is an area where HROs distinguish themselves. They are attentive to the front line, where the real work gets done. The “big picture” in HROs is less strategic and more situational than is true of most other organizations. When people have well-developed situational awareness, they can make the continuous adjustments that prevent errors from accumulating and enlarging. Anomalies are noticed while they are still tractable and can still be isolated. All this is made possible because HROs are aware of the close tie between sensitivity to operations and sensitivity to relationships. People who refuse to speak up out of fear enact a system that knows less than it needs to know to remain effective. People in HROs know that you can’t develop a big picture of operations if the symptoms of those operations are withheld. It makes no difference whether they are withheld out of fear, ignorance, or indifference. All those reasons for



withholding are relational. If managers refuse to examine what happens between heads, they’ll be eternally puzzled by what appears to happen inside individual heads.

In contrast, there is general agreement that relationships at the UP were tense. People keep mentioning intimidation, a militaristic culture, hollow promises to customers, abandonment of workarounds, production pressure on train crews, and the same old resources thrown at problems (for example, send more engines to an already immobilized rail yard). What is striking is the disconnect between operations as viewed at the top and operations as implemented on the front line. Theoretically, the language of operations should have been a common language at UP that everyone from top to bottom could understand and use to resolve merger-related problems. Practically, that didn’t happen. At the top, “sensitivity to operations” meant improving the balance sheet and sensitivity to escalating costs (for example, overtime). At the bottom, “sensitivity to operations” meant sensitivity to the fact that trains were backing up outside the Englewood yard and that the entire UP system was grinding to a halt. Hence, there were at least two “big pictures” of operations at UP, not one.

Commitment to Resilience

No system is perfect. HROs know this as well as anyone. This is why they complement their anticipatory activities of learning from failures, complicating their perceptions, and remaining sensitive to operations with a *commitment to resilience*. HROs develop capabilities to detect, contain, and bounce back from those inevitable errors that are part of an indeterminate world.²⁵ The signature of an HRO is not that it is error-free, but that errors don’t disable it.

Resilience is a combination of keeping errors small and of improvising workarounds that keep the system functioning.



Both these avenues of resilience demand deep knowledge of the technology, the system, one's coworkers, one's self, and the raw materials. HROs put a premium on experts; personnel with deep experience, skills of recombination, and training. They mentally simulate worst case conditions and practice their own equivalent of fire drills. Psychologist Gary Klein, an expert in high-stakes decision making, suggests that the most effective fire commanders have rich fantasy lives and mentally simulate potential lines of attack.

The meltdown of operations at UP by definition shows an inability to bounce back. When some trains began to back up, even more trains began to back up. The problem got worse, not better. There is little evidence of learning, either from the CNW merger or from the massive backups that had occurred years before in the Conrail consolidation. There is little evidence of resilient improvisation to deal with the unexpected. The UP remained essentially a by-the-books operator that favored centralization and formalization and treated improvisation as insubordination.²⁶ People who bypassed the hierarchical decision structure and enacted unique solutions not prescribed in existing procedures were accused of being insubordinate. In addition, there is little evidence that slack resources were reallocated, a common way to create resilience. The UP trimmed crews, locomotives, and supervisors shortly before the Englewood disaster and removed whatever slack they had. A more subtle loss of resilience occurred when UP argued that the merger had merit because the SP was in terrible shape and only the UP could save it. That reasoning is dangerous because, once the merger was approved, UP had to run twice as much railroad with basically the same resources as before. Management couldn't very well merge the companies and then delegate key operations to people they had just labeled inept. In short, most of the moves made by the UP removed rather than added resilience.



Deference to Expertise

The final distinctive feature of HROs is their *deference to expertise*. HROs cultivate diversity, not just because it helps them notice more in complex environments, but also because it helps them do more with the complexities they spot. Rigid hierarchies have their own special vulnerability to error. Errors at higher levels tend to pick up and combine with errors at lower levels, thereby making the resulting problem bigger, harder to comprehend, and more prone to escalation. To prevent this deadly scenario, HROs push decision making down—and around. Decisions are made on the front line, and authority migrates to the people with the most expertise, regardless of their rank. This is not simply a case of people deferring to the person with the “most experience.” Experience by itself is no guarantee of expertise, since all too often people have the same experience over and over and do little to elaborate those repetitions. The pattern of decisions “migrating” to expertise is found in flight operations on aircraft carriers, where “uniqueness coupled with the need for accurate decisions leads to decisions that ‘search’ for the expert and migrate around the organization. The decisions migrate around these organizations in search of a person who has specific knowledge of the event. This person may be someone who has a longer tenure on the carrier or in the specific job.”²⁷

At the UP, however, decisions were made at the top and continued to be made this way regardless of whether they were made during times of crisis or times of calm. This meant that decisions about the Englewood yard were being made by an overloaded team of people who were not current in their operational skills and who were being fed information they wanted to hear. Davidson kept saying publicly that the worst was over when, in fact, the worst was yet to come. He kept sending UP people to see what was up rather than going himself to observe this firsthand or listening to Southern Pacific experts who had run the



yards successfully. This is the classic command-and-control bureaucracy that is adequate for a stable world but too inflexible in times of change.

HROs differentiate between normal times, high-tempo times, and emergencies and clearly signal which mode they are operating in. Decisions come from the top when it is normal, they migrate during high-tempo operations, and a predefined emergency structure kicks in when there is danger the ship could be lost. These clear signals tell everyone when migration is crucial and when it is not. No such signals were available at the UP. There was no agreed-upon way to signal, systemwide, either that this was a unique period with unusual pressure and problems or that "we are in big trouble." Crisis times were treated just like normal times. As a result, people did what they always did, only they did more of it. So when the system approached gridlock, more people and more equipment were thrown at the problem. What top people did not do was consult different resources, listen, pull cars out of the system, bypass the system, rebuild a system elsewhere, or own up to the growing calamity. Stonewalling does not manage the unexpected. HROs have learned this lesson the hard way.

■ What Can We Learn from Those Who Face Catastrophes?

Part of the novelty of the argument presented in this book is that we have taken a persistent pressing problem—*How can we manage the unexpected?*—and suggested a new answer: *By acting more like a high reliability organization.* These high reliability organizations maintain reliable performance despite constant exposure to the unexpected, in part by developing and maintaining their capability for mindfulness. A well-developed capability for mindfulness catches the unexpected earlier, when it is smaller, comprehends its potential importance despite the small size of



the disruption, and removes, contains, or rebounds from the effects of the unexpected. By managing the unexpected mindfully, HROs continue to deliver reliably the performance they were chartered to deliver.

Issues of Harm

HROs have a big incentive to contain the unexpected because when they fail to do so, the results can be catastrophic. Lives can be lost, but so can assets, careers, reputations, legitimacy, credibility, support, trust, and goodwill. All organizations know firsthand the potential for the latter losses. It is the very fact of these high stakes in HROs that makes them unusually good models of how to handle the unexpected. Yet in the eyes of many observers, these high stakes may make HROs seem irrelevant. Without giving the matter much thought, some people tend to dismiss the relevance of HROs to their own activities with the pat remark, "We don't kill people. What can we learn from those who live in chronic fear that they might?"

If you think about it, that reaction doesn't make much sense. If people are serious about becoming a "learning organization," they should not impose strict definitions in advance about where the learning will come from. The whole point of a learning organization is that it needs to get a better handle on the fact that it doesn't know what it doesn't know.

It is commonplace among people in business to claim that "it's a jungle out there," meaning that the world is filled with physical, financial, and psychological casualties. True, most of us don't see ourselves as working in places that kill people. Neither do most people who work in HROs. There were no fatalities at the Three Mile Island nuclear power accident, even though much hand wringing implies there were. In fact, the consequences of a lack of mindfulness in business can be no less deadly than in HROs. Deck operations on carriers kill fewer people in a year

than died at the Union Pacific the year it tried to absorb Southern Pacific. To the currently controversial question of how many people die each year from medical errors, the answers range as high as the equivalent of two fully loaded 747s crashing with no survivors, each day of the year. Hospitals aren't even considered high reliability organizations. The existence of any pattern in these statistics is not obvious. And that's the point. The ability of HROs to teach us about mindfulness does not lie in their outcomes, or in the noncomparability of their outcomes with yours. It lies instead on the input side: what they pay attention to, how they process it, and how they struggle to maintain continuing alertness.

HROs, in fact, are organizations like any other. All organizations, HROs and businesses alike, develop culturally accepted beliefs about the world and its hazards. All organizations develop precautionary norms that are set out in regulations, procedures, rules, guidelines, job descriptions, and training materials, as well as informally on the grapevine. And all organizations accumulate unnoticed events that are at odds with accepted beliefs about hazards and norms for avoiding these hazards.²⁸ It is these very similarities that encourage transfer of the lessons of HROs to other organizations. For example, HROs develop beliefs about the world and its hazards with fewer simplifications, less finality, and with more revision than we see in most organizations. The definition of what is hazardous is continually refreshed. Likewise, HROs develop precautionary norms just like everyone else. But unlike everyone else, they use both the small failures and liabilities of success as sources for these precautions. And like all organizations, HROs accumulate unnoticed events that are at odds with what they expected, but they tend to notice these accumulated events sooner, when they are smaller in size. They also concentrate more fully on the discrepancy, its meaning, and its most decisive resolution. Each of these elaborations of the basics by HROs suggests directions in which other

organizations can make their own elaborations in the interest of heightened mindfulness.

Issues of Scale

Another source of misunderstanding about the relevance of HROs to non-HROs involves a misunderstanding of issues of scale. If the activity being observed is an assembly line, for example, an unexpected shutdown is not a severe crisis (there was no fatality). But it is a crisis relative to what the supervisor expected would not fail and a crisis relative to precautions taken so that it wouldn't fail. A visit from Mike Wallace to a CEO's office does not produce fatalities, but it can affect markets, share price, and liability. In each case the meaning of the unexpected is contextual. Once we understand the context, the precautions, the assumptions, the focus of attention, and what was ignored, it becomes clear that many organizations are just as exposed to threats as are HROs, and just as much in need of mindfulness. In all organizations people do things that they expect to continue doing reliably and for which unexpected interruptions can eventually turn disastrous if they manage the unexpected poorly. This possibility is more at the center of attention for HROs than for most other organizations. But it is a possibility that haunts all organizations.

As noted earlier, how well or poorly people manage the unexpected is a foundational issue that underlies the handling of any pressing business problem. Hence, the difference between an HRO and a non-HRO is not as large as it might appear. In both settings, trouble starts small and is signaled by weak symptoms that are easy to miss, especially when expectations are strong and mindfulness is weak. These small discrepancies can cumulate, enlarge, and have disproportionately large consequences. This path of development also is similar across organizations. What differ across organizations are variables such as

how much value people place on catching such developments earlier rather than later, how much knowledge people have of the system and its capacity to detect and remedy early indications of trouble, and how much support there is from top management to allocate resources to early detection and management of the unexpected, error-acknowledging communication, and commitment to mindfulness at all levels.

Issues of the Setting

The environment of HROs is one in which there are high-risk technologies. These technologies must be mastered by means other than trial-and-error learning, since in many cases the first error will also be the last trial. HRO environments unfold rapidly and errors propagate quickly. Understanding is never perfect, and people are under pressure to make wise choices with insufficient information. But whose environment isn't like this? Stanford business professor Kathleen Eisenhardt, for example, describes the environments of the microcomputer industry as "high velocity environments." "High velocity environments are characterized by rapid and discontinuous change in demand, competitors, technology, and/or regulation such that information is often inaccurate, unavailable, or obsolete."²⁹ The ways people deal with a high-velocity environment resemble the mindful activities of people in HROs. For example, she finds that her fast decision makers pay close attention to "real-time information, that is, information about current operations or the current environment which is reported with little or no time lag."³⁰ The parallel to our third process of mindfulness, *sensitivity to operations*, is clear. Eisenhardt also finds simultaneous centralization-decentralization, which we describe in Chapter Five under How Culture Controls, to be a signature of HROs. She finds it in the form of a pattern she calls "consensus with qualification," which refers to a two-step decision process. The

first step is decentralized because everyone who will be affected by the decision tries to reach a consensus on what it should be. But if they can't reach it, the decision is made in a centralized fashion by the leader.

In summary, HROs worry about the unexpected, mindfulness, and reliability, but so do an increasing number of organizations. The UP is not alone in its troubles with the unexpected. E-commerce, new economic rules, offshore manufacturing, constantly changing parent companies, and jolts of downsizing put every organization in the same position as the UP. Everyone has their own Englewood yard, patched together with baling wire and duct tape, which is just itching to spring the unexpected. For people who hate surprises, a stream of unexpected events can be a pressing problem. It is a problem whose resolution lies partly in the lessons learned by those who live with a steady diet of the unexpected.

CHAPTER SUMMARY

In this chapter we have introduced the topic of *managing the unexpected* by looking at the efforts of the Union Pacific Railroad to absorb both the Chicago and North Western Railroad and the Southern Pacific Railroad in the short span of two years. Both mergers generated escalating events that paralyzed the UP system. These difficulties can be viewed as problems in managing the unexpected. The UP was not prepared for the unexpected. Its management team dealt with it poorly as it unfolded. And when they tried to bounce back from the unexpected, they often made things worse.

A benchmark for best practices in managing the unexpected is a set of organizations, called high reliability organizations, that reliably forestall catastrophic outcomes through mindful attention to ongoing operations. People in these organizations hate the unexpected just as much as everyone else. But it doesn't surprise them or disable them. And their coping actions seldom make the situation worse.



We have summarized five ways in which HROs operate that make them more aware of their own capabilities, what they face, and what it might mean: preoccupation with failure, reluctance to simplify interpretations, sensitivity to operations, commitment to resilience, and deference to expertise. These guidelines apply upward to divisions and organizations as well as downward to teams, crews, and team leaders. Although HROs seem unlike any other organization, that appearance is deceptive. They resemble other organizations in their input processes, their adoption of precautionary beliefs, and their susceptibility to surprises. Where they differ is in their commitment to mindfulness as a means to manage inputs, precautions, and surprises. Even though HROs may be unique in their pursuit of mindfulness, there is nothing unique about how they pursue it. Processes by which HROs pursue mindfulness are processes that can be adopted by anyone. The purpose of this book is to make those processes more visible, accessible, and available.

LEVEL 3 MATERIAL –

OPTIONAL READING FOR FURTHER STUDY (NOT PROVIDED)

Young Men and Fire, Norman Maclean, University of Chicago Press

Mann Gulch Fire: A Race That Could Not Be Won, Richard C. Rothermel, May 1993
http://blm.orlando.veridian.com/Wildland_Fire/manngulch/investigation/reports/Mann_Gulch_Fire_A_Race_That_Could_Not_Be_Won_May_1993.pdf

The Fire In Mann Gulch The Thirteenth Fire 1999 Unpublished Manuscript
http://blm.orlando.veridian.com/Wildland_Fire/manngulch/suggested_reading/The_Thirteenth_Fire_Dave_Turner.pdf

Wildland Fire Accident Virtual Site – Mann Gulch
<http://www.manngulchfire.com/>

Includes: Timeline, Investigation, Fire Behavior, Media Coverage, Organization, Long Term Impacts, Research, Safety Progression over time, Interactive 3D, Suggested Reading:

Benson, Rod - The Mann Gulch Virtual Field Trip
<http://formontana.net/gulch.html>

Driessen, John , PHD, Sociologist - Crew Cohesion, Wildland Fire Transition And Fatalities,
http://www.wildfirelessons.net/Library/Incident_Reviews/Research_Reports/Cohes.pdf

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Weick, Karl - The Collapse of Sense making In Organizations: The Mann Gulch Disaster 1993
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Board of Review of Mann Gulch Fire Hold In Missoula, September 26-28, 1949
http://blm.orlando.veridian.com/Wildland_Fire/manngulch/suggested_reading/Board_of_Review_Sept_26_28_1949.pdf

Report of Board of Review, September 29, 1949
http://blm.orlando.veridian.com/Wildland_Fire/manngulch/suggested_reading/Report_of_Board_of_Review_Sept_29_1949.pdf

Helena High School X-CEL Class Mann Gulch Remembered, 50th Anniversary
http://blm.orlando.veridian.com/Wildland_Fire/manngulch/suggested_reading/Mann_Gulch_Remembered_50th_Aniversary_August_5,_1999.pdf

LEADERSHIP

Fire Leadership

Wildland Fire Leadership Development Program
<http://www.fireleadership.gov>

Leadership

Big Dog: The Art and Science of Leadership:
<http://www.nwlink.com/~donclark/leader/leader.html>

High Reliability Organizations

Managing the Unexpected in Prescribed Fire and Fire Use Operations: A Workshop on the High Reliability Organization

http://www.myfirecommunity.net/documents/MTU_Santa_Fe_Workshop_rmrs_qtr137.pdf

Managing the Unexpected in Prescribed Fire and Wildland Fire Use Operations: A Second Workshop on High Reliability Organizing

<http://myfirecommunity.net/ViewPresentation.aspx?ID=12>

Human Factors

Findings from the Wildland Firefighters Human Factors Workshop

http://www.fireleadership.gov/toolbox/documents/human_factors.htm