Fire Behavior vs. Human Behavior: Why the Lessons from Cramer Matter

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"Life is not what happens to you, but how you react to it… for what caused you to react will surely pass, but how you continue to react can only be passed by you."
– Source unknown

Abstract

Two helitack crew members died in a tragic burnover on the Cramer Fire on July 22, 2003. An investigation ensued. Questions were asked, and many were answered. Others were not or could not be answered, and new questions and controversies surfaced.

All too often, fire behavior is pinned as a major culprit in burnover fatalities and entrapments, usually associated with terms such as "extreme," "sudden," and "unexpected." But while extreme fire behavior has been a common denominator, it is not unusual, and should seldom be unexpected.

Wildland fire behavior covers a wide and diverse spectrum, from creeping, smoldering ground fires to intense and sometimes explosive crown fires. This has always been so. Safe and effective suppression operations under extreme conditions are common, and extreme fire behavior – including crown fire – is sometimes an acceptable or even desired event on fire use incidents. So is fire behavior really the issue?

In reality, the very definition of "extreme fire behavior" is framed within the context of human perceptions, with "extreme" defining our limited ability to control it and its potential impact on firefighter safety. The Cramer Fire offers important lessons in human interaction with rapid changes in the fire environment and the ensuing fire behavior. Through the eyes of the Cramer Fire, this discussion will examine the notion that the real issue is not fire behavior itself, but in how we (humans) perceive and react to fire behavior and important changes in the fire environment. The Cramer Fire offers lessons that matter greatly, if we would only stop and listen. And these are lessons we must learn to keep from repeating the same tragic errors.

Fire Behavior on the Cramer Fire

"We knew we were in the extreme of extremas…the worst-case scenario."
-Helitack crew r.e. the morning of July 22, 2003 9USFS, 2003)

To fully understand what happened on the Cramer fire, and to begin to learn the important lessons, we need to examine the key factors that led up to the fire behavior and events that occurred on July 22, 2003. The following is only a brief synopsis; full details can be found in Appendix C of the Cramer Fatality Investigation Report (USFS, 2003).

Prior Conditions

Fuels in the Cramer Creek Drainage were generally short grass with scattered sage and ponderosa pine at lower elevations and on drier aspects. At the mid elevations, these gave way to open, mixed conifer stands, especially on more northerly aspects which became more continuous at the upper elevations. In the adjacent Cache Bar drainage, the fuels were predominantly short grass on the southerly aspects, and nearly continuous brush fields on the

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northerly aspect (Fig. 1a). These brush fields, composed primarily of shiny-leaf ceanothus, were a result of re-growth after an intense stand replacement fire in 1985, and were littered with fallen snags. In the upper portion of the Cache Bar drainage, isolated stands of trees were all that remained from the 1985 fire (Fig. 1b).

Figures 1a and 1b. Fuels representative of northerly aspects in the Cache Bar drainage – brush fields with fallen snags (1a; photo is of the adjacent unburned Fountain Creek drainage), and evidence of the 1985 stand-replacement burn (1b). The photo in Fig. 1b was taken July 20, 2003; Fountain Creek is in the far left side of the photo.

In 2003, central Idaho was in the fourth year of a prolonged drought. The winter snow pack was near average, but spring and summer rainfall for the area was only 50-70 percent of normal, and no significant precipitation had fallen in the area since June 25. The Energy Release Component (ERC) on the Salmon-Challis NF (SCF) was in the 96th percentile in July, 2003, indicating extreme burning conditions. ERC values for the two RAWS stations closest to the Cramer Fire were well above the 97th percentile, and one station was at the historic extreme.

Hot and dry conditions had persisted in the area since late June, and temperatures in the previous 90-day period were 3-6 degrees F warmer than normal. In the days leading up to the Cramer Fire, conditions had been getting progressively warmer and drier. Daytime temperatures surpassed 100 degrees and had been setting record highs, and relative humidity (RH) from 10-15 percent was common. Night inversions in the Salmon River drainage produced a strong thermal belt effect on the Cramer Fire – not unusual for mid-slope elevations in the Salmon River breaks – promoting active burning conditions at night. Night time RH recovery seldom exceeded 60-65 percent. On the Cramer Fire, this resulted in active burning until 0230-0300h each day.

From mid to late July, a large ridge of high pressure dominated central Idaho. Surface wind patterns were diurnal in nature with thermally induced slope and valley winds. However, forecast models for July 22 indicated that a weak "short wave trough" would move through the area. This would have an effect similar to a dry cold front – changing the typical diurnal wind patterns to a more synoptic pattern, with strong west to northwest winds over central Idaho.

The local National Weather Service (NWS) office had not considered issuing a Red Flag Warning for July 22, 2003. It was just "...another hot, dry day." In addition, though the short-wave trough appeared not only imminent, but with stronger winds than originally expected, this information was not conveyed to the Cramer Fire, nor to two other fires in the

area being managed by Type 2 incident management teams. Interestingly, in hindsight, conditions in the area met multiple criteria for a Red Flag Warning:

Criteria for Red Flag Warnings (NWS, 2005)

- If fuels are critical;
- If wind gusts ≥ 25 mph for any 3+ hours in ID mountains AND
- Relative Humidity is ≤ 15 percent
- OR if dry thunderstorms with areal coverage of widely scattered (≥ 15%) in a Fire Weather Zone [*not a factor on the Cramer Fire]*

Topography in the Salmon River Breaks is steep and rugged, with limited visibility due to the steep slopes and pronounced relief. Slope in much of the Cramer Fire area exceeded 60 percent, with more moderate slopes limited to the bottom of the Cramer Creek drainage. These steep areas are known to be predisposed to rapid uphill fire spread, problems with rolling firebrands, and extreme fire behavior under dry conditions. The topography also has a strong influence on surface winds, and thermally-induced diurnal slope and canyon winds are the norm.

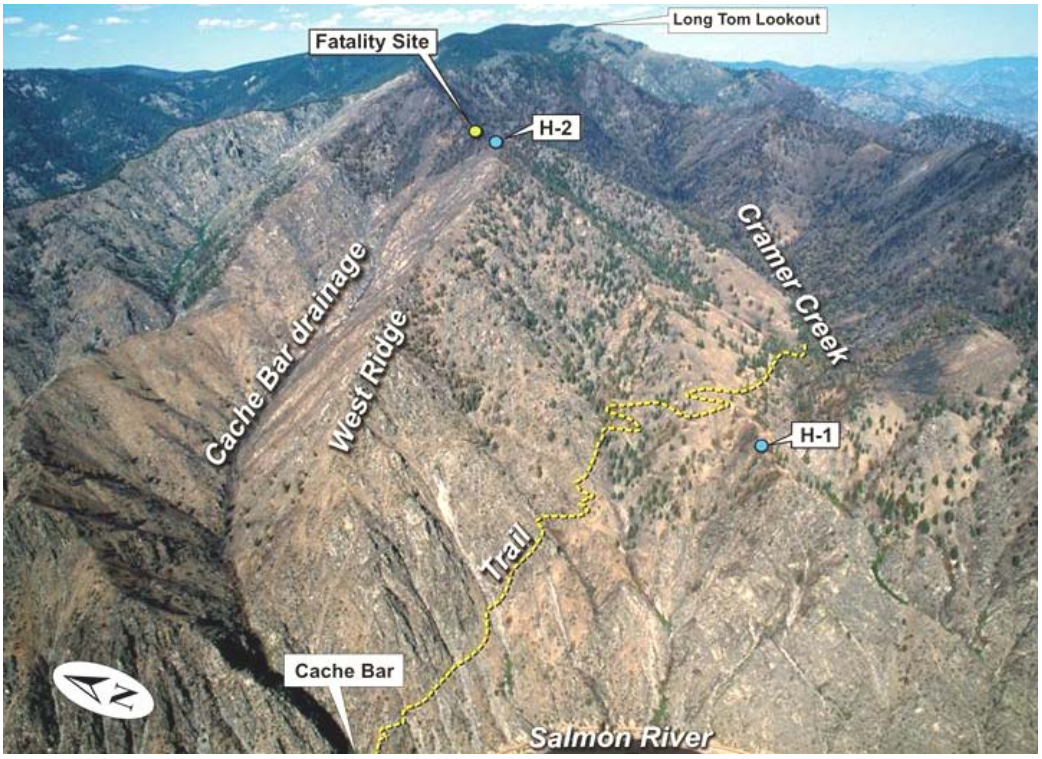


Figure 2. Locations and topographic features on the Cramer Fire.

Fire Behavior Chronology and Discussion

The Cramer Fire was started by lighting on July 19, 2003. Through the morning of July 22, the fire burned with low intensity and spread rates in light fuels, with the typical diurnal winds in the Salmon River drainage. The fire spread by backing, flanking, short uphill runs from rolling burning material, and occasional single-tree torching. RH recovery at night was poor; the fire was burning in the middle of a strong thermal belt, and the fire burned actively until 0230-0300h each day. Fire behavior through July 21 was not extreme, and considered typical for the fuels and conditions (Figs. 3a, 3b). Each day, the fire doubled in size, and it

was over 200 acres on the morning of July 22.

Figures 3a and 3b. Late afternoon fire behavior on the Cramer fire on July 20 and 21, 2003, respectively.

At 1830h on July 21, fire was first noticed spreading into the Cache Bar drainage by the Air Tactical Group Supervisor (ATGS). At that time, the fire activity was moderate in light fuels, and confined to the Cramer Creek drainage. A retardant drop from the previous day, running approximately 100 yards down the West Ridge, had prevented fire spread into the Cache Bar drainage. However, on July 21, as the fire spread laterally westward, it burned below the end of the retardant line, crossing the ridge and beginning to back into the Cache Bar drainage. This slopover was first seen by the ATGS at about 1830h (Figs. 4a, 4b). By 2000h, the estimated fire size was near 200 acres, and the west side of the fire appeared relatively quiet.

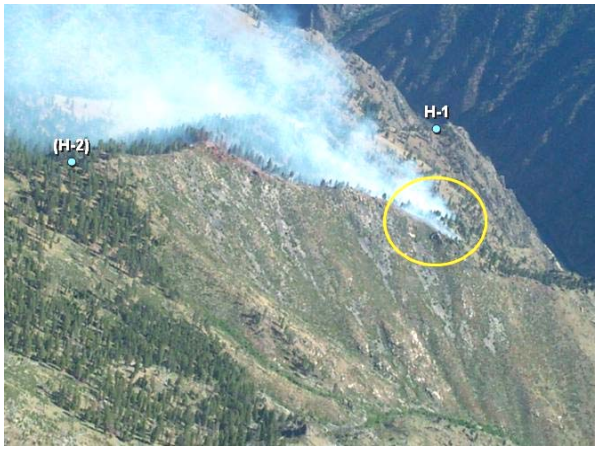


Figure 4a and 4b. Fire spread into the Cache Bar drainage at approximately 1830 on July 21, viewed from the west and north, respectively. The retardant line down the West Ridge is evident in Fig. 4b.

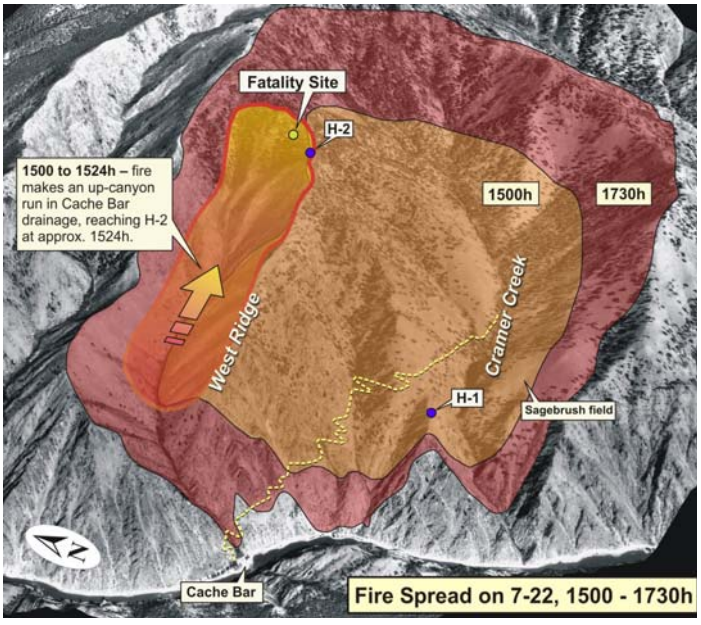
On July 22, the fire again burned actively until about 0300h. A spot weather forecast had not been obtained for July 22, but the Zone fire weather forecast was discussed at the morning briefing, as was the progressive warming and drying trend the previous few days. A change in wind direction to westerly then northwesterly, forecast by the NWS and a result of the impending short-wave passage, was also discussed. However, the local initial attack

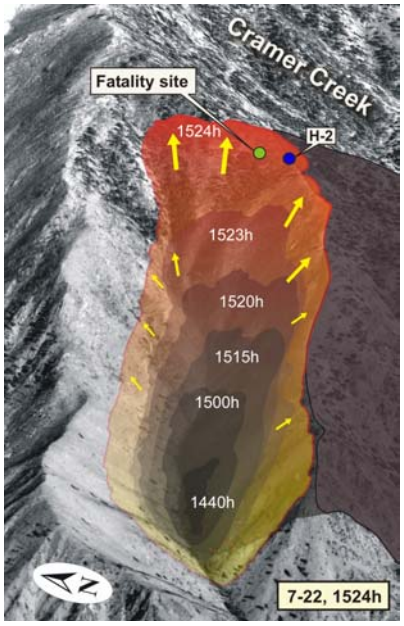
crews generally found the NWS fire weather forecasts to be inaccurate to the point that they routinely disregarded daily fire weather forecasts, relying instead on observed trends the previous 2-3 days for determining the expected weather and fire behavior for the current day.

At about 1430h on July 22, winds began to increase in speed and shift direction to westerly – the short-wave disturbance was moving into the area. By this time, the smokes in the Cache Bar drainage had become established near the bottom of the drainage, and soon erupted into an active fire front. Winds were in near-perfect alignment with the drainage, and the fire began moving up toward H-2. Flame lengths observed from the air reached 30-50 feet at the head as fingers of fire fanned out across the brush-covered slope below H-2. The fire was further intensified by numerous fallen snags, and areas of under-burned brush from the previous 24 hours.

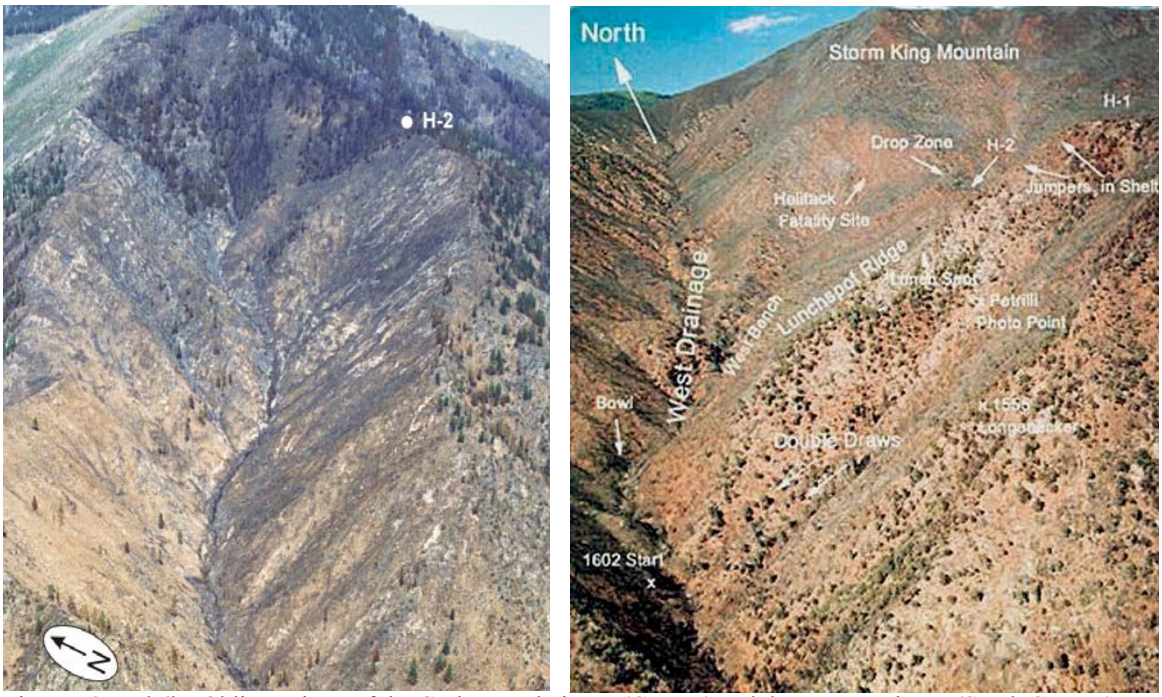
By 1520h, the fire front was intense, described by the ATGS as "a big flash front… [that] just kind of swept over the rocks, and it looked like the rocks were burning too" (USFS, 2003). The rapidly-spreading fire in the Cache Bar drainage had reached the base of the slope below H-2, and began moving rapidly up-slope. The winds had shifted direction to more northwesterly, and speeds at H-2 were estimated to be 20 mph steady with gusts to 30 mph or more. The intense fire front hugged the steep slope, pushed by winds now driving the fire directly upslope. Trees at the base of the stand below H-2 were scorched, but fire did not enter the crowns until it moved into the upper part of the stand. There, the fire became an active crown fire with flame lengths estimated at well over 100 feet. Smoke was thick, and moved rapidly up the slope, over the ridge past H-2, joining into the massive column developing in Cramer Creek. At H-2, surface temperatures reached 1,500 to 2,000 degrees F.

Meanwhile, Cramer Creek was impacted by the same winds, and the entire drainage had erupted in crown fire. A thick, dark column climbed to 12,000 feet and dropped ash at the Cove Creek Helibase, 13 miles away (Figs. 5a, 5b).





Figures 5a, 5b. Fire spread in the Cramer Creek and Cache Bar drainages under the influence of the westerly-northwesterly winds on July 22, 2003. Times of perimeter locations in Fig. 5b were derived from witness estimates (air resources) and modeling. The length of the run in the Cache Bar drainage is approx. 1 mile.



Figures 6a and 6b. Oblique views of the Cache Bar drainage (Cramer) and the West Drainage (South Canyon), respectively.

A Tale of Two Fires – Cramer and South Canyon

> *"Perhaps the most important lesson is that the blowup [South Canyon] was normal under the circumstances. A similar alignment of environmental factors and extreme fire behavior is not uncommon, and will happen again" (Butler et at., 2001).*

The sequence of events that unfolded on the Cramer Fire is hauntingly similar to South Canyon in 1994. If we focus on the fire behavior and fire environment, and human interactions with it, the two scenarios are nearly identical. Some key similarities warrant comparison.

The topography on both fires – the West Draw on South Canyon and the Cache Bar drainage on Cramer – were steep, narrow canyons conducive to rapid, intense fire spread (Figs. 6a, 6b). Slope steepness in both canyons ranged from 50 - 100 percent. The heaviest fuels, the ones that carried the fatal fire runs, were continuous brush on northerly slopes.

In both cases, drought conditions had persisted for the previous several years and live fuel moistures, especially in brush, were critically low. Also common to both was the presence of under-burned foliage in brush fuels, pre-disposing them to explosive fire spread. On South Canyon, what erupted into an intense fire front was Gambel Oak. On the Cramer Fire, it was shiny-leaf ceanothus. In both cases, there was a history of extreme fire behavior in that fuel type. And both areas had a history of previous fatality fires (Ship Island, ID in 1979, and Battlement Mesa, CO in 1976). On the Battlement Mesa fire, the fatalities had been in Gambel Oak.

The extreme fire behavior observed on both fires was predictable, but unexpected, and personnel failed to recognize the fire's potential for high rates of spread and explosive

growth. Both fires were considered "routine" right up to the point of the blowup. Crews in both cases generally didn't expect anything other than what they had seen in previous days. And neither fire had adequate lookouts posted at the time of the blowup.

Weather on both fires had been persistently hot and dry, with the typical diurnal wind patterns each day. On South Canyon, critical information about an approaching dry cold front was not relayed to the crews. On Cramer, it was lack of information about a short-wave disturbance that would have an effect similar to a dry cold front. In both cases, the winds aligned with the drainages in important ways. On South Canyon, the initial winds from the cold front caused flare-ups and spotting below the crews, and when the fire began climbing the slope beneath the firefighters, the frontal winds crossed the adjacent ridge to the west and intensified the fire's run. On Cramer, the winds aligned with the drainage itself at first, initiating the fire's run up the canyon. As the fire climbed the slope beneath H-2, a clockwise shift in the wind direction aligned it in relation to the canyon similar to South Canyon, and with the same results.

On both fires, safety zones were largely inadequate, and it did not appear the travel time to an adequate safety zone had been determined or discussed. Trigger points were notably absent. Once each of the fires began its fatal run upslope and up-canyon, the rate of spread easily outpaced the firefighters' ability to get out of harm's way. And the two helitack personnel on each fire departed H-2 in the same direction of travel, and were overrun in almost exactly the same location relative to the canyon and the approaching fire front (USFS, 1994 and 2003).

"Accidents Happen" …or do they?

"Good judgment comes from experience, and often experience comes from bad judgment"
– Rita Mae Brown

The events that unfolded on the Cramer Fire leading to the burnovers were not random. Contrary to popular thinking, there is a growing notion that accidents aren't random events. One author states "...what we call accidents don't just happen. There is not some vector of pain that causes them. People have to assemble the systems that make them happen" (Gonzales, 2005). In examining the course of events, the accumulation of factors, events, and missteps, what happened on Cramer begins to emerge as the growth of a complex, if not precise, system that led to the eventual outcome. It's a classic example of "organizational accidents" (Reason, 1997).

Before delving into the human factors on the Cramer Fire, it's worth discussing some of the current ideas and thinking behind the development and occurrence of organizational aspects. These will focus on concepts most pertinent to human behavior on the Cramer Fire, particularly those related to the idea of "situational awareness."

Perceptions and Mindfulness

There are many definitions and ideas on just what "situational awareness" means. In the simplest form, it's how well someone's perception matches reality. On the fireline, especially under extreme conditions, it's critical for perceptions of the changing fire potential to reflect what's actually happening "…to deal with reality, you must first recognize it as such" (Gonzales, 2005). It's never a perfect match. The truth is that the real world is complex, and at best, our human perceptions can only approximate reality.

"Mindfulness" is one way of understanding situational awareness – "…coming to an

understanding of yourself and your environment, maintaining an on-going scrutiny of expectations, continuous refinement and differentiation of expectations based on newer experiences, and a willingness and capacity to invent new expectations" (Weick and Sutcliffe, 2001). Of the handful of key components inherent to good mindfulness, perhaps "preoccupation with failure" and "commitment to resilience" are two of the most pertinent components of situational awareness. Without these, we miss important cues and are ill-prepared to cope with an unforeseen event. "The tendency to seek confirmation and shun disconfirmation is a well-honed, well-practiced human tendency… as pressure increases, people tend to search for confirming information, and to ignore information that is inconsistent with their expectations." (Weick and Sutcliffe, 2001). And at the most fundamental level, we are human. "Our attention is fragmentary. We get excited, we get tired, we get stupid." (Gonzales, 2005).

Cognitive Dissonance

Another factor interfering with situational awareness is found in the theory of "cognitive dissonance" – the conflict that arises when new information or experiences conflict with our existing knowledge or perception of reality. A classic manifestation of cognitive dissonance is the belief that "it can't happen to me."

Cognitive dissonance directly interferes with mindfulness and good situational awareness. The discomfort of new information conflicting with what we know to be true and fact often causes us to filter out, rationalize, avoid, or ignore important, though dissonant, new information (Harmon-Jones and Mills, 1999). A good illustration of overcoming cognitive dissonance comes from the military author, Paul Fussell, cited in the book *Deep Survival*. Fussell describes the 'stages of enlightenment' in the transition of a soldier from green recruit to combat veteran. "First he thinks, 'it can't happen to me.' Then he sees action and it becomes, 'it *can* happen to me, and I'd better be more careful.' And finally he sees enough of his fellows die to realize, 'It is *going* to happen to me, and only my not being there is going to prevent it'" (Gonzales, 2005).

"Memories of the Future" and Expecting the Unexpected

Situational awareness is not just about the here and now, but what may happen at some later time – how well your perception of likely events matches what will or could happen. This is based to a large degree on what you recognize based on past experiences, good or bad. But to avoid tunnel-vision and the danger of cognitive lock, it is vital to consider the entire array of possibilities, not just the most likely.

The ability to expect the unexpected, anticipate the undesirable, is especially critical in high-risk environments such as wildland firefighting. Rather than focusing on seeking confirmation, one must be "preoccupied with failure" (Weick and Sutcliffe, 2001). Consider everything that could go wrong, what unexpected surprises may surface, and be mentally prepared to cope with them. Be open to new information, and to adjusting your expectations – especially expectations of the unexpected – to accommodate new information or experiences. This is all part of developing those "memories of the future" that help us foresee the unforeseen, expect the unexpected, and be better able to cope with those (Gonzales, 2005).

Adapt, Improvise and Overcome – Action and Reaction

Only 10-20% of people can remain calm and think clearly during an emergency

(Gonzales, 2005). Yet according to the Ten Standard Firefighting Orders, the expectation is 100%. What causes a person to react, freeze, panic, or take decisive action when faced with an unexpected, life-threatening event such as a potential or imminent entrapment?

Perhaps a clue lies in the split between so-called cognitive vs. emotional reactions – logical, rational, analytical thought processes vs. instinct and "gut feeling." Cognitive thinking is based on experience, knowledge, and information acquisition; adding new information to existing knowledge and experiences, analyzing, considering options, alternatives and outcomes, and taking action. In a calm, controlled environment, this cognitive thought process can work well. However, it breaks down in stressful environments and a person is able to perform only the simplest tasks, becoming narrowly focused – the classic 'tunnel-vision.' "Stress causes people to focus narrowly on the thing they consider most important, and it may be the wrong thing." (Gonzales, 2005). In contrast, emotional responses are more primal and instinctual – the "fight or flight" response. These are the things that enable us to immediately react without thinking. Sometimes the outcome can save us – the instinct to run away from danger. Sometimes it can render us helpless – we panic, we freeze. Both have been factors in fire entrapments, and entrapment avoidances.

The ideal scenario is a combination of the two. Experience and knowledge not only allow us to think things through, but add depth and breadth to those "gut-reactions." And when the unexpected occurs and we're under stress, we are able to react accordingly to avoid harm. "There are few perfect survivors... There are many, though who flail around at first, then get their minds right, and live… Emotion is the source of both success and failure at selecting correct action at the crucial moment. To survive, you must develop secondary emotions that function in a strategic balance with reason." (Gonzales, 2005). Many modern-day risk managers frame this as "Recognition-Primed Decision Making" (Graham, 2005). Or as it's sometimes referred to, "slide in your mental slide tray."

Human Behavior on the Cramer Fire

> *"It helps to remember that people are primates, with a recent and somewhat untested upgrade, the neocortex" (Gonzales, 2005)*

With some of these concepts in mind, let's examine human behavior on the Cramer Fire, focusing on the events directly impacting the fire line. First, expecting the unexpected. No one expected strong winds that would shift to westerly (aligning perfectly with the Cache Bar drainage) then northwesterly (driving 20+ mph winds into the mid- and upper-portion of the slope below H-2). The NWS office did not perceive that conditions expected on July 22, 2003 warranted a Red Flag Warning, and none was issued – even with the knowledge of an ongoing drought, hot, dry conditions, and an impending wind event that would likely impact the Cramer Fire and two other project fires in the area as well.

Through the zone fire weather forecast discussed at the morning briefing, the personnel on the Cramer Fire did receive information that the winds would be different on July 22. The general winds aloft are typically out of the southwest, and had been so for days prior to July 22. On July 22, the NWS called for a westerly flow shifting to northwesterly, with increased speeds. Several personnel assigned to the fire later remarked that this seemed unusual, but most largely dismissed the forecast based on past experiences that gave them little faith in the accuracy of local NWS forecasts. They expected the weather would be similar to the past

two days, and didn't "expect the unexpected."

From early to mid-afternoon on July 22, various people in the air, including a lead plane, the ATGS, and the Incident Commander (IC), saw smokes backing down through the brush into the lower part of the Cache Bar drainage. Some felt there was little threat to the personnel on H-2; brush fields such as those were often a barrier to fire spread, and were commonly used tactically as such by local crews. Any fire spread in the Cache Bar drainage would be in light grass and brush, and with the typical diurnal winds they expected, the potential fire behavior was perceived to not be a serious threat to personnel at H-2. But that is not the case when shiny-leaf ceanothus, the predominant species in those brush fields, becomes drought-stressed, and especially not with strong winds aligned with a steep, narrow drainage. Many on the fire line on July 22 seemed to share the perception that it was "…another fire, a regular day." The Cramer perceptions did not match reality.

Why were no lookouts posted, and no one in constant communication with the rest of the fire assigned to monitor the situation and activities at H-2? Once again, possibly due to the lack of concern given the expected weather and the perceived benign nature of the brush fields below H-2. And the belief the two rappellers would complete their task and leave H-2 long before the peak of the burn period.

The rappellers discussed escape routes and safety zones with the assistant helitack foreman during an aerial recon of the area, but it is unclear whether they assessed these on foot once they were dropped off at H-2. There are indications they didn't perceive the danger that loomed, even after being notified when they were dropped off at H-2 of active smokes below them on the Cramer Creek side – an apparent deficiency of Weick and Sutcliffe's "mindfulness." As the afternoon progressed, the winds picked up at H-2 and they began noticing smoke coming at them from the Cache Bar drainage – a clear indication of fire possibly developing below them. Yet as the winds continued to intensify, and the smoke coming toward them out of the Cache Bar drainage grew thicker, radio communications from H-2 indicated they did not seem concerned.

When they finally decided they needed to leave H-2, again there was much more of a sense of order and calm than any awareness of an emergency developing. They packed up their equipment and stashed it at H-2, and called for a helicopter ride out. As the fire grew below them in the Cache Bar drainage and the smoke at H-2 increased, they did not appear to perceive a need to go to a safety zone – even when prompted to do so by the aircraft radio operator at the Cove Creek Helibase. *The helicopter would be there, as it always had before.* In essence, it appeared that the helicopter had become their escape route and safety zone. Misperceptions. Cognitive dissonance. *It (entrapment) won't happen to me*. Missed cues, not expecting the unexpected. Too few slides in the mental tray, and those they had led them in the wrong direction.

In the final minutes before fire reached H-2, it became apparent that, in fact, the helicopter would not be able to get to them due to the heavy smoke. They were now facing evacuation on foot. Even after the helicopter reaffirmed it couldn't land, they once again requested a ride out. When it was finally clear they were truly on their own, they ran. Uphill, ahead of the advancing fire front. Did they try to reach a safety zone on foot at any point? It's possible, but no one will ever know for sure. Certain events and timings indicate they may have tried, but if so, probably waited too long and were cut off by advancing fire on both sides of the ridge – crown fire in Cramer Creek, and the intense fire front in the Cache Bar drainage. As a last resort, they may have attempted to deploy fire shelters, but the fire was advancing quickly... the shelters were later found out of their cases, but not deployed.

We often tend to define success as the accomplishment of some pre-determined objective. We contain and control the fire as expected, accomplish the objectives as set forth in the incident action plan, and as usual, as expected, no one gets hurt. But sometimes success can just as readily be defined by one's persistence in expecting the unexpected, anticipating failure, updating this continuous process of maintaining mindfulness with new information, and ultimately preventing a serious accident when things don't go as expected (Weick and Sutcliffe, 2001). On fires such as Cramer or South Canyon, the fire environment dictated the fire intensity and growth. Sometimes Mother Nature has the upper hand, and "success" might be simply recognizing this and getting out of the way.

Learning Important Lessons

"Learn from the mistakes of others; you can't live long enough to make them all yourself"
– Sam Levenson

The process of learning from an accident has been described as a 'mindfulness audit,' "...a lot like the time right after the chaos of battle on the battlefield. There are truths lying around everywhere that may be picked up for the asking. These are moments of learning. But it won't be long before moments of candor give way to the moments of normalizing that protect repudiations, decisions, and the style of managing. After the unexpected occurs, the minute official stories get 'straightened out' and repeated, learning stops." (Weick and Sutcliffe, 2001).

The systemic failures and human factors that led to the tragedy on the Cramer Fire are not new. Gonzales bemoans this in *Deep Survival*: "Every accident investigator I've ever talked to has expressed frustration at seeing the same accidents recur again and again." And despite an almost exact re-creation of the fire environment and fire behavior on the South Canyon Fire, many people on Cramer missed important cues and reacted in much the same way as the events unfolded. Few actually expected the unexpected, or were able to cope with it.

Were the personnel on the Cramer Fire familiar with the 10 Standard Fire Orders, the 18 Watch-Out Situations, and LCES? In all likelihood, yes. These are the foundation of wildland firefighter safety training. As was determined in the South Canyon investigation, people not only knew these, but consciously disregarded them in the interest of getting the job done. In examining the "lessons" repeated on the Cramer Fire, it's obvious that these rules and guidelines alone are not enough.

There are many lessons to be gleaned from the tragic events on the Cramer fire. But there was also a positive lesson from Cramer that we seem to have missed in the shuffle. What of the Type 2 crews and their strike team leader at H-1? He appeared to have been very tuned into his environment and the changing situation. Winds were increasing, fire behavior became erratic, H-1 burned over. The inexperienced crews had not been doing well with their assignment, and he was concerned for their safety. He pulled them into a safety zone. Situational awareness, enough of the right slides in his tray, a good mix of cognition and gut-feeling. As an intense fire front raced up the Cache Bar drainage, as the upper reaches of Cramer Creek began erupting in crown fire, he rounded up the crews and guided them down a rocky trail, down to safety on the river road. He did an outstanding thing.

The Cramer Fire can teach us important lessons in the interaction of human behavior and fire behavior, and can help us begin to truly understand and address some of the recurring fireline safety issues. However, we must be receptive to those lessons and willing to listen.

Closing Thoughts – A Personal Perspective

"If, as teachers of history will tell us, failing to learn the lessons of the past dooms us to reliving those lessons, then we must either impress indelibly into the minds of firefighters the lessons of the South Canyon Fire or we will again experience its tragic outcome." (Gleason and Robinson, 1994)

It has been a year and a half since the Cramer Fire claimed two lives in a remote part of Idaho. Since then, numerous controversies have erupted – the "redacted" investigation report and the pursuit of criminal charges against the Incident Commander, among others. What have we really learned at the ground level from the Cramer Fire that will prevent a similar occurrence from happening again? Sadly, very little. We have been focusing on things that have distracted us from more fundamental issues, and have missed some very important lessons.

The conditions on Cramer were not unusual. The area had been under drought conditions for four years, and extreme fire behavior had been a problem on other fires in the area. Shiny-leaf ceanothus was known by many for its intense, sometimes explosive burning characteristics when drought-stressed. And part of the brush field in the Cache Bar drainage had been under-burned as a smoldering, creeping fire worked its way down to the bottom of the drainage, setting it up for even more intense burning conditions.

Neither was the fire behavior unusual for the conditions present. In fact, the fire behavior in the grass and brush fuels in the Cache Bar drainage is readily modeled using BEHAVE. But while the fire behavior was not entirely unusual, its magnitude was not predictable without knowing the conditions that would come into alignment. And it's not a new story.

"One can predict, based upon topographic and weather conditions which existed on those fires [Loop and South Canyon], that extreme fire behavior was a distinct possibility; however, one could not predict how extreme that behavior would become."
– Gleason and Robinson, 1994, discussing the fire behavior on the South Canyon and Loop Fires

The question now is where to go from here. The fact that so many events from South Canyon were repeated on Cramer, to the level of detail they were, is unnerving. It indicates there is still much to be learned. Unfortunately, controversies arising from the Cramer Fire have impeded open dialog and created a situation described by many as a slow, destructive meltdown. We need to stop the meltdown and begin the process of learning.

To start with, it's becoming apparent that too many firefighters are not good at recognizing conditions that may set them up for a bad surprise. We're putting people into critical situations who aren't prepared to handle how those situations may suddenly change. We aren't preparing them to "expect the unexpected." And in the aftermath of the Cramer Fire, we've focused on criminal and legal aspects and are missing some critical lessons: fundamental interactions of fire behavior and human behavior. The very things that are so important.

There is some good news. The U.S. Forest Service (USFS) has some committed people working on some innovative ideas. "Pockets of progressive thinkers," as they've been sometimes called, such as the Fireline Leadership program, the Lessons Learned Center, and initiatives from individuals within the Washington Office (WO) itself. And tools such as the Campbell Prediction System may provide firefighters a means to assess the critical fire behavior potential where they're working (Campbell, 2004). We must promote and encourage more of these types of efforts. And there are initiatives underway to begin dealing

with the problem of the shrinking pool of experience and the transient nature of the seasonal workforce. There's much yet to be done, and some very dedicated folks are trying to make things better.

However, at the national level, there is a growing void in the leadership and direction we as a fire community desperately need right now. The controversial "redacted" investigation report released by the WO added an overtone of secrecy and implied cover-up to the Cramer Fire. And chances of learning any meaningful lessons were immediately minimized. The months of continuing silence about Cramer from the national level speaks volumes. It's creating a perception that personnel at the top of the fire organization simply want to see the problem fade away into obscurity. And judging from recent e-mail and internet chatter, and anecdotal discussions with USFS and other fire personnel, the one public communication about Cramer in recent months – the widely-circulated "Take Care" letter from the WO – seems to have only added to the meltdown. There is a growing frustration with the many unanswered questions and overall silence, and an uneasiness about liability and legal issues that have yet to be adequately answered.

What can we do? First, here are a couple of simple suggestions to begin the learning process and start working toward solutions:

1. Assemble an independent panel to examine the human factors that contributed to the Cramer fatalities. It's imperative to identify and understand the key issues before we can begin to address them;
2. Consider the merits of "Leadership screening" within wildland fire agencies as specified in the Tri-Data report, Phase III (Tri-Data, 1998).

Some have also suggested new or different training. That may be part of the answer, but is not *the* answer, and should be developed within the context of addressing the core issues, such as with (1) or (2) above, not just adding more "book learning." And liability insurance? Not the answer by any means, and certainly no substitute for experience, knowledge, and understanding.

Second, begin the healing and rebuilding. Two simple things would do immeasurable good: releasing the un-redacted Cramer report, and engaging in honest, open dialog with the fire community about Cramer and the related issues. These two actions would send a profound positive message to "the troops," serve as a huge gesture of good faith, and facilitate positive, productive discussions.

Finally, I urge those at the national level to step forward and provide the leadership so desperately wanted and needed. That might mean taking on some tough battles, facing off with battalions of lawyers, and leveling with the families and loved ones of those who have perished on wildland fires. It's vital our leaders acknowledge the problems, be willing to talk about it frankly, and be willing to take on the tougher issues. Not just within the USFS, but at an interagency level. They'll probably find there's far less opposition out there than they think, and more likely, overwhelming support. The fire community is starving for strong, decisive leadership – especially someone willing to step up and tackle the growing mess sometimes referred to as "Cramer-Gate."

We have to stop the cycle. If no one does anything, if we continue on the current course of ignoring the problem, we will repeat Cramer, South Canyon and other tragedies over and over. The lives lost on Cramer, and continued loss of life, in the future, will have been for nothing.

If, on the other hand, we face the hard issues from Cramer, work to understand the

interaction of fire behavior and human behavior, and commit to understanding the dynamics and finding long-term solutions, we can begin taking steps toward preventing many future tragedies. It's not too late. We can still learn much from Cramer, and can alter the course of the future in profound ways. It is absolutely worth the time and effort, and is vital. And it all begins with that all-important first step: the commitment to start.

Acknowledgements

Dedicated to the memory of Paul Gleason – friend, mentor and teacher. We must always be students of fire.

Photos

Figs. 1a, 2, 6a – Jim Kautz, USFS (Missoula Technology Development Center)
Figs. 1b, 3a, 3b, 4a and 4b – ATGS, Cramer Fire
Figs. 5a, 5b – USFS, 2003 (Accident Investigation Factual Report, Cramer Fire)
Fig. 6b – USFS, 1994 (Report of the South Canyon Fire Investigation Team)

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