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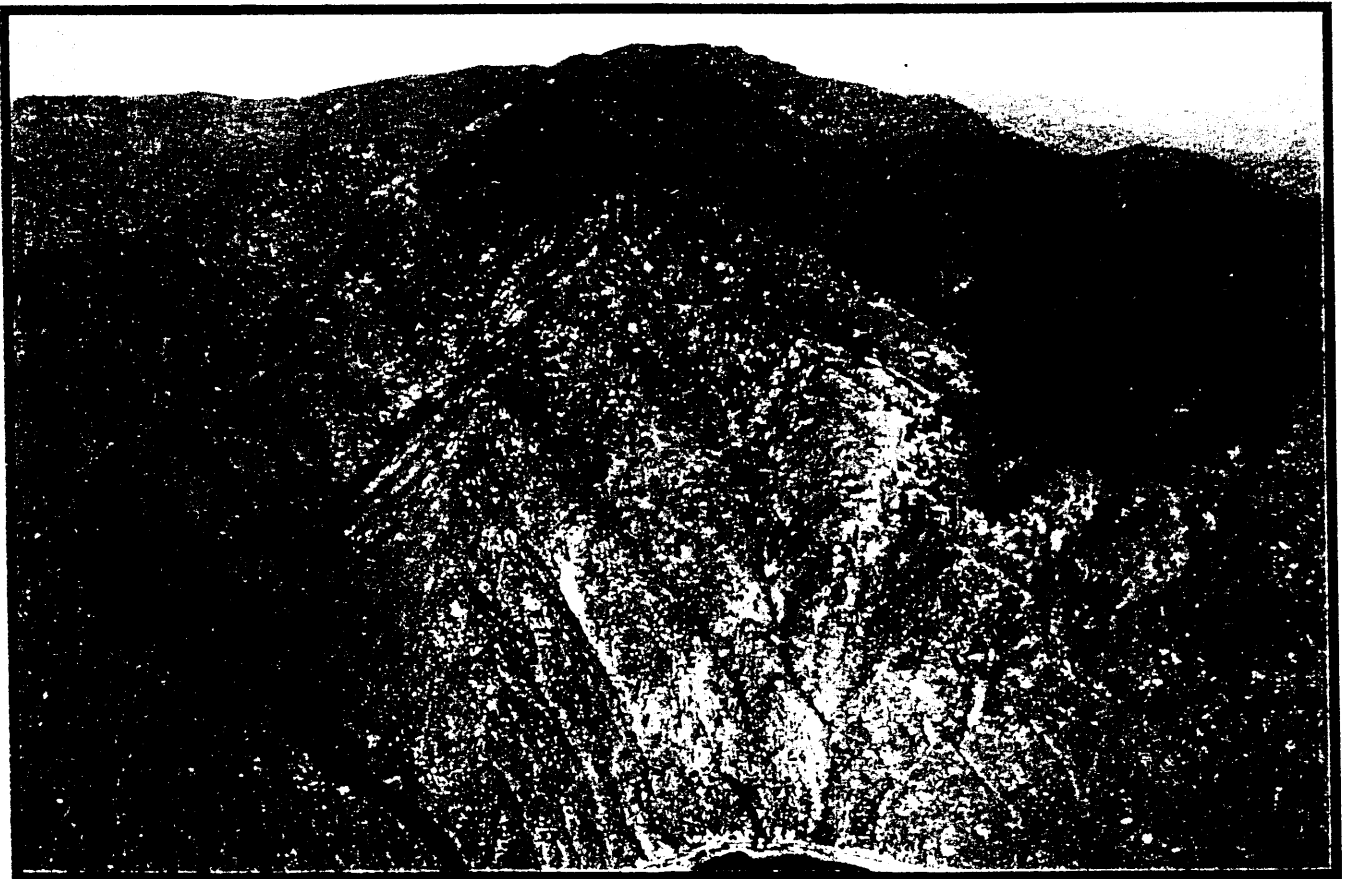
5100 Fire
December 2003
0351-2M48-MTDC



Accident Investigation Factual Report

Cramer Fire Fatalities North Fork Ranger District Salmon-Challis National Forest Region 4

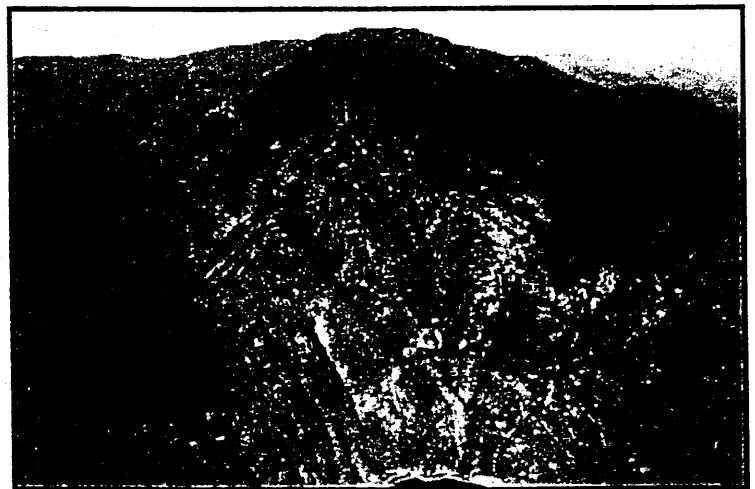
Salmon, ID, July 22, 2003



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USDA Forest Service
Technology and Development Program
Missoula, MT

December 2003

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July 22, 2003

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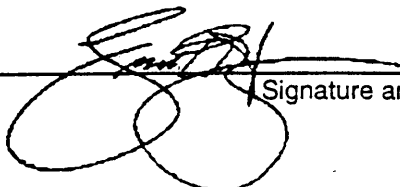
Accident: Cramer Fire Fatalities

Location: North Fork Ranger District, Salmon-Challis National Forest

Date: July 22, 2003

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12/19/03
Signature and Date

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Executive Summary

The Salmon-Challis National Forest (SCNF) in the Intermountain Region (R-4) is located in central Idaho. Rugged, steep terrain on the northern part of the forest has a significant impact on fire behavior, fuels, and local weather. On south-southwest aspects, fuels range from scattered shrubs, grass, and forbs on lower slopes to grass, shrubs and open ponderosa pine stands at higher elevations. On west-northwest aspects, mixed age Douglas-fir are prevalent. Live fuel moisture on the forest was at critically low levels at the time of the Cramer Fire; the *Burning Index* (BI) and *Energy Release Component* (ERC) indicated dangerous conditions.

The SCNF, a high-fire-load forest, has a fire organization, typical for the region, and delegates decisionmaking and fire management on all but Type I fires to the ranger districts (RDs). The fire organization was experiencing some tensions and problems as well as funding and staffing shortages, but the supervisor's office (SO) and regional office (RO) thought it worked well overall. The SCNF has a rigorous system of training and qualifications for its fire management personnel and stressed the importance of firefighter and public safety as the highest priority in fire suppression activities.

From July 12–22, the SCNF had several ongoing Type II fires as well as the Type III Cramer Fire. Because the forest fire staff, the North Fork/Middle Fork district ranger, and the zone duty officer were fully engaged with large fire management and fire-related business, there was little management oversight or direction to the Cramer Fire incident commander (IC).

The Cramer Fire became an extended attack fire at approximately 1938 on Sunday, July 20. This should have triggered a need for a complexity analysis and a wildland fire situation analysis (WFSA). No complexity analysis or WFSA was prepared on July 20, 21, or 22.

July 19 and 20, 2003

The Cramer Fire, located on the North Fork RD, started on July 19, 2003 from a lightning strike. It was detected by Long Tom Lookout at 1630 on July 20. At 1648, a McCall, ID, smokejumper aircraft (jumper 41) was diverted from another fire on the SCNF to do initial attack on the Cramer Fire but was unable to put smokejumpers on the fire because of high winds. Jumper 41 estimated the fire at 3 acres, burning in light fuels on a 60- to 70-percent slope, with a high spread potential.

Later in the evening on July 20, an IC Type IV, an IC Type IV trainee, and five members of an engine crew were flown into the fire by helicopter H-166. The engine crew was not used because the central Idaho dispatch center wanted the crew available for initial attack the next day. Because of dangerous conditions and darkness, no suppression action was taken on July 20 other than to assess and monitor the fire.

July 21, 2003

The Cramer Fire was actively burning through the early morning hours of July 21 and was 35 to 45 acres at 0710. At 1058, the IC Type IV turned the Cramer Fire over to an IC Type III. During a recon of the fire, the new IC noted that the perimeter was calm except for the northeast corner. By late morning, aviation and crew resources began to arrive at the Cove Creek helibase approximately 13 miles up river from the Cramer Fire. A Type II initial attack crew was flown from the helibase to a helispot (H-1) at the base of the fire to begin suppression action on the east flank, and a Type I helicopter was launched to do bucket work. Late in the afternoon after returning from an off-forced assignment, a second helicopter H-193 from the North Fork RD Indianola helitack base arrived on the fire with its crew and was asked to do bucket work above H-1.

At 1613 on July 21, fire behavior on the Cramer Fire increased, pushing the fire east into the Cramer Creek drainage. The hand crew pulled back to H-1 to hold the line they built above H-1, but the winds blew the fire across their hand line. At 1735, the IC decided to cease suppression due to increased fire behavior. The majority of the hand crew walked off the fire to the Salmon River road while the remainder, including the IC, flew back to the Cove Creek helibase. Later that evening, Cramer air attack reported that the fire had grown to 200 acres.

During a conversation later in the evening on July 21 with dispatch, the forest fire management officer (FMO), and the zone duty officer, the IC requested two Type II medium helicopters and logistics and operations support to accomplish his objective of catching the fire at 300 acres on July 22. He was told that Type II helicopters were ordered but unavailable and to use a strike team leader the following day to supervise the hand crews. The logistics support position was filled early on July 22.

July 22, 2003

At 0820 on July 22, the IC reconned the fire with a crew boss and the assistant manager of H-193. The strategy for the day was to fly three crews into H-1, use two crews to secure the east flank and one crew to anchor the fire to the west, and put two rappellers above the fire to build a helispot (H-2). H-2 would be used to fly a fourth crew in to secure the west flank of the fire. At 0900, the Type I helicopter was launched from Indianola to do bucket work on the fire.

At 0943, two Indianola helitack personnel rappelled from H-193 into a site above the fire to build H-2. The rappel spotter in H-193 estimated it would take one hour to clear H-2. During the morning and afternoon, Cove Creek helibase contacted the rappellers on H-2 several times, inquiring about their progress. The

Executive Summary

rappellers responded each time that they needed another 15 minutes to 1 hour before the helispot was completed.

While Cramer air attack was over the fire, he contacted the IC and recommended using retardant to pretreat the ridge above Cramer Creek and H-2. The IC confirmed the plan with Cramer air attack. The crew shuttle from the Cove Creek helibase to H-1 began at 1047. H-166 and H-193 took more than 3½ hours to shuttle 60 people—three per helicopter per 15-minute round trip.

Lead plane 41 arrived over the Cramer Fire at 1245 while two airtankers were dropping retardant. Shortly after arriving on the fire, lead plane 41 assumed the duties of air attack because Cramer air attack had returned to Salmon for refueling. Lead plane 41 noticed small spot fires in the Cache Bar drainage.

During a recon at 1326, the IC noted that most of the fire activity was below H-1 but the fire was also active on the east flank. The IC decided not to put the fourth crew into H-2 because they would have to walk in dangerous terrain at night. At 1400, fire activity increased and was intense around H-1, eventually burning over the helispot. At 1423, the IC contacted the forest FMO with concerns about the fire making a run to the west.

Between 1430 and 1440, the fire that had been smoldering in the Cache Bar drainage turned into an active flaming front. Between 1500 and 1520, lead plane 41 observed spread rates and intensities that were much greater than he expected and thought that the personnel on H-2 would not be at great risk due to the light fuels and rocky areas in the Cache Bar drainage.

At 1500, H-193 was down for a 30-hour maintenance inspection and H-166 was down for refueling. At 1505, the rappellers on H-2 requested a pick up and said, "Send them in a hurry." At 1509, the rappellers again called the helibase requesting the status of their pickup and said, "We need them right now." At approximately 1510, the Cove Creek

helibase radio operator asked the rappellers on H-2 if they were in danger and if they needed to go to their safety zone. The rappellers responded no, it was getting real smoky and they needed a ride out. At 1511 the strike team leader assembled his three crews, and after 1530, began walking the crews off the fire to the Salmon River road. At 1512, the Cove Creek helibase called the rappellers on H-2. When the rappellers responded at 1513, helibase said that the helicopter would be taking off momentarily and asked if there were any problems. The rappellers on H-2 responded, "Oh, God. We just got fire down below us. The smoke's coming right at us. Just make them hurry up."

During this time, the IC was involved in multiple radio conversations with central Idaho dispatch in Salmon, ID, about using resources assigned to the Cramer Fire for initial attack on the Stoddard Fire, a new start close by. H-166 was later diverted from the Cramer Fire to the Stoddard Fire for initial attack.

At 1520, H-166 said it was coming to get the rappellers at H-2 but couldn't land because of the smoke. Lead plane 41 heard the rappellers on H-2 respond to H-166 in a calm voice that the winds were 20 to 25 knots and that they were leaving H-2. At 1524, the rappellers called and asked, "Could I get a helicopter up right now?" Lead plane 41 observed that when the fire in the Cache Bar drainage reached the ridge, some flame lengths were 50 feet or more with occasional flame lengths up to 100 feet. The fire, described as "a big flash front," burned over and around H-2, killing the rappellers shortly after their last radio transmission. Estimated temperatures at the fatality site were from 1,300 °F to potentially over 2,000 °F. Two fire shelters were found at the site, but neither was deployed.

Numerous attempts were made to locate the rappellers after the burnover. Two personnel were rappelled below H-2 later in the afternoon for a search-and-rescue mission. Shortly after reaching the ground, the search-and-rescue person-

nel were notified by a helicopter over the area that it had located the rappellers approximately 75 to 100 yards northwest of H-2. The search-and-rescue personnel flagged and secured the fatalities site. Later on, two more personnel were delivered close to H-2 and the four spent the night near H-2.

At 1008 on July 23, the Lemhi County sheriff, the Lemhi County deputy sheriff, and a Forest Service employee flew into a helispot above H-2 to remove the bodies. The victims were flown to the Cove Creek helibase and then on to the Salmon airport. The accident investigation team arrived in Salmon at 1800.

Findings

Forty-four major findings, conclusions developed from the facts of the incident, were divided into sixteen categories below. Some of the more significant findings are highlighted and summarized within each category.

Fire Management Plan Direction

The SCNF Fire Management Plan identifies two trigger points that define when a fire transitions from initial attack to extended attack and what analyses are needed once a fire reaches extended attack status. It also addresses the hazards of fire suppression in the Salmon River Breaks and recognizes that fire line construction at midslope is dangerous and that underslung fire lines are hard to secure and hold. Midslope fire suppression tactics were used on the Cramer Fire during extreme burning conditions.

Fire Management Organization

Responsibility for managing Type II through Type V fires was assigned to the district rangers on the SCNF, which placed

a considerable fire management workload on the North Fork/Middle Fork district ranger. There was a critical fire management vacancy (the FMO) on the North Fork RD, and there were no initial attack resources from the North Fork RD on duty or available when the fire was reported, lengthening the response time.

The SCNF increased the number of positions in its fire organization when it received additional fire funding, but there were different perceptions on the forest of how well the fire organization functioned. The performance of the fire organization was becoming a source of increasing concern, but limited action was taken to address the state of the fire organization.

Qualifications

Personnel assigned to the Cramer Fire were qualified for their positions.

Transition from Initial Attack to Extended Attack

When the Cramer Fire went into extended attack status, the change from initial attack to extended attack was not acknowledged, recognized, or reported by the IC, the North Fork/Middle Fork district ranger, the forest FMO, or the zone duty officer. As a consequence, the analyses required by the FMP were not conducted and there was no communication regarding the change in fire status.

Fire Suppression Strategy and Tactics

There was minimal discussion of Cramer Fire suppression strategy and tactics among the forest fire staff, the district ranger, the zone duty officer, and the IC. On July 21 and 22, fire suppression strategy and tactics on the Cramer Fire did not provide for safe and effective suppression operations. The IC Type III failed to continually reevaluate the situation and

modify his plan when fire conditions changed and when requested resources were not available.

Safety

There was good attention to safety at the forest level and in the early stages of the Cramer Fire, however, there were significant safety lapses on the Cramer Fire prior to the fatalities. Visibility of the slopes below H-2 was limited by topography and vegetation, obscuring the rappellers' view of fire below them.

Fire Management Resources

There were inadequate resources and a logistical inability to fully utilize available resources to implement the ICs' strategies. On July 22 there was confusion about the availability and positioning of some resources and helicopters were not available to retrieve the rappellers at a critical moment of need.

Weather Information

Fire activity on the SCNF increased in July due to hot, dry, weather and multiple lightning starts, indicating the potential for new starts to grow rapidly. Crews were informed on the morning of July 22 that conditions had been progressively warmer and drier the previous two days. Weather information was not aggressively sought and the information that was obtained did not represent the Cramer Fire site.

Fuels and Terrain

Fuel and terrain conditions on the Cramer Fire lent themselves to extreme fire behavior and difficult fire suppression.

Fire Behavior, General

Fire behavior on the Cramer Fire was consistent each day—calm in the morn-

ing and severe in the afternoon. Even though the Salmon River Breaks are known for their potential extreme fire behavior and some crew members were aware that seasonal conditions were extreme, other personnel on the fire did not expect extreme fire behavior in the afternoon of July 22.

Lookouts

There were no effective lookouts for the rappellers at H-2. The plan for placement of lookouts was not clearly communicated to personnel assigned to the fire. No lookout with a view of H-2 or the Cache Bar drainage was posted on July 22 to monitor fire in the Cache Bar drainage and to communicate critical weather and fire behavior information to the rappellers. Aviation resources over the fire could not function full time as lookouts for ground crews given their other duties and responsibilities.

Escape Routes and Safety Zones

Three of the four safety zones identified by the IC and two crew bosses were not safety zones on the afternoon of July 22, during conditions of extreme fire behavior. Helicopter retrieval became the primary escape route to safety for the rappellers.

Fire Behavior, Cache Bar Drainage

The seriousness of the fire in the Cache Bar drainage was underestimated. Development of an active fire front was observed from the air as much as 50 minutes before the fire reached H-2, but this information was not conveyed to the rappellers on H-2. When the fire front reached H-2, the intensity and rate of spread were much greater than had been anticipated, and conditions were not survivable with or without a fire shelter.

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Postaccident Response

Multiple attempts were made to contact and locate the rappellers. More than 30 minutes after losing contact with the rappellers, the IC became involved in the search and rescue operation. Prior to that time, he was checking on the safety of personnel near H-1 and dispatching Cramer Fire resources to another fire on the forest.

Leadership on the Cramer Fire

Leadership on the Cramer Fire was inadequate to provide for safe and effective

suppression operations. The IC Type III did not request a safety officer. He remained confident he could contain the fire with the same strategy even though he did not receive the requested resources, and his view of the fire on July 22 came from two reconnaissance flights. The rest of the day he was at the Cove Creek helibase, 13 miles from the Cramer Fire. When the IC made his decision to retrieve the rappellers from H-2, ½ hour elapsed before a helicopter was launched to get them, and that launch was requested by the rappellers. During the critical period prior to and after contact was lost with

the rappellers, the IC was also functioning as the district FMO/AFMO, performing multiple collateral duties.

Management Oversight

The SCNF assigned responsibility for the Cramer Fire to the IC Type III but did not provide oversight. Those who should have provided oversight focused attention on other priorities. When concerns about management of the fire surfaced, follow-up on these concerns was inadequate.

Narrative

Background

Fact 1: The Salmon-Challis National Forest (SCNF) in the Intermountain Region (R-4) is located in central Idaho and comprises 4.3 million acres (figure 1). The forest manages 1.3 million acres within the 2.4 million-acre Frank Church River of No Return Wilderness (FC-RONR). It is divided into seven administrative ranger districts (RDs) with the headquarters in Salmon, ID (records: 1 and 2).

Fact 2: Although the Salmon National Forest and the Challis National Forest were administratively combined in 1998, the SCNF operates under two land and resource plans (based on the previous administrative boundaries) completed in 1987 and 1989. Management direction comes from the Salmon NF plan and Challis NF plan and may differ depending on former administrative boundaries. The land and resource plans are scheduled for revision in 2005. In addition to the forest plans, lands within the FC-RONR wilderness area are managed under an approved fire use management plan and wilderness management plan updated in 2002. The forest's fire management plan (FMP), which received minor updates, was reviewed by forest and regional office personnel earlier in the year and signed July 21, 2003. The forest plans and the FMP require the forest to suppress all fires outside the FC-RONR and to stress safety during initial attack (statements: 12 and 15; records: 1 and 2).

Topography

Fact 3: Although topography on the forest varies from place to place, it can be characterized by two general landform types: steep areas with very pronounced relief and rolling hills with broad valleys. The steep terrain, called the Salmon River Breaks, is rugged and dangerous country with limited visibility. The terrain transitions rapidly among distinct features—benches, steep slopes (over 70 percent),

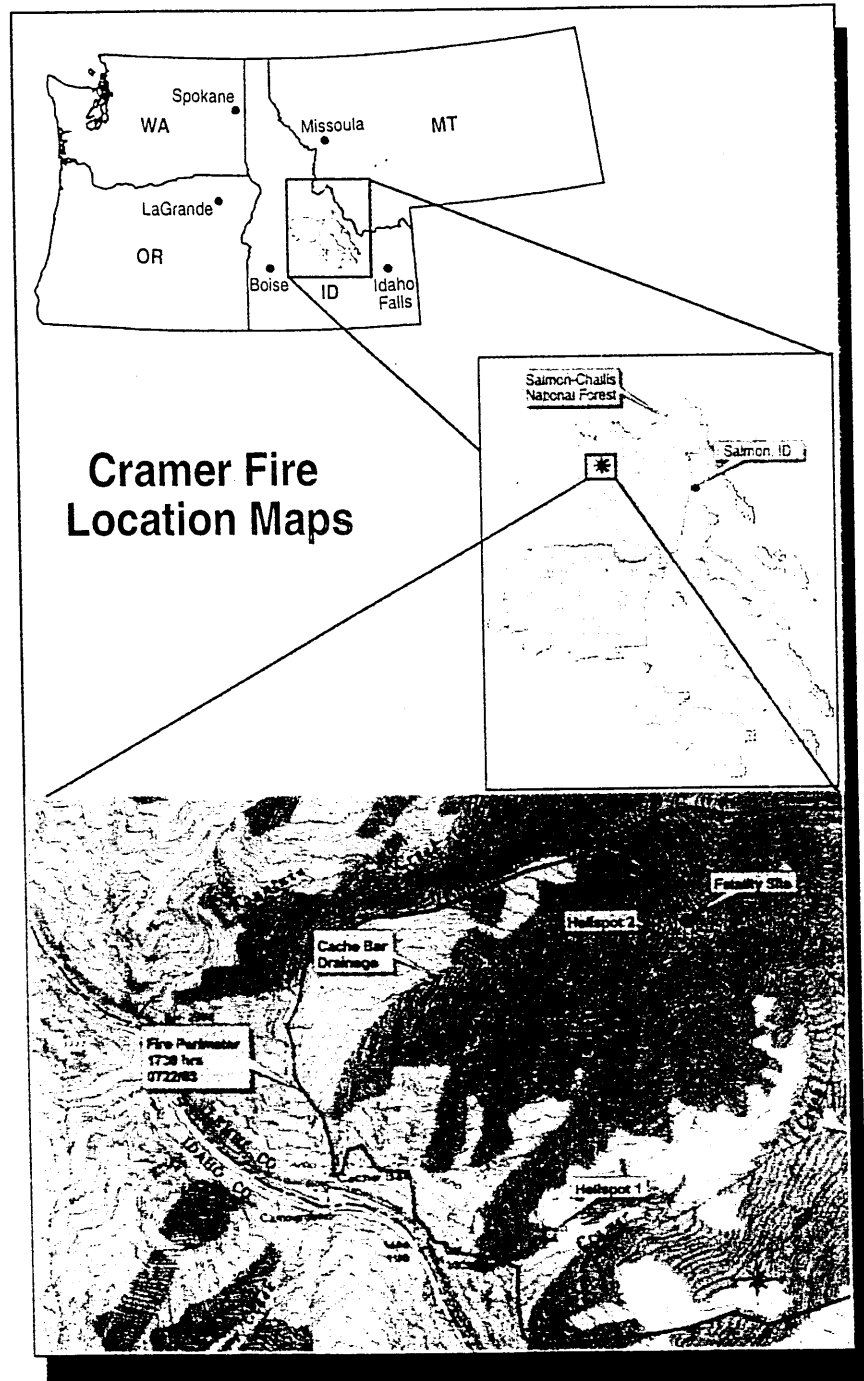


Figure 1—Cramer Fire on the Salmon-Challis National Forest, ID, July 2003.

breaks, and saddles. Vegetation covering the rocky slopes also limits visibility (statement: 32).

Fact 4: The steep topography has a

significant effect on fire behavior, fuels, and weather. Fire behavior in the hotter part of the day can be extreme, with rapid spread through the canyons, draws, and

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chutes. Steep slopes not only predispose areas to rapid uphill fire growth, but also cause firebrands to roll downhill. Historically, a fire that burns in the Salmon River Breaks will burn to the top of the ridges and then downhill to the Salmon River because of the sheer ruggedness and steepness of the terrain (statements: 15 and 32; record: 1).

Fact 5: The topography has a marked effect on fuels, contributing significantly to differences in moisture and surface heating from place to place across the landscape. These differences influence variations in the amount of available moisture as a function of elevation and variations in surface heating due to aspect (record: 1).

Vegetation and Fuels

Fact 6: Vegetation varies considerably by elevation and aspect. On the hot, dry, south and southwest aspects, vegetation on lower slopes is sparse and has broken rock outcroppings or talus patches with scattered shrubs, grass, and forbs. Above the rocky breaks to midslope, vegetation is a mosaic of barren ground, grass, shrubs, and very open ponderosa pine stands. Because ladder fuels are generally absent, canopies are not prone to crown fire. On west and northwest aspects, closed stands of Douglas-fir of various ages are common. Ladder fuels are present, making these stands prone to crown fire (records: 1 and 3).

Fact 7: In 1985, a stand-replacement

fire burned through most of Fountain Creek and the adjacent drainage above the Cache Bar boat ramp. Southern aspects consist of grass and scattered shrubs, and the northern aspects are a mosaic of rocky patches and nearly continuous stands of 2- to 4-foot shrubs, primarily shiny-leaf ceanothus. Large, down, woody fuels from fallen snags are scattered through these brush fields (figure 2).

Fact 8: The primary fire behavior fuel models in the Cramer Fire area are fuel models 2, 5, and 9 (records: 1 and 3).

Fact 9: Shiny-leaf ceanothus burns intensely because there are volatile oils in the foliage. The potential rate of fire spread through ceanothus increases as the growing season progresses from



Figure 2—Fuel types in the Cramer Fire area.

June 20 to September 10. The forest customarily uses brush fields in old burns as an impediment to fire spread (record: 3).

Fact 10: At 75- to 100-percent live fuel moisture, fires exhibit extreme fire behavior and burn actively through the night. When fires exhibit extreme rates of spread and moderate to long-range spotting, indirect attack is necessary. Air turbulence from these fires may also cause problems for air operations. Live fuel moisture on the SCNF was measured five times during June and July. Moisture levels in conifers sampled on July 21, 2003, ranged from 80 to 110 percent. Shiny-leaf ceanothus sampled on July 30, 2003 was at 104-percent moisture. Generally, live-conifer fuel moisture levels were comparable to or lower than samples taken in early August, 2000. During the 2000 fire season, more than 417,000 acres burned on the forest (records: 3 and 4).

Climate and Weather

Fact 11: The climate in the Salmon River Breaks varies widely with elevation. The majority of annual precipitation occurs as snow during late fall through early spring, with occasional intense, short bursts of rain from summer thunderstorms. Wind patterns in the area are predominantly from the west. Topography influences local weather conditions, especially winds. Upslope/upcanyon winds are common during the summer months. Since these winds are channeled by topography, the local wind conditions are far different from those predicted in the general-area fire weather forecasts. Night time thermal zones are common, especially in the deeper canyons, and contribute to active fire behavior at night (record: 1).

Fact 12: The SCNF fire program relies heavily on data provided by seven remote automated weather stations (RAWS) maintained across the forest. The seasonal start and stop dates for data collection and management are the re-

sponsibility of the central Idaho dispatch center in Salmon, ID. Annual maintenance of the RAWS sites is the responsibility of the forest. The forest also has two portable weather stations that are deployed to support fire suppression, fire use, and prescribed fire activities. These stations fill in the gaps between the permanent RAWS sites and provide site-specific data to managers. These were not used on the Cramer Fire (record: 1).

Fact 13: The Skull Gulch RAWS site is the most representative of the Cramer Fire area, but weather data from this site was inaccurate and unusable because of a temperature and relative-humidity sensor that was not functioning properly. This problem was not discovered and corrected until after the Cramer Fire. The RAWS on the forest had not been maintained or calibrated since September 2002 (records: 5 and 6).

Fact 14: The Pocatello, ID, office of the National Weather Service (NWS) provides fire weather information and forecasts for the forest, including daily fire weather forecasts and spot forecasts. The forest is required to use forecasts from the NWS servicing center in Pocatello, even though those from the NWS servicing office in Missoula, MT, are more accurate and useful. In particular, wind predictions from the Pocatello spot weather forecasts are unreliable and the forecasts frequently do not reflect actual conditions on the ground. Weather from previous days is often a more reliable predictor than forecasts from Pocatello. Conditions on the North Fork RD where the Cramer Fire occurred, had been the same for several successive days (high temperatures, low humidities, and brisk afternoon winds) (statement: 21; record: 7).

Fact 15: The Long Tom Lookout generally provides weather information to fire suppression personnel in the area, including the first three days of the Cramer Fire. The difference in elevation between Long Tom and the fire was too great for the lookout's weather observations to be valid

for the fire area (statements: 5 and 10; records: 8 and 9).

Fire Danger and Seasonal Severity

Fact 16: Two indexes from the National Fire Danger Rating System are commonly used to express fire danger and track seasonal trends—the *Burning Index* (BI) and the *Energy Release Component* (ERC).

Fact 17: The BI reflects the difficulty of fire control. The ERC reflects the contribution that all live and dead fuels have to potential fire intensity and is a good indicator of the overall fire danger resulting from local fuel-moisture conditions. It communicates expected fire danger to fire personnel and allows them to associate the numeric values with real-life experiences in the area. Forest fire suppression personnel use the ERC to estimate fire growth potential and in complexity analyses (record: 1; NWCG Web site).

Fact 18: The forest also uses the *Haines Index* as an effective indicator of potential fire behavior. The index is included in the daily zone fire weather forecast and is read by dispatch when the daily fire weather forecast is transmitted to field units (record: 1).

Fact 19: The forest was experiencing fires comparable to the year 2000 when two fires burned 417,000 acres on the forest. During July 2003, the forest and Eastern Great Basin were at preparedness level IV. The BIs and ERCs were near the high-end; the forest BI was well above 90 percentile and the ERC was at 96 percentile, indicating dangerous conditions. The forest had just experienced a 15,000-acre fire on the Leadore RD, a district with historically low fire occurrence and smaller fires. The Eastern Great Basin Coordination Center issued an updated safety alert that was distributed to all personnel, emphasizing the dangerous conditions and the need for aggressive initial attack. The *Fire Danger Pocketcard* is a method of communicat-

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ing information about fire danger to fire-fighters. A crew on the Cramer Fire had reviewed their pocketcards a few days before the Cramer Fire and recognized that they were at conditions comparable to those on the Clear Creek Fire in 2000 that burned 217,000 acres (statements: 1, 16, 36, and 37; record: 10; NWCG Web site).

Fire Regimes and Fire History

Fact 20: On the north side of the forest and in the vicinity of the Cramer Fire, the fire regime is low severity and high frequency (ponderosa pine and dry-site Douglas-fir). Fires historically burned as low-intensity surface fires, and crown fires were uncommon. Fire exclusion in recent decades has dramatically altered the stand structure in this forest type, with a significant increase in the density of ponderosa pine and Douglas-fir on all but the driest sites. At the higher elevations in the Cramer Creek drainage, mixed conifer stands mark a transition to the infrequent, high-intensity regime of the high-elevation subalpine fir (record: 1).

Fact 21: Fire season on the SCNF normally runs from July 1 to September 15. The forest is a high-fire-load forest, one of four forests in R-4 with a high fire occurrence. Based on the last 10 years, the SCNF averages 120 fires and 52,000 burned acres per year. Recent fire events have increased dramatically in size and severity. Two fires, the Clear Creek and the Salmon-Challis Wilderness, for example, burned 417,000 acres in 2000. Most of the fires on the forest are lightning caused and start at higher elevations. The forest had an initial attack success rate of 94 percent from 1998 to 2002 (statements: 9, 15, and 24; records: 1 and 4).

Fact 22: Fire shelter deployments occurred on three fires on the forest—two shelter deployments (one fatality) on the Ship Island Fire in 1979. 82 deployments (no fatalities) on the Lake Mountain Fire

in July 1985, and 73 deployments (no fatalities) on the Butte Fire, also in July 1985 (records: 1 and 26).

SCNF Fire Management Organization

Fact 23: Prior to 2001, the forest's fire organization was centralized. The supervisor's office (SO) ran large fire operations and made fire management decisions for the forest. The district rangers were not involved in Type I and Type II incidents. After the 2000 fire season, a new position, operations staff officer, was created and filled to oversee fire management on the forest. The forest received National Fire Plan funding, based on the 2000 fire season, and in 2001, filled a number of new fire management positions in the SO and on the RDs to increase suppression capability. Each forest in R-4 has a similar fire organization (statements: 9, 12, 21, and 24). The SCNF fire organization is structured as follows:

Supervisor's Office

Fact 24: The SO fire staff consists of:

- Operations staff officer whose duties are split among fire (70 percent) and other program areas on the forest
- Forest fire management officer (forest FMO)
- Deputy FMO
- Forest aviation officer (FAO)
- Part-time geographic information specialist (GIS)
- Part-time fire ecologist
- Fire business assistant
- Fire planner
- Forest fuels management specialist
- Forest logistics coordinator
- Frank Church fire coordinator

The role of the SO fire staff is to provide support, guidance, and oversight to fire programs on the RDs (statements: 9, 12, 21, 27, and 28).

Dispatch Center

Fact 25: The central Idaho dispatch (CID) center was transferred from the SO fire staff and placed under the management of an interagency board of directors. Forest Service positions include a logistics coordinator, lead dispatcher, part-time aviation dispatcher, and part-time fire warehouse supervisor (statement: 12).

Ranger Districts

Fact 26: Since 2001, decisionmaking and fire management on all but Type I fires were delegated to the RDs. However, the RDs are expected to coordinate with the SO on large fire incidents. District rangers with fire experience were given the authority to manage Type II fires. The SO continued to manage Type I fires. Each RD has its own fire organization (table 1), which varies from district to district, except for the Leadore RD which functions as a zone organization with the Salmon-Cobalt RD and the Yankee Fork RD which functions as a zone organization with the Challis RD. The three districts with the heaviest fire load have a fire management officer (FMO), an assistant fire management officer (AFMO), a helitack crew, and several engines. In addition, a national helicopter module is assigned to the Middle Fork RD. It consists of a foreman, assistant foreman, lead crewmember, and seven seasonal crewmembers. The district and zone fire organizations report to district rangers. The SO provides aviation management, but the helicopters are assigned to the districts (statements: 9, 12, 15, 21, and 27).

Fact 27: The flow of information and fire management coordination changed with the expanded fire organization, reducing the amount and type of information shared with the SO fire staff as well as their participation in critical fire management decisions. The North Fork and the Middle Fork RDs are managed by one district ranger and have the largest fire programs on the forest. The districts com-

Table 1—District resources on July 19, 2003.

Ranger district	FMO	AFMO	Helicopter crew Type III helicopter	Engine crew Type VI engine	Hand crew (five person)	Lookouts
Salmon-Cobalt	•	•	•			
Leadore	1*			•		
Challis	•		•	•	•	1
Yankee Fork	2*			•	•	
Lost River	•			•	•	
Middle Fork	•	•			•	1
North Fork		•	•			2
TOTALS	4	3	3	4	4	4

1* Zoned FMO with Salmon-Cobalt RD 2* Zoned FMO with Challis RD

bined have 85 percent of the fire activity on the forest and 95 percent of the forest's roadless areas. The North Fork and Middle Fork RDs assumed greater autonomy under the new organization and coordinated less with the SO, causing friction in the new organization, confusion below the operations staff officer as to SO staff roles and responsibilities, and possibly reduced organizational effectiveness. The deputy FMO noted, for example, that the SO fire staff had been less involved in day-to-day fire management and that he was marginalized in the expanded organization. Although the forest supervisor was aware of some organizational tensions and problems, he did not feel they hampered fire safety. He stated that he "took some of the sting out of the district running everything" by incorporating checks and balances in the fire management decisionmaking process. The regional director of aviation and fire management (A&FM) stated that upcoming reviews of the forest's fire organization might surface and address the issues and concerns about fire management on the forest. (statements: 9, 12, 21, 24, 27, and 28).

Fact 28: The forest supervisor, the regional director of A&FM, and a deputy regional forester thought the SCNF fire

organization worked well. From a communication standpoint, the regional fire staff has a conference call every Monday with forest FMOs in R-4 to discuss current issues, safety messages, and other fire business. The operations staff officer on the SCNF and the forest FMO also have a formal conference call every Monday with the district rangers to share fire management information. Every Tuesday, the district FMOs and the forest FMO have a conference call to discuss fire danger, general fire management strategies, and specific fire strategies and tactics (statements: 1, 9, 15, 24, and 27).

Fact 29: Fire funding decreased after 2001. The forest had an expanded organization, insufficient funds to fill numerous vacant positions, and conflicting strategies for managing fire vacancies. The forest FMO and his staff supported reducing overhead at the forest and district levels in order to fill initial attack positions. The district rangers and the operations staff officer generally felt that overhead was more critical because of the hard decisions that needed to be made during project fires. Although the forest's 2003 initial budget allocation was 51 percent of MEL (most efficient level), the final allocation was 95 percent of MEL during the third quarter of the fiscal year.

The forest postponed strategic organizational decisions because of delayed budget allocations, and later decided to fill key overhead/supervisory fire positions to provide leadership needed on fires. In the interim, existing forest fire personnel typically performed their own duties as well as the duties of the vacant fire positions. Broader organizational staffing issues, however, remain unresolved (statements: 9, 15, 21, 27, and 28; record: 1).

Fact 30: The Cramer Fire was on the North Fork RD. The FMO position on the North Fork RD remained vacant 1 to 1½ years prior to and during the Cramer Fire, although a new hire for the position arrived shortly afterward. The delay in filling the district FMO position was partly because of concerns by the forest FMO that the district did not have adequate, long-term funding. The AFMO on the North Fork RD is [redacted] who had been on the district since May 2001. He was detailed to the FMO position for a 120-day acting assignment. For interim periods, when others were not detailed to the position, [redacted] was assigned the duties of the district FMO (statements: 1, 14, 15, 21, 25, 27, and 28).

Training and Qualifications

Fact 31: Red-card certification on the forest is very tightly managed and monitored, ensuring accurate and up-to-date qualifications of fire personnel. The forest established a red-card committee which reviews the qualifications of fire personnel on the forest. It also has an incident commander (IC) committee that reviews IC qualifications, performance weaknesses, and needed training or experience. To monitor performance, the forest requires evaluations of fire personnel before returning from a fire assignment. Even with this level of oversight, some personnel were concerned that the addition of new or inexperienced people may impact safety and situational awareness on fires. The forest supervisor and North Fork/Middle Fork district ranger considered [redacted] the Cramer Fire IC Type III on July 21 and 22, to be one of the safest Type III ICs on the forest. [redacted] is trained and qualified as a Type III IC. Other personnel on the fire also met agency qualifications (statements: 1, 12, 15, 26, 27, and 32).

Fact 32: The forest was able to accomplish all of its preseason fire training, which included training for returning firefighters and fire shelter training. Each line officer conducted an "expectations briefing" for ICs, helicopter foremen, and other supervisors. If fire personnel missed the briefing, the forest supervisor and the operations staff officer briefed them later to ensure that all fire personnel were fully informed (statement: 15).

Safety

Fact 33: The forest's safety record has been above average in R-4. The forest supervisor consistently emphasized firefighter and public safety as his highest priority and cautioned against taking risks that jeopardized human life (statements: 12, 21, and 27).

Fact 34: During fire season each year, the forest supervisor received daily fire briefings from his staff, visited with per-

sonnel on fires to stay informed, met with the crews, participated in district orientations, and emphasized his safety message at several different locations. In June of 2002 and 2003, the forest supervisor met with his Type III, IV, and V ICs to discuss expected weather conditions, implications for the fire season, and public and employee safety (statement: 27).

Fact 35: The regional office (RO) monitors compliance of the *Thirtymile Action and Prevention Plan*, communicates the importance of fire training, funds training activities, and stresses the need to use the *Great Basin Incident Organizer* on wildland fires staffed by forest employees. Each year, the district rangers and FMOs on the SCNF jointly conduct after-action reviews to improve fire management on the forest. District FMOs monitor fire operations for safety and compliance with work/rest guidelines (statements: 9, 16, 24, and 27).

Fact 36: The forest supervisor, the North Fork/Middle Fork district ranger, and the operations staff officer indicated that past and current fire experience, training, safety messages, job hazard analyses, and/or red-card qualifications constitute effective risk management on the forest (statements: 1, 15, and 27).

Fire Situation on the Forest, July 19-22, 2003

Fact 37: Even though the fire season started slowly because of average winter snowpack and precipitation, June turned hot and dry. A burst of late spring moisture resulted in pine fuel growth and good grass cover through all elevations. Up until June 10 or 11, the forest had approximately 20 fires (statements: 15 and 27).

Fact 38: On July 12, between 1400 and 1500, the Tobias Fire on the Leadore RD began growing rapidly, expanding from 400 acres to 13,000 acres in 6 hours. By the following weekend, fires increased because of lightning activity (statement: 15).

Fact 39: Facing heightened fire dan-

ger, the forest requested \$9,000 for preventing human-caused fires associated with an air show on the southern end of the forest (statement: 28).

Fact 40: On Saturday, July 19, the recently ignited Blackwall and Tobias Fires required Type II incident management teams. [redacted] operations staff officer, provided support to the team on the Blackwall Fire while [redacted], the forest FMO, supported the team on the Tobias Fire. The deputy FMO left for a house-hunting trip in central Oregon (statements: 12 and 28).

Fact 41: On Sunday, July 20, additional lightning starts were reported, including the Crystal Fire, Dutch Lakes Fire, and the Cramer Fire. The Dutch Lakes Fire was given highest priority. If it reached stands of bug-killed trees, it had the potential to burn into the town of Stanley, ID. At 400 acres, the Crystal Fire was second priority, and the Cramer Fire, at 20 acres, was third priority. [redacted] the district ranger for the North Fork and Middle Fork RDs, was working as a supervisory dispatcher in the SO. She had the Blackwall and Crystal Fires burning on her districts. [redacted] informed her that she had a new fire, the Cramer Fire, on her district and indicated what resources were being dispatched. She was shown maps that indicated where the Cramer Fire was located (statements: 1, 5, 12, 15, and 28).

Fact 42: On Monday, July 21, [redacted] and [redacted] were preparing to participate in a regional fire preparedness review, which had been canceled the previous year. The regional office was aware of the fire situation on the forest, but chose to hold the review as scheduled. [redacted] was involved in a transition from a Type II to a Type III team on the Tobias Fire and a consultation with the RO about initial attack issues. Later in the day, he was also preparing an inbriefing for the Crystal Fire Type II team. [redacted] was at the North Fork RD. She informed [redacted] her AFMO, of the Cramer Fire. She briefed him on the fire location, identified [redacted]

[redacted] the district FMO on the Salmon-Cobalt RD, as the IC, and told [redacted] to contact [redacted]. [redacted] was unable to contact [redacted] and subsequently talked with [redacted] around 0830. Shortly after a call between [redacted] and [redacted], [redacted] approved [redacted] as the Cramer Fire IC. [redacted] worked the rest of the morning on North Fork RD business, and at midday ordered a Type II team for the Crystal Fire. She traveled to Salmon, ID, for a Fish and Game meeting and remained in Salmon for most of the day. In the late afternoon, she heard [redacted] over the radio express concern about the Cramer Fire burning down to the Salmon River road. She ordered a patrol for the road through dispatch. She traveled to the Blackwall Fire to serve as the agency administrator's representative and returned home at 1930 (statements: 1, 9, 15, and 28).

Fact 43: In response to extreme burning conditions and the large fires on the forest, central Idaho dispatch was aggressive about sending resources to new fire starts, including the Cramer Fire (statements: 8 and 36).

Fact 44: By Tuesday, July 22, the forest was focusing on the Tobias, Crystal, and Blackwall Fires, while ensuring that the Dutch Lakes Fire was contained. In the meantime, the forest had two new fire starts. The RO fire preparedness review began that morning, involving [redacted] and [redacted]. At 1300 or 1400 a new large fire, the Frog Pond Fire, started near Lost Trail Pass, and [redacted] who was participating in the RO review, decided to take members of the review team to the fire to witness it first hand. Radio and phone communications were limited. His attention was focused on the Frog Pond Fire and the Blackwall Fire, which had the potential of burning together. [redacted] was at the Middle Fork RD early Tuesday morning, working on a wildland fire situation analysis (WFSAs) and delegation of authority for the Crystal Fire. She briefed the Type II team at 1000 and spent the

morning and early afternoon with them. During the afternoon, she spent time managing issues related to the Frog Pond and Blackwall Fires. She had no contact with the North Fork RD until she called the RD at 1700 (statements: 1, 15, 27, and 28).

Fire Strategy, Tactics, and Complexity

Strategy and Tactics

Fact 45: According to the SCNF operations staff officer, an IC typically would talk to the district ranger, district FMO, forest FMO, forest duty officer, or zone duty officer to discuss strategy and tactics on a fire (statements: 1 and 15).

Fact 46: In the absence of a district FMO or AFMO, the zone duty officer can provide guidance to an IC on initial attack (statements: 1 and 15).

Fact 47: When discussing strategy and tactics with the district, the forest FMO is the principal contact with the district FMO. The operations staff officer communicates with the district rangers about fires on their districts, although the forest FMO may also, depending on the circumstances (statement: 15).

Fact 48: The operations staff officer generally does not get involved with the strategy and tactics on Type III incidents such as the Cramer Fire (statement: 15).

Fact 49: In a discussion with the North Fork/Middle Fork district ranger on Sunday night, July 20, [redacted] informed [redacted] that the strategy for the Cramer Fire was to use a helicopter for bucket work and a hand crew to control the fire at the smallest acreage. She heard this again in a secondhand conversation between [redacted] and [redacted] on Monday morning, July 21. From that point on, her information about the strategy and tactics on the Cramer Fire came from the radio on Monday afternoon and from radio logs after the accident on July 22 (statement: 1).

Complexity Analyses

Fact 50: The zone duty officer or district FMO and the IC typically use the *Incident Response Pocket Guide* extended attack transition analyses to make decisions about incident complexity (statement: 15).

Fact 51: After consulting with the IC, the zone duty officer or district FMO informs the SO fire staff when a fire is exceeding a district's capabilities (statement: 15).

Fact 52: The forest uses four guidelines to analyze the complexity level of a fire (statement: 15; records: 11, 12, 13, and 27).

- *Incident Response Pocket Guide*
- *Great Basin Incident Organizer*
- *Central Idaho Interagency Incident Management Team 2003 Operations Plan Type III*
- *Interagency Standards for Fire and Fire Aviation Operations 2003*

Fact 53: Based on discussions with the SO fire staff, preparing wildland fire situation analyses (WFSAs) on all but Type I fires was the responsibility of the ranger district. In the case of the North Fork RD, the AFMO would prepare a WFSAs with the North Fork/Middle Fork district ranger, who would approve the WFSAs (statements: 1, 14, and 15).

Fact 54: The SCNF fire management plan identifies two trigger points that define when a fire transitions from initial attack to extended attack (appendix e):

1—Suppression efforts have not succeeded or are not expected to reach containment within 24 hours.

2—The initial attack incident commander (IC Type IV or IC Type V) requests additional resources that result in fire complexity attaining Type III status within or following the first 24 hours following the arrival of the first suppression resources.

Narrative

The Cramer Fire became an extended attack fire when [redacted] the IC Type IV, requested an IC Type III at approximately 1938 on Sunday, July 20 (statement: 20; record: 15). This transition request should have triggered the need for a complexity analysis and WFSA. No complexity analysis or WFSA was prepared on July 20, 21, or 22.

Fact 55: The North Fork/Middle Fork district ranger did not know if a complexity analysis had been done for the Cramer Fire (statement: 1).

Fact 56: According to the district ranger, no WFSA was prepared, because she had not been advised that the fire had escaped and that a WFSA was required. Normally, she would receive that information by radio or cell phone, and the zone duty officer or district FMO would have kept her informed. She did know, however, that an IC Type III had been ordered on July 20, and she approved her North Fork AFMO as the IC Type III early in the morning on July 21. The forest FMO, zone duty officer, and CID also knew that an IC Type III had been ordered on July 20 (statement: 1).

Fact 57: The operations staff officer recognized that the Cramer Fire was an extended attack fire with an IC Type III, but larger fires on the forest received higher priority. The North Fork/Middle Fork district ranger, the forest FMO, CID, the zone duty officer, and the operations staff officer should have known, based on the FMP and the transition to an IC Type III, that a complexity analysis and WFSA were required (statements: 1, 14, 15, 20, and 36).

Preaccident

Saturday Evening, July 19, 2003

Fact 58: At approximately 2100, a lightning strike was reported in the area of Cramer Creek on the SCNF in Idaho.

The fire started in steep terrain in country known as the Salmon River Breaks (statements: 5 and 29; record: 14).

Sunday Afternoon, July 20, 2003

Fact 59: 1400 weather: 76 °F, 25-percent relative humidity, northwest winds at 2 mph (record: 9).

Fact 60: The Cramer Fire was reported by [redacted] the Long Tom Lookout, at 1630 (statements: 5, 36, and 37).

Fact 61: At 1648, jumper 41 was diverted from its original mission on the Crystal Fire to the Cramer Fire. Smoke-jumpers were unable to staff the Crystal Fire because it was too windy (statement: 6; record: 15).

Fact 62: Between 1704 and 1710, jumper 41 reported that the fire was approximately 3 acres and burning in light fuels, on a 60- to 70-percent slope, with a high spread potential (figure 3). The jump ship was unable to staff the Cramer Fire because of high winds (statements: 5 and 15; record: 15).

Fact 63: Cramer air attack departed Salmon, ID, at 1713 for the Cramer Fire and at the time of arrival, estimated the fire at 3 acres (statements: 18 and 36).

Fact 64: Bureau of Land Management (BLM) engines 7157 and 422 were dispatched to the fire at 1715 from Salmon (record: 15).

Fact 65: At 1754, Moyer helicopter H-166, was dispatched from the Crystal Fire to the Cramer Fire (record: 15). The North Fork RD helicopter H-193, helitack crew, and foreman, based at Indianola, ID, were not able to do initial attack on the fire, because they were on assignments in Utah and Wyoming. Dispatch informed Cramer air attack that a Type II initial attack crew (Ferguson 18B) was on its way to the fire. The Ferguson crew got lost on the way, and since the crew boss did not know how to program his radio to communicate with the IC, the crew did not report to the Cove Creek helibase, which

was approximately 13 miles up river from the Cramer Fire, until the following day (figure 4) (statements: 5, 8, 10, 15, and 16; record: 15).

Fact 66: Between 1800 and 1952, a single-engine airtanker, T-454, dropped two loads of retardant on the Cramer Fire (record: 15).

Fact 67: At 1900, [redacted] from the Moyer helitack crew became the IC Type IV for the Cramer Fire and [redacted] also from Moyer, became an IC Type IV trainee. [redacted] and [redacted] arrived at the Cove Creek helibase (statements: 15, 28, and 37; record: 15).

Fact 68: At 1938, [redacted] Moyer helitack foreman, and [redacted] a Moyer helitack crewmember, reconned the fire in H-166 while on their way to the Cove Creek helibase and reported the fire was 20 to 25 acres (figure 5), burning in ponderosa pine, mountain mahogany, and grass (statements: 3, 5, 14, 15, and 16; record: 15).

Fact 69: After selecting a helispot designated H-1 that was $\frac{1}{4}$ mile below the fire, [redacted] and [redacted] landed at the Cove Creek helibase to brief the helitack and engine crews (H-166 and BLM engine 7157) (statement: 3). [redacted] requested an IC Type III for the fire, which was subsequently ordered by [redacted] the forest FMO (statement: 20).

Fact 70: At 1943, Cramer air attack landed in Salmon for the night (statement: 18).

Fact 71: At 1950 or 2000, [redacted] and [redacted] reconned the fire in H-166. During the recon, they identified escape routes and safety zones in recently burned areas referred to as "the black." The east flank of the fire, which was their primary concern, was burning actively. The west flank was fairly cool, and a retardant line had been placed on the northwest corner of the fire (statements: 5, 18, and 37).

Fact 72: At 2015, [redacted] and [redacted] landed on H-1 and engine 7157 crewmembers were flown in shortly afterward. Their plan was to work the west

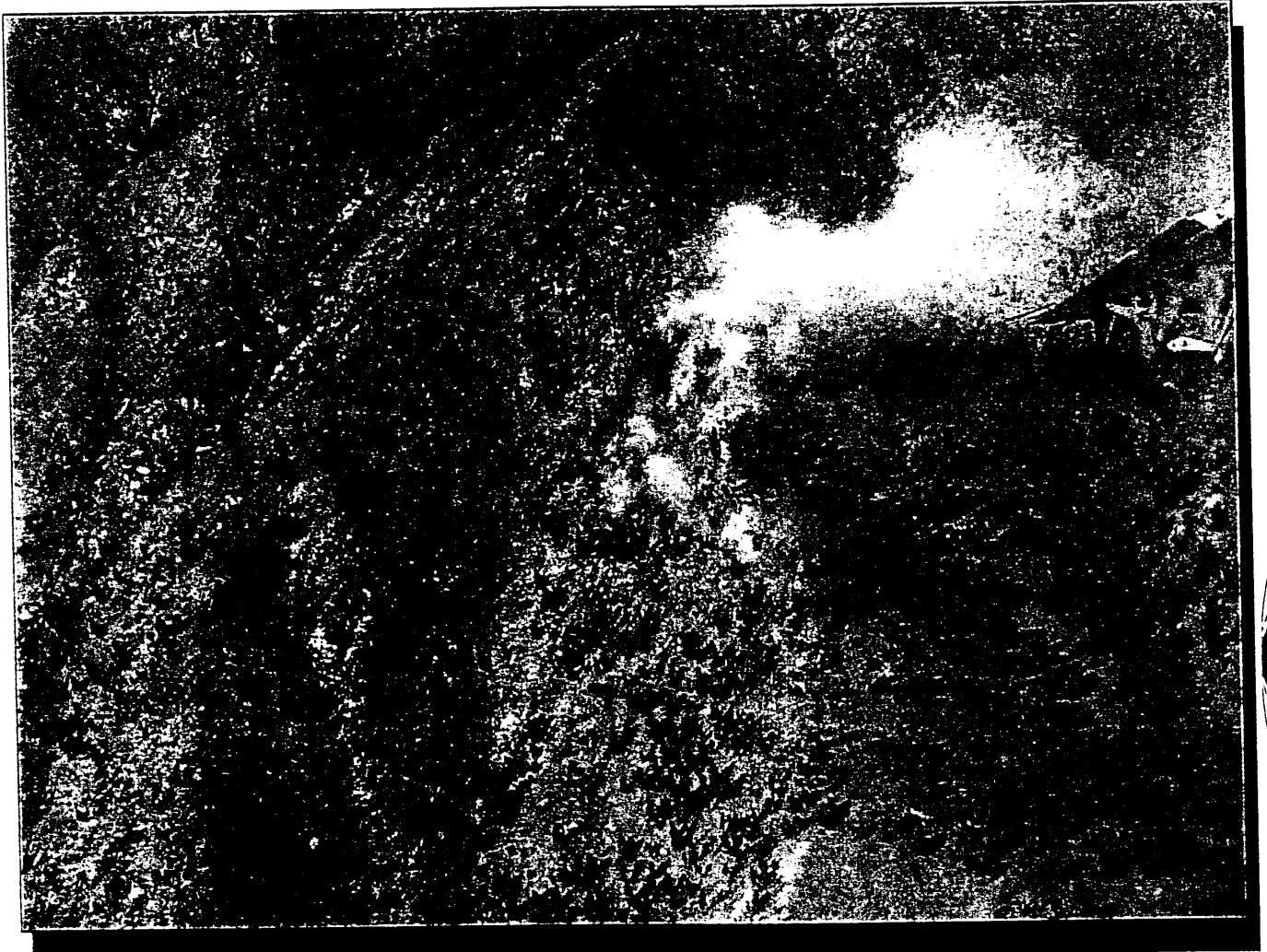


Figure 3—Cramer Fire from jumper plane 41, July 20, 2003, at 1705.

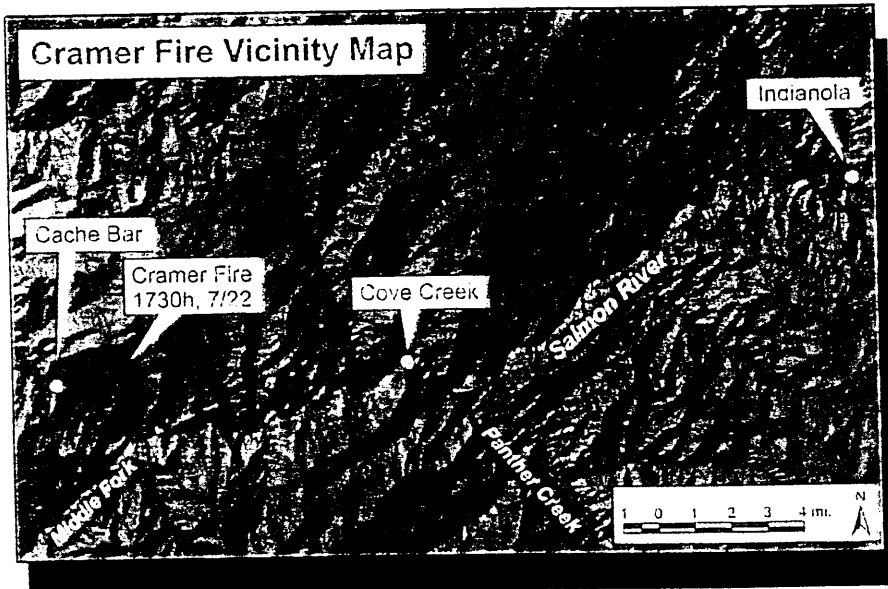


Figure 4—Cramer Fire vicinity map.

14



Figure 5—Cramer Fire perimeter and spread on July 20 later in the evening.

side of the fire so that when they transitioned to an IC Type III the next day, they would have a secure west flank. While [redacted] scouted the west flank, [redacted] stayed at H-1 to unload and brief the engine 7157 crew. [redacted] informed dispatch that they were on the Cramer Fire (statements: 3, 5, 10, 14, 16, and 37).

Fact 73: As he continued to walk the fire, the east flank burned to within 100 yards of H-1. He did not feel comfortable working the east side—it was unsafe and he lacked the personnel to start a direct attack. During that time, the fire crossed the ridge about ¼ mile above H-1 into Cramer Creek (statement: 37).

Fact 74: At 2045, [redacted] the Salmon-Cobalt FMO, was dispatched to the Cove Creek helibase to relieve [redacted] as the IC. After consulting with [redacted] told [redacted] that [redacted] would remain the IC on the fire (statements: 20 and 36).

Fact 75: At 2200, as [redacted] left the Cove Creek helibase, he tried to notify [redacted] the North Fork RD AFMO, that he would be the IC Type III on the Cramer Fire the following day. Because [redacted] was unable to contact [redacted], he notified dispatch, which planned to call [redacted] in the morning. [redacted] had the weekend off and arrived home around 1900 (statements: 14 and 20).

Fact 76: Because of daylight flight restrictions, H-166 headed back to Moyer at 2143 and was unable to fly personnel from BLM engine 422 to H-1 (statements: 3 and 20).

Fact 77: [redacted] finished his recon by walking the west flank of the fire at 2300. It was steep and rocky and the fire was creating "rollouts," burned debris that rolled downhill and increased fire spread. He notified dispatch that he would not engage the fire that night because of dangerous conditions (statement: 37).

Monday Morning, July 21, 2003

Fact 78: At 0030, the engine 7157 crew bedded down so they could be avail-

able for initial attack later in the day. [redacted] and [redacted] remained on the fire as lookouts, monitoring the fire and gathering information (statements: 3, 5, 8, 16, and 37).

Fact 79: Because the fire was in a thermal belt, it remained active and increased to about 8 to 10 acres. Winds were upslope 5 to 15 mph (statement: 5; record: 15).

Fact 80: 0100 weather: 62 °F, 35-percent relative humidity (record: 9).

Fact 81: At 0130, there was rolling debris within the fire perimeter that included rocks and large trees. Conditions remained warm, 73 °F with little humidity recovery. [redacted] ordered two hand crews in addition to the two that Cramer air attack ordered the evening before (statements: 5, 14, 15, 33, and 37).

Fact 82: The fire, which burned actively until 0200 or 0230, started to die down and had reached 25 to 45 acres (statements: 33 and 37).

Fact 83: At 0300, the weather station at Long Tom Lookout showed maximum humidity recovery of 46 percent (record: 9).

Fact 84: At 0530, [redacted] walked the perimeter of the fire (statement: 37).

Fact 85: [redacted] called for a spot weather forecast at 0710 and reported to dispatch 64 °F, 45-percent relative humidity, and winds upslope 1 to 2 mph (statement: 37; record: 15).

Fact 86: He also estimated the size of the fire at 35 to 45 acres (record: 15).

Fact 87: 0800 weather: 60 °F, 49-percent relative humidity, northeast winds at 2 mph (record: 9).

Fact 88: At 0800 [redacted] received the spot weather forecast, which called for sunny skies, zero chance of wetting rain, maximum temperatures between 97 and 101 °F, minimum relative humidity at 11 percent, and winds upslope 4 to 8 mph. Based on the winds the previous night (10 to 20 mph from the west, southwest), [redacted] and [redacted] expected the winds to be higher than predicted in the spot weather forecast (statement: 37; records: 7 and 15).

Fact 89: Dispatch notified [redacted] at 0805 that 133-KA, a heavy helicopter used for water bucket support, was available. [redacted] and [redacted] made the decision to keep 133-KA on the ground until [redacted] became the IC (statements: 15, 16, 25, 36, and 37).

Fact 90: Earlier in the morning when [redacted] returned to the North Fork RD from his days off, [redacted] informed him about the Cramer Fire and identified [redacted] as the IC. [redacted] told [redacted] to contact [redacted] for a briefing, but [redacted] was unable to contact him. [redacted] talked to [redacted] again at 0830. [redacted] told [redacted] to call [redacted] at the SO. During the call, [redacted] requested that [redacted] be the IC, because [redacted] was assigned the zone duty officer for that day. According to [redacted] was the zone duty officer, but since [redacted] could not be reached, [redacted] approved [redacted] as the IC. [redacted] told [redacted] to "go out there and take it," relieving him of his AFMO duties (statements: 1, 14, 15, and 28).

Fact 91: [redacted] as the zone duty officer, was directed by the forest FMO to work on fire business unrelated to the Cramer Fire and was "out of the loop" on the Cramer Fire until the afternoon of July 22 (statements: 16 and 20).

Fact 92: At 0900, [redacted] and [redacted] returned to H-1, and [redacted] left the North Fork RD for the Cramer Fire (statements: 14, 16, 33, and 37).

Fact 93: Shortly afterward, at 0908, Cramer air attack departed Salmon for the fire (statements: 18 and 40).

Fact 94: At 0945, dispatch notified [redacted] that personnel on engine 7157 were needed for initial attack in the local area and that [redacted] would be the incoming IC Type III on the fire (statements: 3 and 37; record: 8).

Fact 95: At 0948, H-166 flew to the Cove Creek helibase from Moyer (statement: 3; records: 8 and 15).

Fact 96: Around 1000, Cramer air attack was over the fire and estimated the size at 40 acres. After circling the fire for 30 minutes, he returned to Salmon be-

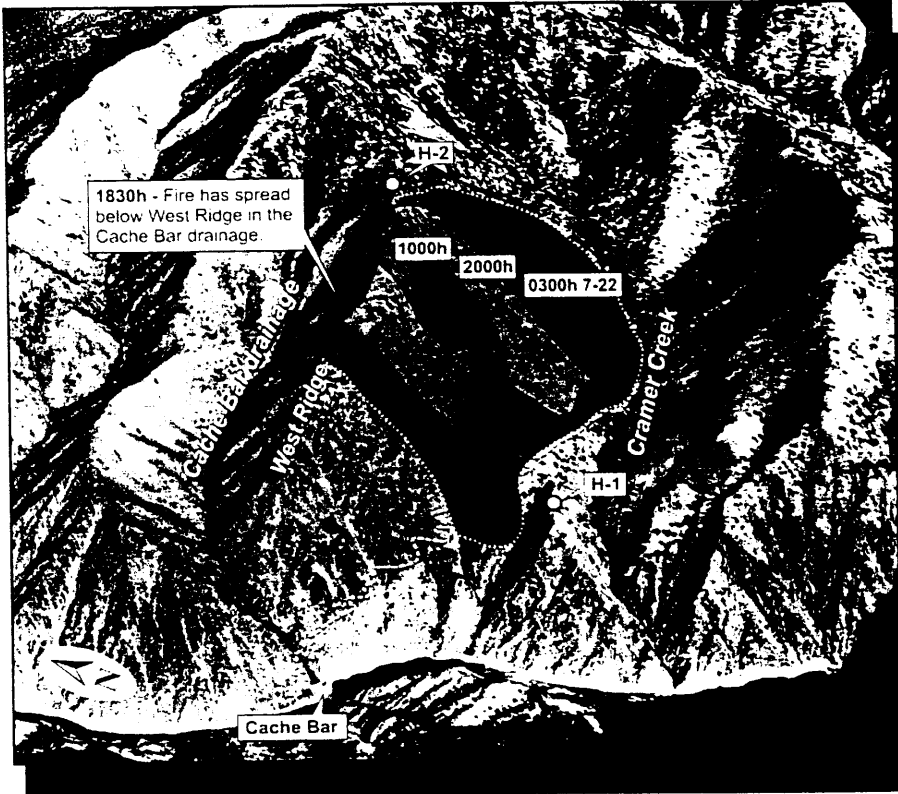


Figure 6—Cramer Fire perimeter and spread on July 21, 2003, and early morning on July 22.

Creek helibase at 0800 on July 22 (statement: 14).

Fact 120: At 2030, Cramer air attack returned to Salmon and landed at 2048 (statements: 5 and 18).

Fact 121: At 2100, [redacted] the forest aviation officer (FAO), shared two concerns with [redacted] and [redacted]. 133-KA was not used on the morning of July 21 and fire operations on the Cramer Fire sounded disorganized and chaotic, based on radio traffic during the afternoon. He suggested that the IC be pulled from the fire (statements: 15, 25, and 36).

Fact 122: Later that evening, [redacted] informed [redacted] of [redacted] concerns (statement: 15).

Fact 123: After 2130, [redacted] called the SO to discuss plans for the next day. Although he was unable to talk to [redacted], [redacted] talked with [redacted] and [redacted] CID manager, recounting the day's fire behavior and weather, noting that he could catch the Cramer Fire at

300 acres or less if he had two medium helicopters and additional overhead, especially operations and logistics. [redacted] mentioned that he had been having supervision problems with Ferguson 18B. While he did not discuss specific strategies and tactics for the following day, he felt that three hand crews were adequate to stop the fire's growth to the east and south, given the line digging conditions on the fire. [redacted] was told that the two medium helicopters that he requested were ordered but unavailable because they were committed to other fires. He was also told to use [redacted] as the strike team leader on the fire the following day (statements: 8, 14, 28, and 36). The logistics support person that [redacted] requested was filled at 0858 on July 22 (record: 24). Although Type I crews were available, they were neither offered nor requested (record: 25).

Fact 124: Following the call, [redacted] went home and got a "decent night's

sleep." H-166 flew back to Moyer. At the SO that evening, [redacted] identified the Cramer Fire as having higher priority than some other fires on the forest to assure that [redacted] received the resources he needed (statements: 3, 14, and 28; record: 8).

Fact 125: [redacted] was satisfied with an IC Type III, three contract crews, a strike team leader, and 133-KA. He also felt that an IC Type III could handle the Cramer Fire without a Type III team (statement: 15).

Tuesday Morning, July 22, 2003

Fact 126: The Cramer Fire was active until 0300. At 0700, Long Tom Lookout reported winds west 4 to 10 mph. The Moyer helitack crew came on duty at Moyer, ID, with dual responsibilities—the Cramer Fire and local initial attack (statements: 5, 16, and 37).

Fact 127: Around 0730 or 0745, [redacted] returned to the Cove Creek helibase (statement: 14).

Fact 128: H-193 arrived at the helibase at 0806 (statements: 10 and 41; records: 8 and 15).

Fact 129: Later in the morning, while [redacted] was preparing for a Type II team to take over the Crystal Fire, she talked to the FAO about the concerns he surfaced the previous evening with [redacted]. 133-KA was not used the morning of July 21 and fire operations appeared unorganized. [redacted] said that, when asked, the FAO did not have concerns about the IC. As a result she did not follow up after their conversation and address his concerns. However, the FAO stated that he did register concerns about the IC's ability to control the situation on the fire line, but that [redacted] had no comment and proceeded to brief the Type II team (statements: 1 and 25).

Fact 130: 0800 weather: Clear, 64 °F, 50-percent relative humidity, winds from the west at 5 to 10 mph, 10-hour fuel moisture, 7 percent. Conditions were warmer than usual (statement: 5).

Narrative

Fact 131: The Moyer crew based their weather assessment on the report from Long Tom Lookout that morning, as well as fire behavior the previous day. [redacted] reported that, "We knew we were in the extreme of extreme," and [redacted] described it as the "worst-case scenario" (statements: 3, 16, and 37).

Fact 132: H-166 departed for the Cove Creek helibase at 0822 and landed at 0834 (statements: 35 and 37; records: 8 and 15).

Fact 133: At 0820, [redacted] the Indianola helitack assistant foreman, and [redacted] crew boss of the central Oregon regulars, departed in H-193 to recon the Cramer Fire. During the recon, they discussed securing H-1. One crew would work the bottom of the fire and two crews would work up from H-1 on the east flank. They discussed tying in with the black and cold trailing to avoid digging so much line (statements: 4, 5, 10, 11, 14, and 41; records: 8 and 15).

Fact 134: They identified two options for safety zones for the crews working the east flank from H-1—the black and an open sagebrush field (1 to 2 acres) east of Cramer Creek that would have to be burned out to be used as a safety zone. [redacted] estimated the sage height to be about 2 feet and the grass about 1 foot high (statements: 10 and 14).

Fact 135: [redacted] identified [redacted] as the lookout above H-1, across the Cramer Creek drainage from the fire, on its east flank. A second lookout on the east side was to be flown in above [redacted] although this was never done. That second lookout would have had a view into Cramer Creek and a view of H-2, but not a view of the Cache Bar drainage. Other lookouts according to [redacted] were Cramer air attack, the helicopter pilots as they were flying the fire, and Long Tom Lookout. There were no lookouts for the west side of the fire (statements: 10, 14, 16, and 40).

Fact 136: They then turned their attention to placing two rappellers above the retardant line to cut a two-way helispot

(H-2). They chose the H-2 site because it was fairly open and closer to safety zones than another site further up the ridge. The rappellers would need to remove approximately six trees and one snag in the middle of the opening on H-2. This helispot would be used to fly in a fourth crew that would build downhill line along the west side to secure the west flank of the fire. That, combined with a retardant line down the west side, would tie off the fire (statements: 10, 14, 16, and 41).

Fact 137: They identified two safety zones for the rappellers. One was a grassy area in a ceanothus brush field (an old burn), about 200 to 300 yards down and to the west from H-2 along the ridge. The rappellers would have had to burn it out for it to be used as their safety zone. The other was approximately 150 yards down the east side of the ridge, back into the black from the previous day's burn. Both were an estimated 2-minute walk or less. The recon party was comfortable with the plan of attack for the day. [redacted] was fairly confident that, with the resources on hand, he was going to be able to contain the fire (statements: 10, 14, and 41).

Fact 138: Fire intensity was low during the recon, with flame lengths less than 1 foot in open pines, backing through the grass. The fire was 150 to 200 acres and had burned up to and slightly over the ridge on the west side into the Cache Bar drainage but looked cold. There was some fire activity below H-1 (statements: 10 and 14).

Fact 139: When H-193 landed about 0855 [redacted] was assigned helibase manager and [redacted] was helibase manager trainee (statement: 37).

Fact 140: 0900 southeast Idaho fire weather: mostly sunny, highs 86 to 95 °F in the valleys and 81 to 87 °F on the ridges, trend 3 degrees warmer, minimum relative humidity 9 to 17 percent for valleys and ridges, unchanged, 20-foot/10-minute average winds northwest 5 to 15 mph, Haines Index 5 moderate (record: 7).

Fact 141: At 0900, 133-KA left

Indianola for the Cramer Fire to do bucket work (statement: 5; record: 15).

Fact 142: [redacted] briefed the crew bosses and helitack crews at the Cove Creek helibase. The central Oregon regulars, Ferguson 18A, 18B, and 4B, and the Moyer and Indianola helitack crews were present (statements: 3, 13, and 16).

Fact 143: [redacted] strategy was to put three crews into H-1, two starting up the east side and the third at the bottom of the fire. He was going to rappel two people into H-2 to construct a helispot. Once H-2 was completed, a fourth crew would go into H-2, cold trail down the west flank, and tie in with the crew working the bottom of the fire. [redacted] did not have a plan for supervising the hand crew that would be flown into H-2 to work the west flank. Supervision of the rappellers on H-2 was [redacted] responsibility. He discussed the placement of two lookouts—[redacted] and a member of the Indianola crew. With three crews and three helicopters,

[redacted] communicated that he could have the fire contained that day. This sentiment was shared by others—it was a "another fire, a regular day." [redacted] discussed communications and assigned radio frequencies (statements: 3, 4, 10, 14, 16, 33, 37, and 41).

Fact 144: He also identified [redacted] as the strike team leader or division supervisor for the H-1 crews and noted that [redacted] would be running ground operations on the fire (statements: 4, 10, 16, and 37).

Fact 145: During the morning briefing, [redacted] discussed the weather from the previous two days and noted that it was getting progressively warmer and drier. He told the crews to expect stronger winds in the area later in the afternoon as was the case the previous day. [redacted] had forgotten to request a spot weather forecast for Tuesday. Had a request been made, the National Weather Service would have told him to expect higher winds than forecasted. He also mentioned that the general fire weather forecast was available over the radio and

told everyone which channel to access for the weather. [redacted] discussed fire behavior the previous day and reported that the fire intensity was low during Tuesday morning's recon (statements: 3, 4, 14, and 16; record: 16).

Fact 146: [redacted] noted during the briefing that [redacted] and [redacted] who had been detailed to the Moyer helitack crew, might be needed as a saw team with the central Oregon regulars (statements: 13 and 33).

Fact 147: Other than flying recons at 0820 and at 1326, [redacted] stayed at the Cove Creek helibase during the day to manage logistics, operations, and related responsibilities (statement: 5).

Fact 148: After [redacted] briefing, [redacted] briefed the central Oregon regulars crew prior to their departure to H-1. When [redacted] asked who the other lookout would be besides himself, [redacted] asked [redacted] told him that H-193 would "fly one up there." [redacted] told [redacted] that the other lookout would be responsible for establishing communications with [redacted] assumed, as the day progressed, that a lookout had been posted on the western flank and that the rappellers on H-2 were in contact with the lookout. [redacted] did not place a lookout on the western flank to monitor the progress of the fire, which by 0943 had crossed over the ridge and into the Cache Bar drainage (statements: 10, 13, and 16).

Fact 149: Jeff Allen and Shane Heath from the Indianola helitack crew were chosen to rappel into H-2. They were considered the best two for the job. Allen, a class B faller, was in charge and Heath, a class C faller, was his rappel partner (statements: 4 and 10).

Fact 150: At 0929, H-193 launched to rappel Allen and Heath onto the H-2 site. [redacted] a one-way communication with the rappellers, showed Allen and Heath their escape routes and safety zones. He also conveyed the work assignment at H-2, estimating that it would take an hour to clear the helispot. Allen and Heath confirmed that they understood

what the job was and rappelled into H-2. Upon reaching the ground at 0943, Allen and Heath contacted [redacted] to say they were okay. [redacted] told the rappellers about a low-intensity ground fire on the West Ridge of the Cache Bar drainage.

[redacted] the pilot of H-193, saw fire below H-2 to the east, though it was not very active, and asked 133-KA to do some bucket work in the area. [redacted] did not observe fire activity on the west side. H-193 returned and landed at the Cove Creek helibase at 0958 (statements: 3, 4, 10, 14, 19, 37, and 41; records: 8, 15, and 18). After returning to the helibase, [redacted] became the Cove Creek helibase manager (statement: 10).

Fact 151: H-2 was located approximately 1 mile north-northeast of H-1, on the ridge between Cramer Creek and the Cache Bar drainage and ½ mile down the main ridge from a usable helispot (H-4) cleared years earlier. H-2 was closer to the fire than H-4 and provided a less treacherous descent for the hand crew that would be sent in later in the afternoon. Visibility of the slopes below was limited due to topography and standing timber. The slope below H-2 in the Cache Bar drainage was unburned. The slope below H-2 in the Cramer Creek drainage was underburned but the tree canopy was still intact (statements: 10 and 32; record: 17).

Fact 152: At 0927, Cramer air attack departed Salmon for the Cramer Fire and arrived at 0955. Fire activity near H-1 consisted of scattered, low-intensity ground fire in grass and timber. Air attack contacted Allen, confirmed the location of H-2, and discussed the location of safety zones. He then spoke with [redacted] about prepping the ridge above H-2 with retardant. [redacted] confirmed the plan. The pilot of 61-N, on hearing the conversation between Allen and Cramer air attack, felt that the rappellers were not in harm's way (statements: 10, 18, and 40; record: 18).

Fact 153: At 1021, H-166 departed for H-1 with [redacted] and the Oregon regu-

lars crew boss trainee. They reconned the fire enroute to H-1 and saw that the fire perimeter was below the West Ridge in the Cache Bar drainage. They discussed the black as a safety zone. Although [redacted] felt that they could make good progress that day, he didn't feel he could accomplish what the IC thought they could. He also didn't think the crews could reach H-2 from H-1 that day. [redacted] landed on H-1 and walked the fire line with the crew boss trainee, explaining that he wanted the central Oregon regulars to do some cold trailing and hot spotting to secure the east side of the fire. While walking the fire line, [redacted] requested that 133-KA work in the Cramer Creek drainage. H-166 departed H-1 and landed at the Cove Creek helibase at 1047 to begin shuttling crews along with H-193. The crew shuttles took an extended period of time—each round trip, carrying three crewmembers, took approximately 15 minutes. Sixty people needed to be transported to H-1. The first crew in was the central Oregon regulars, the second crew in was Ferguson 18B, and the third crew in was Ferguson 18A (statements: 3, 4, 14, 16, 37, and 41; records: 15 and 18).

Fact 154: When [redacted] arrived at H-1, [redacted] discussed the terrain, crew safety, and [redacted] placement as a lookout. [redacted] also briefed the incoming crews on safety zones, fire weather, tactics, strategy, and the probability of rollouts. As the first two crews arrived, they began cold trailing, hot spotting, and constructing hand line on the east flank of the fire (statements: 5 and 16).

Fact 155: [redacted] walked to the east side of the fire and could see fire down below the crews but not around into the next drainage (statement: 11).

Fact 156: Between 1030 and 1100, the fire became active below H-1, to the southwest just above the Salmon River road (statement: 33).

Fact 157: At the same time, [redacted] asked [redacted] an Indianola helitack crewmember, to check on the progress of H-2. [redacted] established com-

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munications with Allen, who responded that things were going well and that they needed more time, maybe 45 minutes to 1 hour to complete the job (statements: 4, 5, and 10).

Fact 158: Shortly after, 133-KA left Indianola for the Cramer Fire to do bucket work and then returned to Indianola for fuel at 1256 (statement: 5; records: 8 and 18).

Fact 159: 1130 weather: 84 °F, 21-percent relative humidity, south-southwest winds at 3 to 4 mph up drainage, gusting to 5 mph, 4300-foot elevation. The weather observations taken by the central Oregon regulars on the fire differed from those taken by Long Tom Lookout, but both showed the same warming and drying trend (records: 9 and 19).

Tuesday Afternoon, July 22, 2003

Fact 160: 1230 weather: 91 °F, 18-percent relative humidity, south-southeast winds at 2 to 3 mph up drainage, gusting to 6 mph (record: 19).

Fact 161: Lead plane 41, which was dispatched to the Cramer Fire at 1150, departed Boise, ID, at 1210 and arrived over the fire at 1245 along with tanker 1. Cramer air attack was over the fire working with tanker 26, which was dropping retardant. Cramer air attack briefed lead plane 41 about the rappellers on H-2; about the ground contact at H-1, who was working the south and east flanks with three crews; and about 133-KA, which was working with the crews and two other helicopters conducting crew shuttles to H-1 (statements: 18 and 29).

Fact 162: Around 1245, Allen asked 133-KA to fly up to H-2 and look at smoke that concerned him between the West Ridge and Cramer Creek. 133-KA had a limited view because of the smoke, but could see a hot spot ½ mile below H-2. 133-KA told Allen that his view was limited, to which Allen responded, "OK, fine. We'll keep an eye on it" (statement: 19).

Fact 163: Between 1230 and 1300,

asked to check again on the progress of H-2. Allen said that things were going fine and they would be another 30 to 45 minutes (statements: 4, 5, and 10).

Fact 164: Lead plane 41 was unsure of the plan for the west side of the fire other than to drop retardant down toward H-1 and hold the fire on the west flank at the ridge where H-2 was located. He commented later, as conditions were heating up, that this plan was very optimistic under ideal conditions. He thought that was the IC because he assumed that role and had a good handle on the fire. He did not know how many personnel were on H-2, how many firefighters were on the ground, or what unit they belonged to but noted that the information he received was as much as any lead plane pilot normally gets when they transition with an air attack. While flying the fire, lead plane 41 observed small spot fires on the upper third of the slope in the Cache Bar drainage. Fire activity was low and the fire was lying down. Fire was also burning in grass 50 to 100 feet below H-1 at low intensity (statements: 18 and 29).

Fact 165: At 1304, lead plane 41 relieved Cramer air attack, which returned to Salmon and landed at 1329 for lunch and refueling. Lead plane 41 assumed dual responsibilities—air attack and lead—for approximately 2 hours while he worked with tanker 1 and tanker 26. He estimated the outside air temp to be 86 °F at 8,000 feet and observed that fire activity was starting to increase. The airtankers dropped two more loads of retardant (statements: 18, 29, and 40; record: 18).

Fact 166: At 1326, departed in H-166 for a recon of the fire. The plan was to off load at H-1 to work with y felling trees for a crew on the east side of the fire. During the recon around H-1, they noted that most of the fire activity was just below the helispot, with flame lengths 4 to 6 feet. The fire also was active along the east flank and to the

northeast but was low intensity and backing down the hill with 1- to 2-foot flame lengths. told that the crews were doing fine on the east flank. They were in a draw in greener vegetation and safe. informed that the crew west of H-1 was in the black. noted benign fire behavior and concluded that "these guys have it" (statements: 3, 13, 14, and 33; record: 18).

Fact 167: When they flew to the top of the ridge, observed Allen and Heath on H-2 and noted that the visibility was clear. One of them waved from below. When contacted Allen to check on their progress, Allen replied that there was a little more work to do—maybe another 15 or 20 minutes and they would be done. told them to call for a pickup when they were finished. He had decided not to put a crew into H-2 because they would have to walk in dangerous terrain at night. noticed that fire was backing into the Cache Bar drainage with 1- to 2-foot flame lengths and slowly working its way downslope. "There was fire [in an old burn] that was backing down into that draw, and I was like, wow, I wonder what the hell's going to happen here." assumed that a lookout was aware of the problem. also saw fire in the Cache Bar drainage. According to lead plane 41, agreed they would not be able to do anything Tuesday afternoon and would need to plan for the next day, the next burning period, and to possibly do a burnout in the Cache Bar drainage (statements: 13, 14, 29, and 37).

Fact 168: H-193 and H-166 shuttled crews while the spot fires below H-1 continued to grow. At 1327, H-193 discontinued crew shuttles to do bucket work (approximately two fuel cycles) on the fire below H-1, which was increasing in intensity (statements: 14, 29, and 41; record: 18).

Fact 169: At approximately the same time, 133-KA left Indianola for the Cramer Fire (record: 18).

Fact 170: 1330 weather: 95 °F, 15-percent relative humidity, south-southwest winds at 4 mph updrainage, gusting to 7 mph (record: 19).

Fact 171: At 1340, during the recon, H-1 was threatened by fire. While doing bucket work below H-1, 133-KA noted that the temperature in the canyon below the fire was 106 °F. Personnel were pulling back from H-1 because of active fire in the area. Rather than putting [redacted] into H-1 as planned, [redacted] let [redacted] off in an opening east of H-1 on the next ridge over. [redacted] was without a plan, a briefing, or any designated safety zone, and [redacted] at that point was unaware that [redacted] had been dropped off. [redacted] completed his recon and returned to the Cove Creek helibase at 1404 (statements: 4, 13, 14, 16, 19, 37, and 41; records: 15 and 18).

Fact 172: On returning from his recon, [redacted] discussed with [redacted] the possibility of not using H-2 that day (statement: 10).

Fact 173: Once on the ground, [redacted] noticed the fire was making small runs to the east in grass with upcanyon winds and was slowly backing down slope into the main draw with small flame lengths. The fire had reached Cramer Creek (statement: 13).

Fact 174: At 1400, [redacted] noted that fire activity was picking up—downhill winds started and the wind was “whipping back and forth.” A large, brown, smoke column formed west of H-1. Fire activity was intense around the helispot, eventually burning over H-1 and making it too smoky to land (statements: 3, 10, 11, 13, 16, and 33).

Fact 175: At 1413, [redacted] asked CID to locate the forest FMO (statements: 4 and 14; record: 8).

Fact 176: 1400 weather: 82 °F, 16-percent relative humidity, north-northwest winds at 2 mph (record: 9).

Fact 177: 1414 weather: 82 °F, temperatures up 6 degrees from July 21, relative humidity down 12 percent, winds 0 to 2 mph (statement: 5; record: 8).

Fact 178: At 1420, H-166 refueled and departed for H-1 with [redacted] a Moyer helitack crewmember, and the two remaining Ferguson 18A personnel. By this time, the central Oregon regulars, Ferguson 18B, 18 people from Ferguson 18A, [redacted] Allen, and Heath were on the fire. While enroute to the fire, [redacted] called [redacted] and asked if he wanted the two Ferguson crewmembers dropped off at H-1. [redacted] told [redacted] to return the Ferguson crewmembers to the Cove Creek helibase and to pull [redacted] off the ridge. H-166 dropped off [redacted] and the two Ferguson crewmembers at the helibase, returned to the fire at 1445, and picked up [redacted] (statements: 3, 13, 16, and 37; record: 18).

Fact 179: At 1423, in a radio communication with [redacted] expressed concern that the Cramer Fire was going

to make a run to the west and, though the fire made a run to the east, everybody was safe (figure 7). He had a plan that might work depending on the timing and availability of helicopters (statement: 28; records: 8 and 15).

Fact 180: Between 1430 and 1440, the fire that had been smoldering in the Cache Bar drainage turned into an active flaming front (statement: 29).

Fact 181: At 1443, [redacted] used his crews and the helicopters to try and secure H-1. He then decided to pull his crews off the line because they were not capable of doing the assignment (statements: 4, 5, 13, 16, and 29; record: 15).

Fact 182: A minute later, [redacted] told [redacted] that he intended to hike off the hill with his three crews (record: 8).

Fact 183: [redacted] asked [redacted] at the helibase if Allen and Heath had returned

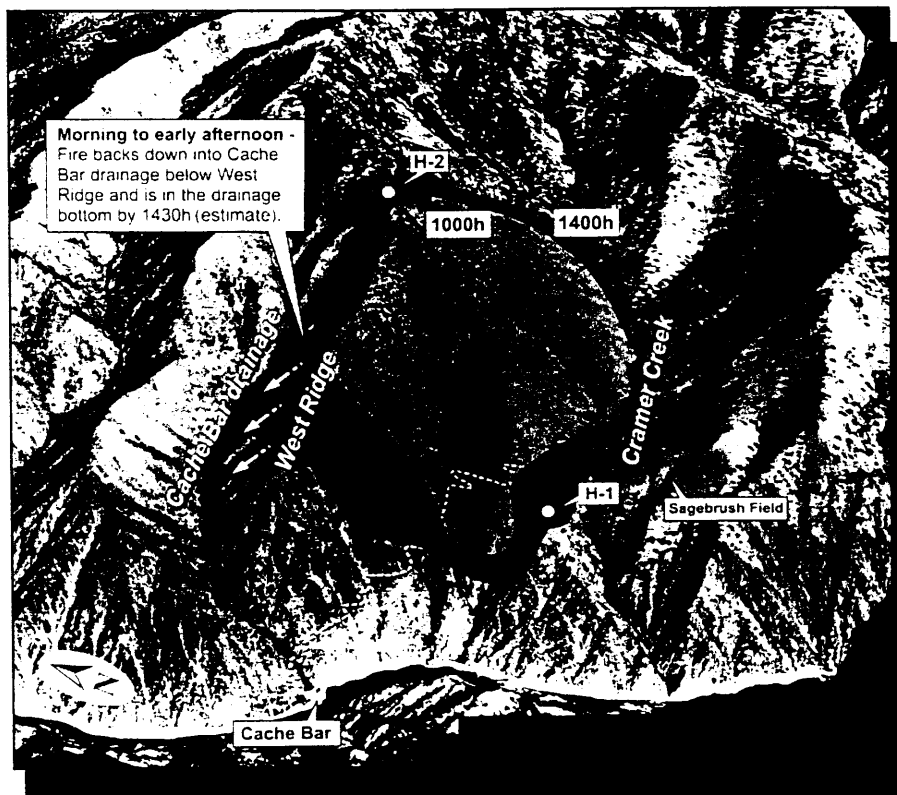


Figure 7—Cramer Fire perimeter and spread on July 22, 2003 by 1430 (estimate).

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to the Cove Creek helibase. [redacted] said they were still on H-2, that he had just contacted Allen through lead plane 41, and that they needed another 40 to 45 minutes (statements: 4 and 10).

Fact 184: At 1447, [redacted] in a radio conversation with [redacted], said that he needed to get hold of Allen on H-2 to get him out. [redacted] responded, "Why don't you go ahead and pull them out, we're okay at H-1." [redacted] repeated once more that he was going to go get Allen and Heath at H-2, and [redacted] responded, "Sounds like a plan" (record: 8).

Fact 185: At 1454, Cramer air attack returned to the fire after departing Salmon at 1442. Lead plane 41 briefed Cramer air attack and noted that the two rappellers were on H-2, but that a helicopter was enroute to pick them up. Upon reentering the fire area, the Cramer air

attack pilot noted the fire had grown significantly and gained a great deal of energy in the preceding 2 hours. The wind had also shifted to the west (statements: 18 and 40; record: 18).

Fact 186: At 1500, winds were from the west, gusting up to 30 mph at H-1 (statements: 11 and 18).

Fact 187: Between 1500 and 1520, lead plane 41 and Cramer air attack observed that the fire had crossed into the Cache Bar drainage and was widening out, climbing the slope of the drainage, and starting to spread rapidly, creating a lot of smoke. Lead plane 41 observed spread rates and intensities that were much greater than he had expected. He thought that H-2 would not be at great risk due to the light fuels and rocky areas on the west slope, and that Allen and Heath had been transported from H-2 to H-1. Lead plane 41 was confused about

the location of Allen and Heath because personnel on the fire were using first names and last names on the radio. The Cramer air attack pilot described the fire in the Cache Bar drainage as very intense and moving quickly. He felt strong updrafts at the leading edge and downdrafts at the trailing edge, causing him to gain and lose 1,000 feet of altitude, an effect he experienced on previous fires that were "blowing up." The smoke was moving almost due east close to the ground, rolling over the ridgeline at H-2 and merging with the main plume at Cramer Creek, which was blowing to the southeast towards Salmon (figure 8) (statements: 18, 29, and 40).

Fact 188: At approximately 1500, both H-193 and H-166 were at the Cove Creek helibase. H-193 was down for a 30-hour maintenance inspection and refuel-

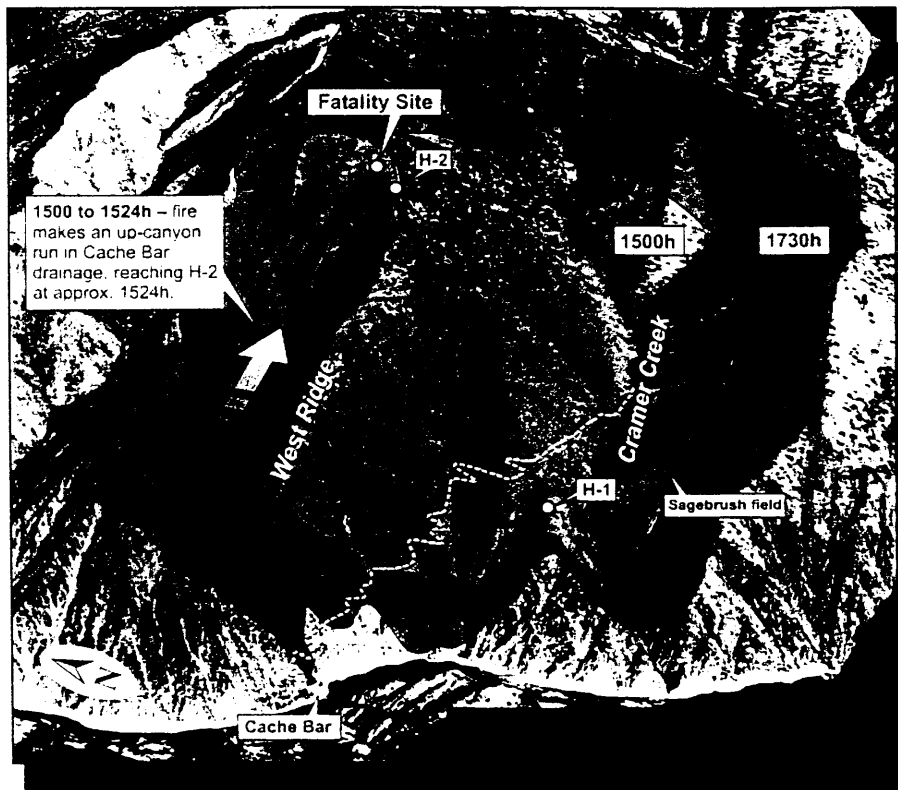


Figure 8—Cramer Fire perimeter and spread on July 22, 2003, from 1500 to 1730 (estimate).

ing. H-166 had just landed for refueling, after returning with [redacted] (statements: 3, 13, 29, 37, and 41).

Fact 189: At 1505, Allen notified helibase that they were ready to be picked up from H-2. Helibase responded to Allen that they would send H-193 on its way. Allen replied, "Send them in a hurry" (statements: 4, 10, and 14; record: 8).

Fact 190: At 1509, Allen called the Cove Creek helibase and asked about the status of H-193. The helibase responded that H-193 was still on the ground and would leave shortly to pick them up. Allen responded, "We need them right now." Helibase said that they were sending H-166 to get them immediately. Allen replied, "Good ...thanks." At the same time Long Tom Lookout reported quite a bit of smoke from the Cramer Fire (statements: 4, 10, and 37; record: 8).

Fact 191: At approximately 1510, [redacted] instructed [redacted], the Cove Creek helibase radio operator, to ask Allen and Heath if they were in danger and if they needed to go to their safety zone. According to [redacted] Allen responded no; it was getting real smoky and they needed a ride out (statements: 3, 4, and 10).

Fact 192: At the same time, [redacted] while enroute to the fire, called dispatch and told [redacted] not to divert resources from the Cramer Fire (statement: 28).

Fact 193: At 1511, [redacted] announced he was pulling three crews off the fire line back to H-1. [redacted] reported to Long Tom Lookout that he was pulling three hand crews, under [redacted] command, off the Cramer Fire. [redacted] observed shortly before that the winds were strong and increased significantly. At H-1, the winds were steady at 20 to 25 mph, gusting to 30 to 35 mph (statements: 4, 14, and 16; record: 8).

Fact 194: At 1512, the Cove Creek helibase called Allen. When Allen responded at 1513, the helibase said that H-166 needed fuel, but it would be leaving right away, and asked if there were any problems at the moment. Allen responded, "Oh, God. We just got fire down

below us. So the smoke's coming right at us...uh...just make them hurry up" (statements: 4 and 10; record: 8).

Fact 195: At 1513, H-166 launched with just enough fuel to retrieve Allen and Heath (statements: 3, 5, 14, 37, and 41; record: 8).

Fact 196: Between 1513 and 1520, lead plane 41 reported that the fire was blowing up, especially on the west side. The entire upper portion of the Cache Bar drainage erupted into flames which ran uphill. Flame lengths averaged 20 feet in brush and 50 feet at the leading edge. Although the fire was not a solid front, it tended to follow stringers of brush and timber and spread simultaneously among the stringers. The fire did not die down when it hit rocky areas on the slope. According to lead plane 41, it "just kind of swept over [the rocks] and it "looked like the rocks were burning, too" (statements: 18 and 29).

Fact 197: Between 1514 and 1522, [redacted] was involved in multiple conversations about aviation and ground resource allocation for the Stoddard Fire. [redacted] was in dispatch when the Stoddard Fire was reported and his response was to aggressively attack it to prevent another problem fire (statement: 6; record: 8).

Fact 198: At 1515, CID called [redacted] requesting 133-KA for another fire. [redacted] responded that 133-KA was refueling, he had two people on a helispot, and he might need 133-KA to do bucket work. He told dispatch that he was in the process of retrieving the individuals from the helispot. [redacted] also told dispatch that, as soon as he retrieved Allen and Heath from H-2 and knew that [redacted] crews were safely walking off of H-1, he would release 133-KA to the new fire (record: 8).

Fact 199: At 1519, Allen contacted the Cove Creek helibase regarding the status of H-166. Helibase replied that H-166 was off the ground and should arrive shortly. Allen copied [redacted] suggested alternative helispots for Allen and Heath

if H-166 could not land at H-2 (record: 8).

Fact 200: At approximately 1520, H-166 said it was coming to get Allen and Heath and notified them that he couldn't land because it was too smoky. At about the same time, lead plane 41 heard Allen calmly report to H-166 that winds were 20 to 25 knots from the west, which was consistent with what lead plane 41 was seeing. Allen reported to H-166 that they were leaving H-2. Cramer air attack was looking for a route the rappellers could follow to safety (statements: 4, 10, 13, 14, 16, 18, 29, 37, and 40).

Fact 201: At 1524, Allen, calling in an excited voice and breathing heavily, asked, "Could I get a helicopter up right now?" Lead plane 41 observed that, as the fire reached the ridge, some flame lengths were 50 feet or more, with occasional flame lengths up to 100 feet in timber. He described the fire, which was fast-moving on a very steep slope in light fuels, as "a big flash front." The smoke column was dark and straight up, extending to 12,000 feet. It dropped spots at the Cove Creek helibase as it drifted from the west to east (statements: 3, 4, 13, 18, and 29; record: 8).

Accident

Fact 202: The Cache Bar drainage was fully involved in fire. The fire burned over and around H-2, killing Allen and Heath shortly after Allen's last call for a helicopter. Estimated temperatures at the fatality site were from 1,300 °F to potentially over 2,000 °F. One fire shelter at the site was accordion-folded in the same shape in which it was packaged, indicating that it had not been unfolded before the burnover. The second fire shelter was unfolded lengthwise, but was still almost completely folded width-wise, indicating that the shelter was removed from its plastic bag and partially unfolded before the burnover. The Lemhi County coroner

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reported that the fatalities were caused by fire, but no autopsy reports were available for this investigation (appendix d; records: 20 and 21).

Postaccident

Fact 203: At 1525, H-166 landed at the Cove Creek helibase to refuel. At about the same time, lead plane 41 departed for McCall, ID, and did not return to the fire (statements: 3, 29, and 37; record: 18).

Fact 204: At 1530, Cramer air attack tried to contact Allen. A minute later, [redacted] asked [redacted] if his crews were together and starting to head down to the Salmon River road. [redacted] reply was negative—he was still waiting for his crews to assemble. [redacted] asked if everything was still safe on that side and [redacted] replied that everyone was fine (statement: 18; record: 8).

Fact 205: At 1534, H-193 with [redacted] onboard departed the Cove Creek helibase to pick up Allen and Heath, but was unable to find them because of smoke. [redacted] reported that the fire had burned the slope below H-2 in the Cache Bar drainage. Trees were torching just below H-2, but there was no crown fire. Smoke was coming out of the Cramer Creek drainage and billowing over H-2, but most of the fire below H-2 in that drainage was a surface fire. When H-193 returned to the Cove Creek helibase, [redacted] formulated a plan for search and rescue (statements: 10, 13, 14, 37, and 41; record: 18).

Fact 206: At 1545, H-166 launched to attack the Stoddard Fire, which had been reported by Long Tom Lookout at 1508 (statements: 3, 5, 13, 14, 20, 29, and 37; record: 18).

Fact 207: At 1550, [redacted] reported to [redacted] that he was at Indianola and asked [redacted] if he wanted 133-KA back on the Cramer Fire. When [redacted] replied affirmative, he also noted that he had two

firefighters with whom he was out of contact. A minute later, [redacted] told dispatch that H-166 was leaving for the Stoddard Fire. When asked if he needed the helicopter, [redacted] replied that he had the fire covered with H-193 and 133-KA and that anymore aircraft would be a hazard (statements: 4 and 13; record: 8).

Fact 208: In a discussion with [redacted] at 1557, Long Tom Lookout noted that H-193 was patrolling the ridge for Allen and Heath and could not reach Allen and Heath on the air-to-ground frequency. At 1559, [redacted] asked Long Tom Lookout if H-193 had made contact with Allen and Heath, and H-193 via Long Tom Lookout responded that he was unable to locate them. At 1600, [redacted] notified CID that he had two firefighters on H-2 and was unable to contact them for the last ½ hour. At the same time, H-193 headed back to the Cove Creek helibase. At 1612, [redacted] notified CID that H-193 was flying near H-2, they had tried several times to reach the firefighters, and it was smoky. He also reported that helispots H-1 and H-2 had been burned over (statement: 37; record: 8).

Fact 209: 1600 weather: 84 °F, 19-percent relative humidity (record: 9).

Fact 210: By 1609 the fire had reached the ridge between the Cramer Creek and Long Tom Creek drainages (figure 8) (statement: 5).

Fact 211: When CID offered to send H-166 back to the Cramer Fire, [redacted] confirmed that he needed H-166 returned. H-166 was sent from the Stoddard Fire to the Cove Creek helibase. At 1617, [redacted] asked H-166 to fly the West Ridge again and try to contact Allen on the air-to-ground frequency. [redacted] contacted CID and requested that [redacted] and [redacted] come to the Cramer Fire (statements: 3 and 37; records: 8, 15, and 18).

Fact 212: At 1625, H-166 tried to locate Allen, Heath, and H-2. At 1638, when H-166 asked [redacted] for the direction of the safety zone from H-2, [redacted] said it was to the west in the old burn. H-166 responded that he was still unable to locate Allen and Heath, but then immedi-

ately confirmed the site of H-2. The area around it was burned over and some trees were torching. At 1642, H-166 reported to [redacted] that he was still unable to locate Allen and Heath and was returning to the Cove Creek helibase. [redacted] reported at 1649 that he had two crews at the Salmon River road and one crew walking down from the fire. [redacted] contacted CID at 1654, requesting to have Missoula Life Flight on standby (statement: 37; record: 8).

Fact 213: At 1650, H-193 departed the Cove Creek helibase to search for Allen and Heath (statement: 10; record: 18).

Fact 214: At 1727, a Type I incident management team was ordered for the Cramer Fire (record: 22).

Fact 215: [redacted] reported at 1730 to the Cove Creek helibase that his crews were heading back. At the same time, H-166 launched with two rappellers, [redacted] and [redacted], to conduct a ground search for Allen and Heath (statements: 4, 10, 13, 37, and 41; records: 8 and 18).

Fact 216: A short time later, Cramer air attack departed the fire to refuel and returned at 1839 (records: 8, 15, and 18).

Fact 217: At 1749, [redacted] officially turned the Cramer Fire over to [redacted] (IC Type III) and briefed Henson on the current situation (statement: 14; records: 8 and 15).

Fact 218: At 1755, [redacted] and [redacted] rappelled approximately 75 to 150 yards below H-2 to begin their search for Allen and Heath. After [redacted] and [redacted] were on the ground and H-166 established contact with them, the helicopter returned to the Cove Creek helibase (statements: 3, 4, 13, 14, and 37; record: 18).

Fact 219: [redacted] walked up the ridge to H-2 and found gear ready for transport—two chain saws, two Indy gas packs, tools, and a few wedges (appendix d; statements: 4, 10, and 13; record: 21).

Fact 220: Allen and Heath had done a great deal of work on the helispot. On the east side of H-2, they felled 15 to 17 ponderosa pines, some 24 inches DBH

and larger, that were on a rocky ridge, with "lots of lean" to them and rot inside. There were at least as many smaller diameter trees, 6 to 8 inches DBH, that had been felled. Approximately the same number and size of trees had been felled on the west side of the ridge (statement: 32; record: 23).

Fact 221: At 1820, H-193 located the bodies of Allen and Heath and guided to the site. remained at H-2. H-193 then returned to the Cove Creek helibase to refuel (statements: 3, 10, 13, 14, 30, and 41; record: 18).

Fact 222: found the bodies of Jeff Allen and Shane Heath roughly 75 to 100 yards northwest of H-2 up the ridge, away from their safety zones (figure 9) (statements: 3 and 14).

Fact 223: The site contained the remains of two fire shelters, two fire line packs, personal items such as watches, cameras, keys, and belt buckles, and work items such as carabiners, a radio, batteries, and two flight helmets (appendix d; statements: 4 and 41; record: 21).

Fact 224: joined and together they flagged the site. called with a message for on what they found at the site. was distraught and asked to leave (statements: 3, 4, and 13).

Fact 225: a Moyer helitack crewmember, rappelled close to H-2 to spend the night with and provide moral support. It was also too dangerous and too late in the day for

to walk off the ridge. returned to H-2 to flag off the saws and other equipment. H-166 put an external load of overnight gear into the H-2 area and returned to Moyer (statements: 3, 4, 13, 20, and 37).

Fact 226: At 2020, Cramer air attack reported that the fire had spread into the Long Tom Creek drainage (statement: 18).

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Fact 227: Around 0600, called dispatch to check on plans for the day (statement: 13).

Fact 228: asked and to locate a helispot for a medium helicopter. ocated a

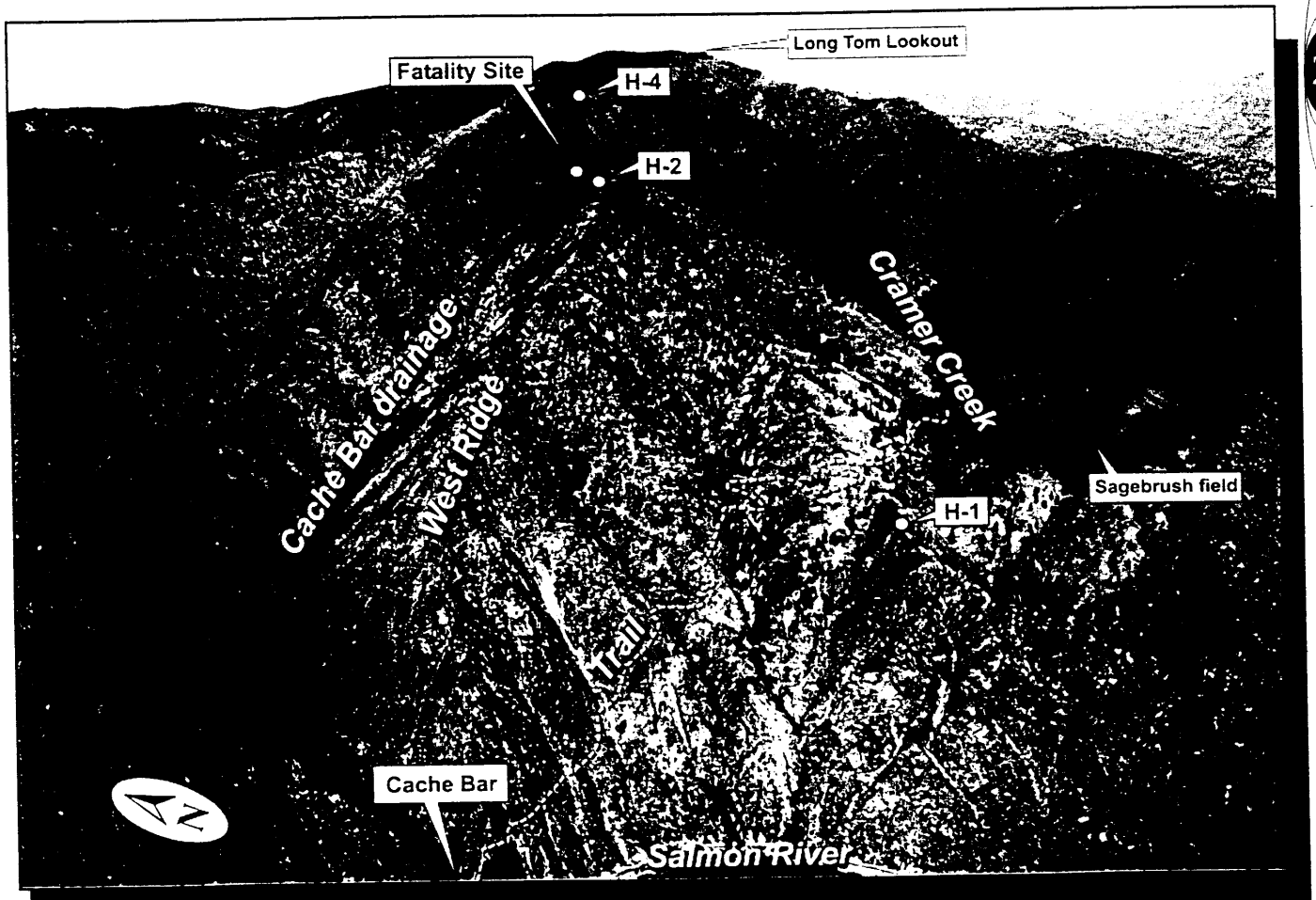


Figure 9—Cramer Fire overview.

Narrative

spot above H-2 on the ridge adjacent to the fatality site and ordered two chain saws (statements: 4 and 13).

Fact 229: At 0912, H-166 launched to deliver the chain saws (statements: 3, 20, and 25).

Fact 230: When the saws arrived, () cut the landing spot for the medium helicopter (statement: 13).

Fact 231: Once the site was cut, 133-KA did bucket drops for dust abatement. After assessing the new helispot, H-166 decided to use an alternative site, referred to as H-4, due to safety considerations. At that point, 133-KA was released and H-166 returned to the Cove Creek helibase (statements: 13 and 32).

Fact 232: At approximately 1008, H-166 launched to deliver ()

the Lemhi County sheriff, () deputy sheriff, and () Forest Service employee, to H-4. While enroute, () radioed to () and () to meet him at H-4 for a flight back to the helibase. After dropping off () H-166 returned to the helibase with the two rappellers (statements: 3, 4, 13, 20, 25, and 32).

Fact 233: When () and () reached H-2, () briefed them about the fatality site and a strategy for removing the bodies (statements: 13 and 32):

Fact 234: At 1258, () and () walked to the fatality site, placed the deceased in body bags, and carried them to the newly cleared helispot. The bodies of Jeff Allen and Shane Heath

were flown to the Cove Creek helibase and transferred to a medium helicopter for transport into Salmon, ID. () hiked to H-4 for a return flight to the helibase (statements: 13, 20, 25, and 32).

Fact 235: At approximately 1500, () secured the fatality site, and when finished, walked to H-4 and flew in H-166 to Indianola (statements: 3 and 32).

Fact 236: At 1510, the bodies of Jeff Allen and Shane Heath were flown on a medium helicopter from the Cove Creek helibase to the Salmon airport (statement: 20).

Fact 237: At 1800, the Cramer Fire accident investigation team arrived in Salmon.

Findings

Fire Management Plan Direction

Finding 1. The Salmon-Challis National Forest (SCNF) fire management plan (FMP) provided adequate direction for management of fires (findings: 1a and 1b).

a. The FMP has two different trigger points that define when a fire transitions from initial attack to extended attack. It clearly defines the followup requirements, such as a complexity analysis and a wildland fire situation analysis (WFSA), once a fire reaches extended attack status (appendix e).

b. The FMP addresses the hazards of fire suppression in the Salmon River Breaks. It recognizes the effects that steep slopes have on fire behavior, rapid uphill fire growth, and rolling firebrands. The FMP also cautions that fire line construction at midslope is dangerous and that underslung fire lines are hard to secure and hold. The FMP states that the Salmon River Canyon experiences up slope winds that are pronounced during the summer, often resulting in winds far different from those predicted in general area fire weather forecasts. Midslope fire suppression tactics were used on the Cramer Fire on July 21 and 22 during extreme burning conditions (facts: 107, 154, 166, and 193; appendix e).

Fire Management Organization

Finding 2. Responsibility for managing Type II through Type V fires was assigned to the district rangers (DRs) on the SCNF, which placed a considerable fire management workload on the DR of the North Fork and Middle Fork ranger districts (RDs). There was a critical fire management vacancy on the North Fork RD. There were no initial attack resources from the North Fork RD on duty or avail-

able on July 20 (findings: 2a–2d).

a. SCNF district rangers have made, for some time, fire management decisions on Type III, IV, and V fires. Beginning in 2001, authority for fire management decisions on Type II fires transferred from the supervisor's office to the district rangers, increasing their authority, responsibility, and fire management workload, particularly on the North Fork and Middle Fork RDs (facts: 23, 26, and 27).

b. The SCNF was having a difficult time staffing and aligning its fire organization and setting priorities in response to reduced, fluctuating, and/or delayed funding. This resulted in a critical vacancy on the North Fork RD—the district fire management officer (FMO)—and inconsistent long-term management and leadership (facts: 29 and 30).

c. The FMP requires that incident commanders (ICs) Type III be full time, dedicated ICs with no collateral duties. When the assistant fire management officer (AFMO) became the IC on the Cramer Fire, he was not to perform his duties as AFMO on the North Fork RD. During the Cramer Fire, no personnel were assigned to the FMO or AFMO positions on the North Fork RD (facts: 30, 90, 147, 197, and 207; appendix e).

d. When the Cramer Fire was reported on July 20, the North Fork RD had no FMO and the AFMO had just returned from three days off. The district helitack crew was off-forest, lengthening the response time to the Cramer Fire. It took 15½ hours from the time the IC Type IV ordered an IC Type III for the IC Type III to arrive on the Cramer Fire and assume command (facts: 30, 63, 69, 75, 90, 99, and 107).

Finding 3. The SCNF increased the number of positions in its fire organization when it received National Fire Plan funding in 2001 (fact: 23).

Finding 4. There were different perceptions on the SCNF of how well the fire organization functioned. The performance of the fire organization was becoming a

source of increasing concern among some of the forest-level fire staff and at the regional office. Limited action had been taken to address the state of the fire organization (facts: 27 and 28).

Finding 5. Fire management information was routinely conveyed through the region, forest, and district (fact: 28).

Finding 6. The forest requested one-time, limited severity assistance while it was experiencing dangerous conditions (facts: 19 and 39).

Qualifications

Finding 7. Personnel assigned to the Cramer Fire were qualified for their positions (findings: 7a–7b).

a. The SCNF has a rigorous system of training and qualifications for its fire management personnel (facts: 31 and 32).

b. Line officers considered the AFMO on the North Fork RD a safe IC Type III. The IC Type III qualifications of the AFMO meet the requirements of agency policy. Other personnel assigned to the fire met the qualifications in Forest Service Manual (FSM) 5109.17 (fact: 31).

Transition from Initial Attack to Extended Attack

Finding 8. According to the FMP, a fire transitions from initial attack to extended attack when an IC Type IV or V requests additional resources (increasing incident complexity to the next level), suppression efforts have failed, or suppression efforts may not contain the fire within 24 hours (appendix e).

Findings

Finding 9. When the Cramer Fire went into extended attack status, the change from initial attack to extended attack was not acknowledged, recognized, or reported by the IC, the North Fork/Middle Fork district ranger, the forest FMO, central Idaho dispatch, or the Salmon-Cobalt FMO/zone duty officer. As a consequence, no complexity analysis or WFSA, required by the FMP, were conducted and there was no communication regarding the change in fire status (facts: 50–57, 69, 74, 75, 90, and 99).

Finding 10. In the morning on July 21, the IC assessed fire conditions and potential in order to provide information for the incoming IC Type III. The IC gave the incoming IC Type III his incident organizer and passed on information about suppression resources and weather (facts: 84, 85, 86, 88, and 99).

Fire Suppression Strategy and Tactics

Finding 11. The strategy for July 20 was to secure the west side of the fire, because the east flank was burning actively and there were insufficient personnel on the fire. The entire plan was abandoned late that evening due to dangerous conditions (facts: 71, 72, 73, and 77).

Finding 12. Between July 20 and July 22, there was minimal discussion of Cramer Fire suppression strategy and tactics among the forest fire staff, the North Fork/Middle Fork district ranger, the zone duty officer, and the IC (facts: 42, 45, 46, 47, 49, 90, and 123).

Finding 13. On July 21 and July 22, fire suppression strategy and tactics on the Cramer Fire did not provide for safe and effective suppression operations. The IC Type III failed to continually reevaluate

the situation and modify his plan when fire conditions changed and when requested resources were not available (findings: 13a–13k).

a. From the time the fire was reported until midday on July 21, there was no suppression action taken on the fire other than two retardant drops (facts: 62, 66, 73, 76, 77, 89, 94, 101, and 102).

b. Between July 20 and July 22, both ICs on the Cramer Fire had a containment strategy and tactics for controlling the fire, which they communicated to assigned incident personnel. Suppression objectives for the fire were not clearly articulated by the forest FMO, North Fork/Middle Fork district ranger, zone duty officer, or the IC Type III (facts: 42, 69, 72, 90, 99, 123, 133–137, 142–145, and 167; appendix e).

c. The hand crew was unable to hold the fire line on the afternoon of July 21 because of increased fire activity and pulled back to protect H-1. The IC decided to abandon suppression action on the fire, while a helicopter continued bucket work (facts: 107, 113, and 115).

d. The IC Type III's strategy for July 21 was to hold the fire in place using aerial resources and a hand crew. In the afternoon, helicopters used buckets to support the hand crew, which was hot spotting, cold trailing, and building line up the east flank of the fire (facts: 99, 107, 108, and 115).

e. The IC's strategy on July 22 was to contain the fire at its current size. The planned tactics were to anchor the fire, construct hand line to the east and west from the anchor, and cold trail and build line down the west flank from the ridge above, after a helispot had been cleared and a hand crew flown in. Bucket and retardant drops would be used in conjunction with ground forces (facts: 133, 136, 141, and 143).

f. The strike team leader and the lead plane pilot felt that the strategy for July 22 was overly optimistic (facts: 153 and 164).

g. On July 22, the IC, two crew bosses, and air attack felt that H-2 was a safe location based on early morning conditions. The lead plane pilot felt that H-2 was a safe location based on light fuels and rocky areas in the Cache Bar drainage (facts: 136, 137, 152, and 187).

h. Although the IC Type III did not receive the resources and support he requested on July 21, he remained confident that he could contain the fire on July 22 and did not change his suppression strategy (facts: 99, 107, 123, 125, 137, and 143).

i. By midafternoon on July 22, the suppression plan was partially executed. An anchor was not established on the fire and the plan to place a hand crew on H-2 was abandoned but not communicated to the rappellers (facts: 143, 154, 167, 171, 172, 181, and 184).

j. On July 22 as on July 21, the suppression strategy failed. Hand crews were pulled off the fire line in the afternoon of both days to ensure their safety (facts: 174, 179, 181, and 193).

k. From late morning until midafternoon on July 22, Cove Creek helibase contacted the rappellers three times and the IC one time for updates on their progress. The IC and two crew bosses, as well as the H-2 rappellers, underestimated the amount of work and time required to clear H-2, delaying timely retrieval from H-2 (facts: 136, 157, 163, 167, 183, 189, and 220).

Finding 14. On the morning of July 22, the IC and two other overhead personnel discussed strategy, tactics, lookouts, escape routes, and safety zones (facts: 133, 134, 135, 136, and 137).

Finding 15. During his morning briefing on July 22, the IC covered the range of topics found in the *Incident Response Pocket Guide* briefing checklist (facts: 143, 144, and 145).

Safety

Finding 16. There was good attention to safety at the forest level and in the early stages of the Cramer Fire. However, there were significant safety lapses on the Cramer Fire prior to the fatalities (findings: 16a–16i).

a. Line officers on the SCNF complied with agency safety policy by communicating the importance of firefighter and public safety as the highest priority in fire suppression activities (facts: 33 and 34; appendix e).

b. The region, forest, and districts emphasized and monitored safety using multiple venues (facts: 33, 34, 35, and 36).

c. On July 20, the IC recognized, assessed, and monitored the hazards on the fire and took safe actions to mitigate them (facts: 71, 73, 77, and 78).

d. Based on a review of timesheets, each individual on the Cramer Fire was within their work-rest and length of assignment guidelines, including the AFMO on the North Fork RD who became the IC Type III on July 21 after three days off (facts: 75, 90, and 99).

e. On July 21, after assessing changing conditions on the fire and monitoring crew demeanor, the IC took measures to assure crew safety in the afternoon (facts: 111 and 115).

f. The FMP requires a safety officer on Type III incidents. A safety officer was not requested or assigned to the Cramer Fire (fact: 123; record: 24; appendix e).

g. Briefings on July 21 and July 22 did not emphasize the Ten Standard Firefighting Orders, the 18 Watch Out Situations, or ongoing risk assessments required by agency policy nor did they acknowledge extreme fire behavior potential in the Cramer Fire area (facts: 105, 143, 144, 145, and 154; appendix e).

h. On July 22, the IC placed an employee at risk east of the fire while fire activity was increasing (facts: 171 and 173).

i. On July 22, firefighters continued to be dropped off at H-1 even though the helispot was being threatened by fire (facts: 168, 171, 174, and 178).

Finding 17. Visibility of the slopes below H-2 was limited by topography and vegetation, obscuring the rappellers' view of fire below them (facts: 3 and 151).

Fire Management Resources

Finding 18. There were inadequate resources and a logistical inability to fully utilize available resources to implement the ICs' strategies. On July 22, there was confusion about the availability and positioning of some resources, and helicopters were not available to retrieve the rappellers at a critical moment of need (findings: 18a–18j).

a. On July 20, jumpers from the McCall, ID, base were unable to staff either the Crystal or the Cramer Fires due to high winds (facts: 61 and 62).

b. On July 20, approximately 40 minutes after arriving on the Cramer Fire, the IC Type IV requested an IC Type III for the fire (facts: 67, 68, and 69).

c. One jumpship, one air attack aircraft, one airtanker, two engine crews, one hand crew (which got lost enroute to the fire), and one helitack crew were dispatched to the Cramer Fire on July 20. The only suppression action on July 20 was two retardant drops (facts: 61–67).

d. On July 20, personnel on the fire consisted of an IC Type IV, an IC Type IV trainee, and five engine crew members (facts: 67 and 72).

e. Because dispatch instructed the IC to keep his five firefighters ready for initial attack on July 21, he could not use them for suppression action on the Cramer Fire on July 20 (facts: 78, 94, and 102).

f. The IC Type IV kept a helicopter on the ground when it could have been used on the morning of July 21 to assist with fire containment and control while the fire was relatively inactive (facts: 89, 98, 99, 103, and 121).

g. Type I crews were available through the National Interagency Coordination Center but were not requested by central Idaho dispatch. In addition, the IC did not request Type I crews or sufficient management personnel (fact 123; record 25).

h. Because the crew shuttles took more than 3½ hours on July 22, most of the ground forces did not reach the fire line until the middle of the afternoon (facts: 153 and 178).

i. On July 22, lead plane 41 was confused as to the number and location of resources and assumed that the personnel at H-2 had been transported to H-1 (facts: 164 and 187).

j. Helicopters were unavailable for immediate dispatch when the rappellers called for pickup, delaying the launch to retrieve them (facts: 188, 189, 190, 194, and 195).

Finding 19. Suppression in the afternoon on July 21 consisted of one retardant drop, bucket drops, and hand line construction that began midafternoon (facts: 107, 108, and 115).

Finding 20. During the morning of July 22, one helicopter was doing bucket drops on the fire. In the afternoon, two helicopters were doing bucket work, multiple loads of retardant were dropped on the ridge above Cramer Creek, and three hand crews were building fire line (facts: 141, 153, 158, 161, 165, 168, and 171).

Weather Information

Finding 21. Weather information was not aggressively sought. Weather information that was obtained did not represent the Cramer Fire site (findings: 21a–21f).

a. Due to lack of station maintenance, weather observations from remote automated weather stations were of questionable accuracy and provided potentially erroneous National Fire Danger Rating System indices (fact: 13).

b. Winds were much stronger than predicted in the spot and zone forecasts on July 21 (facts: 88, 99, 112, and 113).

c. Because a spot weather forecast was not requested for the July 22, updated information from the National Weather Service, indicating stronger winds than specified in the zone forecast, was not relayed to personnel on the fire (fact: 145).

d. Because spot weather forecasts were viewed as inaccurate and unreliable, fire personnel on July 22 tended to rely on the general fire weather forecast and the previous day's weather and fire behavior for their information (facts: 14, 88, 131, and 145).

e. There was substantial reliance on Long Tom Lookout for weather observations on the fire. Weather observations aired from Long Tom Lookout were invalid for much of the fire area due to substantial differences in elevation and site characteristics (facts: 15, 170, and 176).

f. Weather observations taken on July 22 were significantly different from those communicated by Long Tom Lookout (facts: 170 and 176).

Finding 22. Fire activity on the SCNF increased in July due to hot, dry weather and multiple lightning starts, indicating the potential for new starts to grow rapidly (facts: 38, 40, and 41).

Finding 23. Thermal belts are common at midslope locations in the Salmon

River Breaks and promoted active burning on the Cramer Fire well into the late night and early morning on July 21 (facts: 11, 79, 81, and 126).

Finding 24. The National Weather Service's Pocatello Office issued a spot weather forecast in a timely manner on July 21 (facts: 85 and 88).

Finding 25. Crews were informed during the July 22 morning briefing that conditions had been getting progressively warmer and drier the previous two days (facts: 130, 131, and 145).

Fuels and Terrain

Finding 26. Fuel and terrain conditions on the Cramer Fire lent themselves to extreme fire behavior and difficult fire suppression (findings: 26a–26d).

a. Steep slopes predisposed areas to rapid, uphill, fire growth and problems with firebrands rolling downhill (fact: 4; appendix e).

b. Live fuel moisture was at a critically low level, and the Burning Indices (BIs) and Energy Release Components (ERCs) indicated dangerous conditions (facts: 10 and 19).

c. Fire exclusion in the north part of the SCNF resulted in a shift from a high frequency, low intensity fire regime to one of lower frequency, higher intensity (fact: 20).

d. Shiny-leaf ceanothus is capable of burning intensely with rapid rates of spread, yet this information was not included in the FMP (fact: 9, 187, 196, and 201).

Fire Behavior, General

27. Fire behavior was consistent each day—calm in the morning and severe in the afternoon (findings: 27a–27g).

a. The fire became active in the early evening on July 20, growing from 3 to 25 acres in 2½ hours in light fuels on steep slopes (facts: 62 and 68).

b. From late night until very early morning on July 21, conditions remained warm and dry, allowing continued fire growth and spread and precipitating the call for additional resources. At approximately 0230 on July 21, fire activity was minimal and remained that way until approximately 1130 (facts: 79, 81, 82, 96, 98, and 103).

c. Fire activity began to increase by late morning and early afternoon on July 21 and built through the late afternoon with increasing, gusty winds (facts: 103, 110, 112, 113, and 115).

d. In the evening on July 21, the fire remained active with isolated torching and grew an additional 140 acres in 2½ hours (facts: 114, 115, and 117).

e. On July 22, fire activity in the morning was low, backing and creeping through grass with scattered smokes in open timber (facts: 138, 150, and 152).

f. Fire activity increased late morning on July 22 near H-1. By early afternoon, the fire had become active to the east and northeast but was backing downhill at low intensity (facts: 156, 166, 168, and 173).

g. By midafternoon on July 22, strong, gusty winds increased fire activity around H-1 and made a run to the east in the Cramer Creek drainage (facts: 174, 179, and 185).

Finding 28. Even though the Salmon River Breaks are known for their potential for extreme fire behavior and some crew members were aware that seasonal conditions were extreme, other personnel on the Cramer Fire did not expect

fire behavior in the afternoon of July 22 (facts: 19, 131, 143, 167, and 187).

Lookouts

Finding 29. There were no effective lookouts for the rappellers at H-2 (findings: 29a–29c).

a. The plan for placement of lookouts was not clearly communicated to personnel assigned to the fire. No lookout with a view of H-2 or the Cache Bar drainage was posted on July 22 to monitor fire in the Cache Bar drainage and to communicate critical weather and fire behavior information to the rappellers. Aviation resources over the fire could not function full time as lookouts for ground crews given their other duties and responsibilities (facts: 135, 143, 148, 155 and 167; record 8).

b. The strike team leader running ground operations on July 22 was watching out for the safety of his three crews. He was not in a location to see the H-2 operation and was not responsible for the rappellers (facts: 143, 144, 153, 154, 181, 184, and 193).

c. On July 22, during the time of critical fire behavior transition: Lead plane 41 assumed dual responsibilities as lead plane and air attack, affecting his situational awareness; H-166 and H-193 were busy with crew shuttles, refueling, and maintenance; and 133-KA was refueling (facts: 161, 164, 165, 185, 188, and 198).

Escape Routes and Safety Zones

Finding 30. Three of the four safety zones identified by the IC and two crew bosses were not safety zones on the afternoon of July 22, during conditions of

extreme fire behavior. Near H-1, the black was a safety zone, but the unburned sagebrush field was a survival zone. There were no effective safety zones for the rappellers at H-2. Near H-2, the black on the east side of the ridge during the uphill fire run may have been a survival zone, but the old burn/ceanothus brush field was neither a safety zone nor a survival zone (facts: 134, 137, 196, and 201).

Finding 31. Between 1505 and 1524 prior to being overrun by fire, the rappellers communicated with the helibase five times in quick succession. During those calls, they repeatedly requested a pickup and reported during the third call fire and smoke below them (facts: 189, 190, 194, 199, and 201).

Finding 32. The rappellers were asked at approximately 1510 if they needed to go to a safety zone and they replied no. Helicopter retrieval became the primary escape route to safety for the rappellers (facts: 189, 190, 191, 194, 199, and 201).

Finding 33. The rappellers were found outside a previously identified safety zone with their flight helmets. Their rappel equipment and chain saws were prepared for transport at H-2, indicating that they were awaiting pick up at H-2 (facts: 219, 222, and 223).

Finding 34. When the rappellers left H-2, they carried their line gear with them, but did not deploy their shelters (facts: 200, 202, and 223).

Fire Behavior, Cache Bar Drainage

Finding 35. The seriousness of the fire in the Cache Bar drainage was underestimated (findings: 35a–35f).

a. On July 22, the rappellers were

notified of low intensity ground fire below the West Ridge of the Cache Bar drainage as soon as they were dropped off. Subsequent sightings of ground fire in this area from midmorning to early afternoon were not acted on (facts: 150, 153, 164, and 167).

b. After 1400 on July 22, fire activity increased dramatically on the fire. Fire that had been smoldering in the Cache Bar drainage became an active flaming front (facts: 174, 179, and 180).

c. Development of an active fire front in the Cache Bar drainage on July 22 was observed from the air by lead plane 41 and Cramer air attack as much as 50 minutes before the fire reached H-2, but this information was not conveyed to H-2 (facts: 180, 185, and 187).

d. Beginning at 1500, the fire, driven by strong westerly winds, made rapid, intense, updrainage runs simultaneously in the Cramer Creek and Cache Bar drainages (facts: 186, 187, and 196).

e. When the fire front reached H-2, the intensity and rate of spread were much greater than had been anticipated (facts: 187 and 201).

f. Conditions were not survivable with or without a fire shelter at the fatality site because of hot gases and extreme temperatures from an intense fire front (facts: 201 and 202).

Postaccident Response

Finding 36. Because of extremely smoky conditions, multiple attempts were made to contact and locate the rappellers after the fire overran H-2 (facts: 205, 208, 211, 212, and 213).

Finding 37. During the first half hour after losing contact with the rappellers, the IC checked on the safety of personnel in the vicinity of H-1 and was dispatching Cramer Fire resources to the Stoddard Fire. More than 30 minutes after losing

Findings

contact with the rappellers at H-2, the IC became engaged in the search-and-rescue operation (facts: 204, 206, 207, 208, 211, and 212).

Leadership on the Cramer Fire

Finding 38. Leadership on the Cramer Fire was inadequate to provide for safe and effective suppression operations (findings: 38a–38e).

a. The IC Type III did not request a safety officer on July 21 or 22 (fact 123; record 24).

b. On July 21, the IC Type III's confidence in his ability to contain the fire was based on his expectation of receiving the requested resources the following day. On July 22, he remained confident he could contain the fire with the same strategy even though he did not receive the requested resources (facts: 114, 123, 137, and 143).

c. On July 22, the IC's view of the fire came from two reconnaissance flights. The rest of the day he was at the Cove Creek helibase, 13 miles from the Cramer Fire, managing logistics and operations (facts: 133, 147, and 166).

d. On July 22, when the IC made his decision to retrieve the rappellers from H-2, ½ hour elapsed before a helicopter was launched to get them, and that launch was requested by the rappellers. When the IC made his decision, a helicopter had just left the helibase to pick up a helitack crewmember near the fire and could have retrieved the rappellers at the same time (facts: 178, 184, 189, and 195).

e. During the critical period prior to and after contact was lost with the rappellers on July 22, the IC was also functioning as the district FMO/AFMO, performing multiple collateral duties on the radio (facts: 197, 198, and 207).

Finding 39. On July 20 and 21, there were different perceptions by the North Fork/Middle Fork district ranger, the zone duty officer, and the forest FMO of who was and would be the IC Type III and duty officer for the day (facts: 74, 75, and 90).

Finding 40. The IC Type III sized up the fire on July 21, briefed his crew, and was onsite for the entire afternoon, running operations (facts: 98, 99, 105, 107, 110, 113, 114, and 115).

Finding 41. On July 22, Cramer Fire personnel identified the strike team leader as the IC, operations section chief, and/or division group supervisor (facts: 123, 144, and 164).

Finding 42. The Indianola helitack assistant foreman was the rappel spotter for the H-2 rappellers and, after the rappel operation, became the Cove Creek helibase manager responsible for helicopter operations. He directed helibase communications to check periodically on the rappellers' progress (facts: 150, 157, 163, 183, and 191).

Finding 43. After seeing increasing fire activity around H-1 and in the Cramer Creek drainage during the afternoon recon on July 22, the IC requested assistance from the forest FMO in reviewing his strategy (facts: 175 and 179).

Management Oversight

Finding 44. The SCNF assigned responsibility for the Cramer Fire to the IC Type III but did not provide oversight. Those who should have provided oversight focused attention on other priorities. When concerns about management of the fire were surfaced, followup on these concerns was inadequate (findings: 44a–44f).

a. The operations staff officer, who conveys fire information to the district rangers, was occupied with Type II fires on the forest as well as a regional preparedness review from July 20–22 (facts: 40, 42, 44, and 47).

b. The North Fork/Middle Fork district ranger was occupied as a supervisory dispatcher for the central Idaho dispatch center, with Type II fires on her districts, and with non-fire business from July 20–22. Her involvement with the Cramer Fire was limited (facts: 41, 42, 44, 49, 90, and 129).

c. The forest FMO, who is the liaison between the zone duty officer/district FMOs and the operations staff officer, was occupied with multiple fires on the SCNF, a regional preparedness review, briefings, and related fire business from July 20–22. His involvement with the Cramer Fire was limited until the afternoon of July 22 (facts: 40, 41, 42, 44, 47, 51, 90, 123, 179, 192, and 207).

d. The forest deputy FMO was off the forest during the Cramer Fire, and no one was assigned his duties in his absence (fact: 40).

e. After his initial, limited involvement on the Cramer Fire on July 20, the zone duty officer, who was the point of contact for the Cramer Fire IC, shifted his attention to other fire business until he became the Cramer Fire IC in the early evening of July 22 (facts: 45, 46, 74, 75, 90, 91, and 217).

f. When the forest aviation officer (FAO) surfaced concerns to the forest fire staff about resource use, crew disorganization, and/or IC competency on the Cramer Fire, the forest operations staff officer discussed those concerns with the FAO and reported them to the North Fork/Middle Fork district ranger. The district ranger did not follow up after talking with the FAO (facts: 121, 122, and 129).

Appendix A – Resources on the Fire


Daily Assignment and Responsibilities of Resources on the Cramer Fire

Sunday, July 20, 2003

PERSONNEL		.....	Moyer helitack crew
		.....	Long Tom Lookout
	Ferguson 18B	.....	Contract crew Type II
		.....	Moyer helitack foreman
		.....	Salmon-Cobalt fire management officer
		.....	Forest fire management officer
		.....	Moyer helitack crew, IC Type IV trainee
		.....	Moyer helitack crew, IC Type IV
AVIATION	Jumper 41	.....	Smokejumpers
	H-166	.....	Moyer helicopter Type III
	Tanker 454 (SEAT)	.....	Fixed-wing retardant Type IV
	61-N	.....	Cramer air attack
EQUIPMENT	BLM engine 7157	.....	Engine crew
	BLM engine 422	.....	Engine crew

Monday, July 21

PERSONNEL		.....	North Fork district ranger
		.....	Moyer helitack crew
		.....	Long Tom Lookout
	Ferguson 18B	.....	Contract crew Type II
		.....	Indianola helitack assistant foreman
		.....	Central Oregon regulars crew boss
		.....	North Fork RD assistant fire management officer, IC Type III
		.....	Forest operations staff officer
		.....	Moyer helitack foreman
		.....	Zone duty officer
		.....	Forest aviation officer
		.....	Forest fire management officer
		.....	Indianola helitack crew
		.....	Moyer helitack crew, IC Type IV trainee
	.....	Central Idaho dispatch manager	
		.....	Moyer helitack crew, IC Type IV
AVIATION	133-KA	.....	Helicopter Type I
	H-166	.....	Moyer helicopter Type III
	H-193	.....	Indianola helicopter Type III
	Tanker 454 (SEAT)	.....	Fixed-wing retardant Type IV
	61-N	.....	Cramer air attack

Continued 

Daily Assignment and Responsibilities of Resources on the Cramer Fire

EQUIPMENT BLM engine 7157 Engine crew
 BLM engine 422 Engine crew

Tuesday, July 22

PERSONNEL

Allen, Jeff Indianola helitack crew
 North Fork/Middle Fork district ranger
 Moyer helitack crew
 Indianola helitack crew, helibase radio operator
 Long Tom Lookout
 Moyer helitack crew
 Central Oregon Regulars Forest Service crew Type II
 Moyer helitack crew
 Ferguson 18A Contract crew Type II
 Ferguson 18B Contract crew Type II
 Ferguson 4B Contract crew Type II
 Indianola helitack assistant foreman, helibase manager
 Central Oregon regulars crew boss
 Logistics support
 IC Type III
 Strike team leader
 Heath, Shane Indianola helitack crew
 Zone duty officer, IC Type III
 Forest aviation officer
 Forest fire management officer
 Moyer helitack crew, helibase manager trainee
 Moyer helitack crew
 Pilot (H-193)

Continued →

Daily Assignment and Responsibilities of Resources on the Cramer Fire

AVIATION 133-KA Helicopter Type I
 H-166 Moyer helicopter Type III
 H-193 Indianola helicopter Type III
 Tanker 1 Fixed-wing retardant Type I
 Tanker 26 Fixed-wing retardant Type I
 Lead plane 41 Lead plane
 61-N Cramer air attack

EQUIPMENT BLM engine 7157 Engine crew
 BLM engine 422 Engine crew

Wednesday, July 23

PERSONNEL Lemhi County sheriff
 Moyer helitack crew
 Indianola helitack crew
 Moyer helitack crew
 Moyer helitack crew
 Fatality site manager
 Lemhi County deputy sheriff

AVIATION 133-KA Helicopter Type I
 H-166 Moyer helicopter Type III

Appendix B—Cramer Fire Timeline

Date	Time	Action
July 19, 2003	2100	Lightning strike reported in the area of Cramer Creek.
July 20, 2003	1630	Cramer Fire reported.
	1648	Jumper 41 diverted from the Crystal Fire to the Cramer Fire.
	1704	Fire 3 acres with high spread potential. Jumper 41 unable to staff due to high winds.
	1713	Cramer air attack departed for Cramer Fire. BLM engines 7157 and 422 dispatched.
	1754	Moyer helicopter (H-166) dispatched to Cramer Fire.
	1900	[redacted] became IC Type IV for Cramer Fire.
	1938	IC Type IV requested an IC Type III for fire.
	1950	Fire reconned by helicopter.
	2015	IC Type IV, IC Type IV trainee, and five engine crewmembers landed on H-1.
	2143	Additional firefighters unable to fly to fire because of darkness.
July 21, 2003	0030	Five firefighters bed down. IC Type IV and trainee monitor the fire.
	0230	Fire, which burned actively until 0230, started to die down.
	0530	IC Type IV trainee walked perimeter.
	0710	Fire 35 to 45 acres.
	0800	Spot weather forecast. 133-KA available.
	1000	Cramer air attack over fire. Estimated size at 40 acres. Landed at 1042.
	1058	[redacted] became IC Type III after helicopter recon.
	1130	Fire activity increased on east and north sides.
	1148	133-KA sent to fire.
	1242	Hand crew began shuttle to H-1.
	1410	IC Type III requested retardant.
	1515	Indianola helicopter (H-193) and crew reported to fire.
	1558	Cramer air attack returned to fire.
	1613	IC Type III reported active fire and potential to reach Salmon River road by morning.
	1631	Lookout posted for hand crew.
	1715	Fire 60 acres. Two medium helicopters requested.
	1735	IC Type III and crew began leaving fire.
	1952	Fire 200 acres.
	2000	Fire intensity low.
	2100	Forest aviation officer reported fire operations concerns.
	2130	IC Type III shared plan for July 22 with forest fire staff and zone duty officer.
July 22, 2003	0300	Fire, which burned actively until 0300, started to die down.
	0820	Fire reconned by helicopter.
	0900	133-KA sent to fire for bucket work.
	0900	Morning briefing at Cove Creek helibase.
	0929	H-193 launched to rappel Allen and Heath onto the H-2 site.
	0955	Cramer air attack over fire.
	1021	Recon enroute to H-1. Fire perimeter into Cache Bar drainage.
	1030	Fire active below H-1.

Continued ↗

Date	Time	Action
	1100	..... Progress check on H-2 construction.
	1230	..... Progress check on H-2 construction.
	1300	... identified fire in Cache Bar drainage.
	1304	..... relieved Cramer air attack.
	1326	..... Fire reconned by helicopter. Fire visible in Cache Bar drainage.
	1327	..... H-193 transitions to bucket work on H-1.
	1340	..... H-1 threatened by fire. Firefighters pull back. Crewman on helicopter recon dropped off.
	1400	..... Fire activity intense. H-1 burned over.
	1423	..... communicated concerns about fire to
	1430	..... Smoldering fire in Cache Bar drainage became active fire front.
	1445	..... Progress check on H-2 construction.
	1445	..... H-166 sent to pick up crewman from fire previously dropped off.
	1447	..... planned to remove rappellers from H-2.
	1454	..... Cramer air attack over fire.
	1500	..... Fire in the Cramer Creek and Cache Bar drainages began to spread rapidly. Helicopters down for maintenance and refueling.
	1505	..... Rappellers called for immediate pickup.
	1509	..... Rappellers called for immediate pickup. Reported they were fine, just taking a lot of smoke.
	1511	..... crews began to pull off the fire line.
	1513	..... Rappellers report fire and smoke below them. Ask for immediate pickup.
	1514	..... involved in multiple conversations about diverting resources.
	1519	..... Rappellers contacted helibase about status of H-166. H-166 enroute to H-2.
	1520	..... H-166 unable to land. Rappellers departed H-2.
	1524	..... Cache Bar drainage fully involved in fire. Rappellers made final call for immediate pickup and died shortly afterward.
	1525	..... H-166 returned to helibase for fuel.
	1530	..... Cramer air attack attempted to contact rappellers.
	1534	..... H-193 launched to search for rappellers.
	1545	..... H-166 diverted to Stoddard Fire.
	1600	..... reported contact lost with rappellers.
	1616	..... H-166 returned. Searched for missing rappellers.
	1650	..... H-193 departed helibase to continue search.
	1730	..... crews at road awaiting pickup.
	1749	..... Transition to new
	1755	..... Two helitack crewmembers initiated ground search for rappellers.
	1820	..... Bodies of rappellers located. Two more helitack crewmembers arrive to spend the night.
	2020	..... Fire reached Long Tom Creek.
July 23, 2003	0912	..... New helispot near H-2 cleared.
	1008	..... H-166 transports Lemhi County officials to fatality site.
	1258	..... Bodies of rappellers transported to helibase.
	1500	..... Fatality site secured.
	1510	..... Bodies flown to Salmon, ID, airport.
	1800	..... Investigation team arrived in Salmon.

Appendix C—Fire Behavior and Weather

Introduction

This appendix describes the fire behavior on the Cramer Fire from July 19 through July 22, 2003, and includes a discussion of conditions and events contributing to the fire behavior. Several key geographic features in the fire's vicinity are not indicated on commonly available maps and were denoted for this report to minimize confusion about locations being discussed. Specifically, these are the two helispots (H-1 and H-2), the West Ridge (the east-west ridgeline on which H-2 is situated), and the Cache Bar drainage (a small drainage running north and east from Cache Bar, a raft takeout location on the Salmon River). These locations are indicated on figure 1.

Prior Conditions

Precipitation and Drought Conditions

Central Idaho, including the region encompassing the Salmon-Challis National Forest (hereafter referred to as "the forest"), had been in a period of prolonged drought for the previous four years. The National Drought Monitor for the week of July 22, 2003 indicated the area was in the "extreme drought" category (figure 2).

Precipitation amounts during the winter of 2002–2003 were greater than the previous year. By May, snowpack in central Idaho was near average, ranging from 90 to 110 percent of normal (figure 3).

Spring and summer rainfall for the area lagged, however, and was 50 to 70 percent of normal. No significant precipitation had fallen in the area since June 25, 2003.

The "cumulative water year," which accounts for both rain and snow received since October 1, 2002, also showed the area to be in deficit. For the 2003 water year (beginning October 1, 2002), the area had received 50 to 70 percent of normal precipitation as of July 19, 2003 (figure 4). This is in sharp contrast to the 110 to 130 percent of normal precipitation received by the same date in 2002.

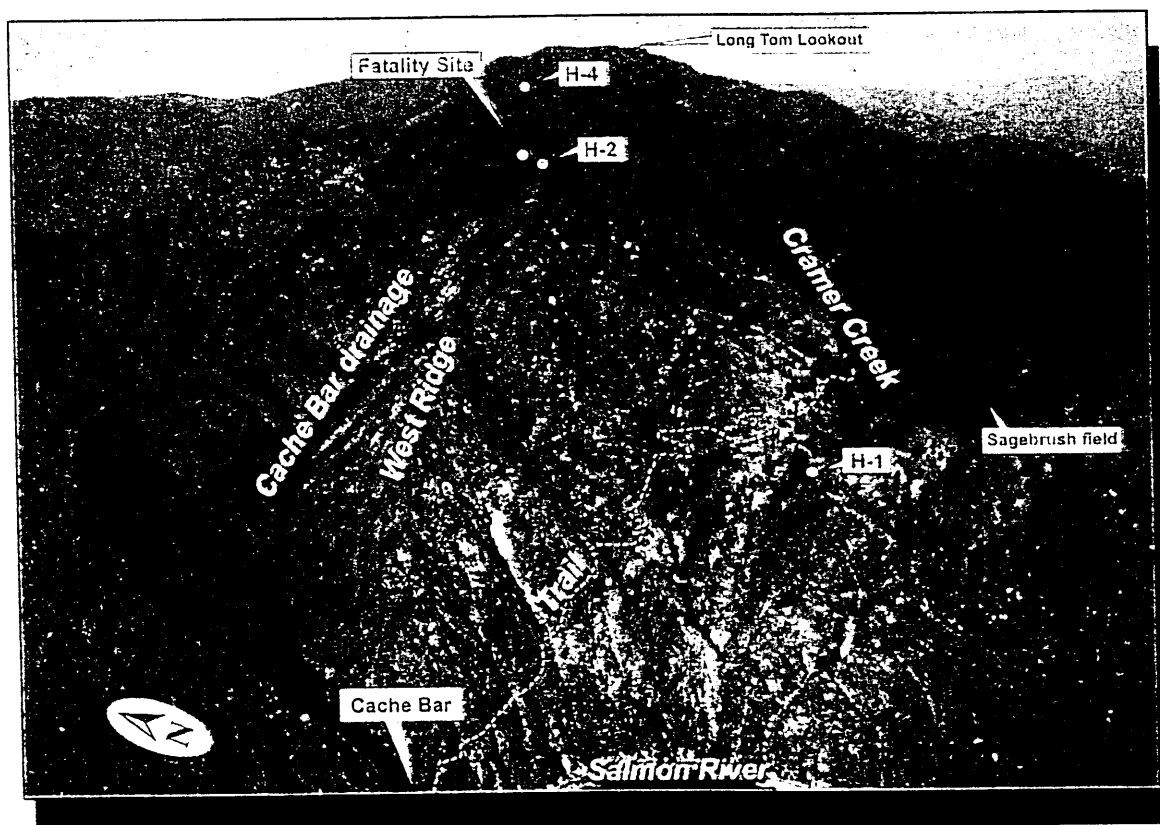


Figure 1—Cramer Fire area.

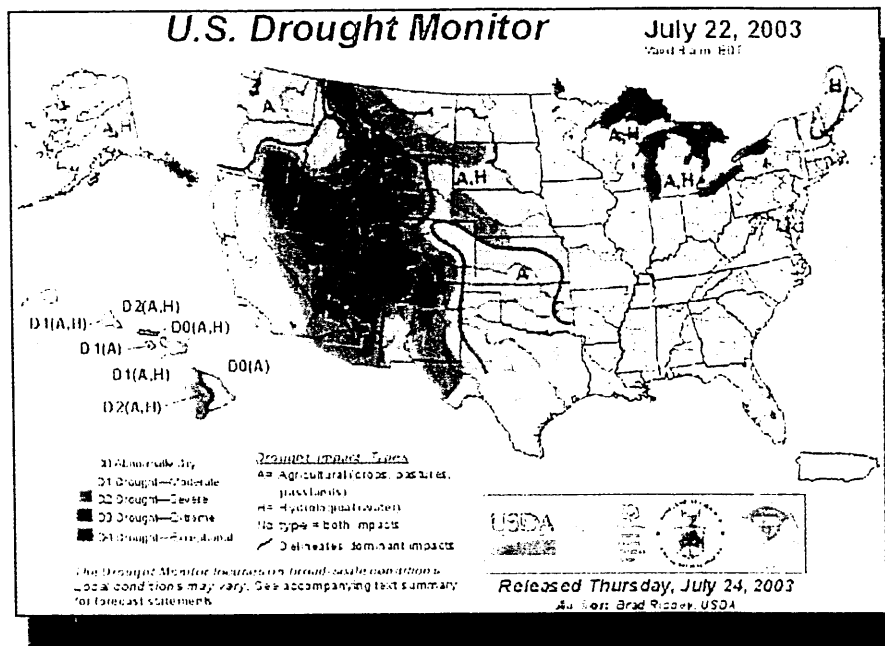


Figure 2—Drought severity map for July 22, 2003.

Fuels

Fire-behavior fuel models representing the area include fuel models:

- 1 Short grass
- 2 Grass with litter understory
- 5 Short brush
- 6 Dormant brush
- 9 Long-needle pine litter
- 10 Mixed conifer

Figure 5 is a map of fire-behavior fuel models. Fuels in the Cramer Creek drainage area are primarily grass, grass-litter understory in open stands of ponderosa pine and Douglas-fir, and mixed conifer stands with more continuous canopy in the upper reaches of Cramer Creek. In the Cache Bar and Fountain Creek drainages, south-facing slopes are covered by continuous short grass with scattered shrubs in some places. North-facing slopes are covered by large, continuous brush fields where an intense stand replacement fire in 1985 removed mixed-conifer stands and facilitated brush growth. These brush fields consist primarily of shiny-leaf ceanothus, with pockets of ninebark interspersed. Snags are nu-

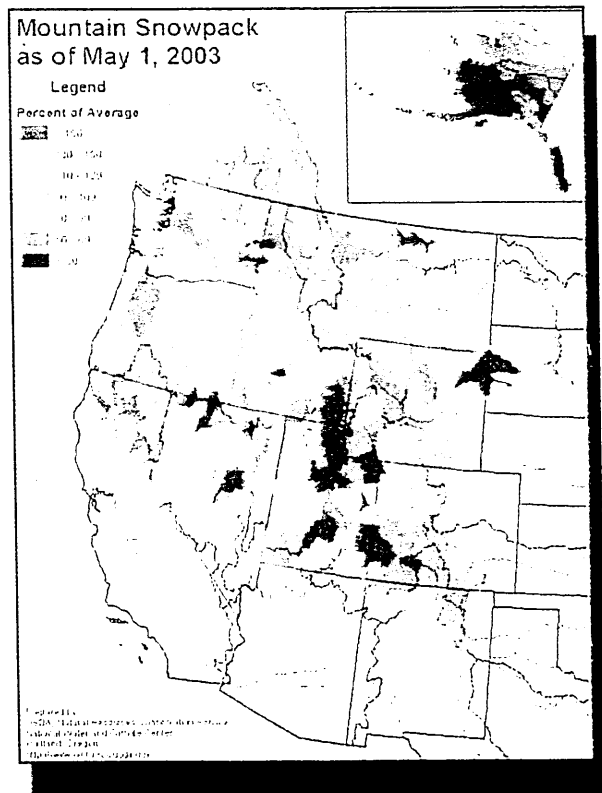


Figure 3—Snowpack as of May 2003.

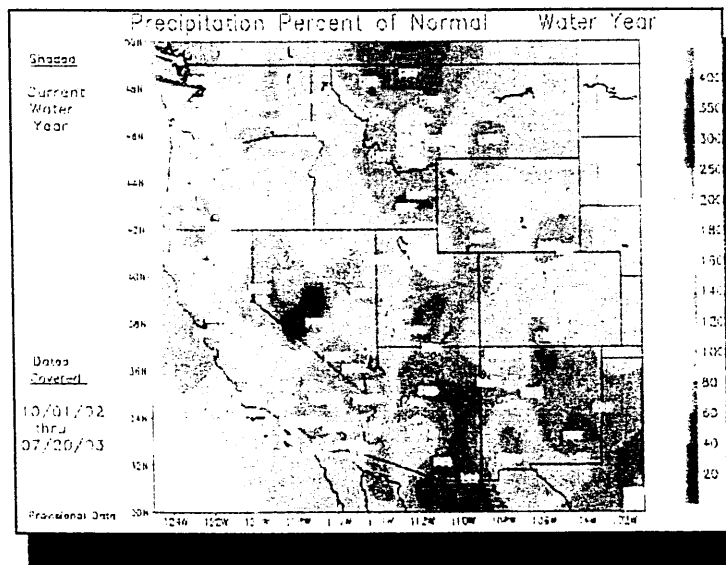


Figure 4—Water year, percent of normal, as of July 20, 2003.

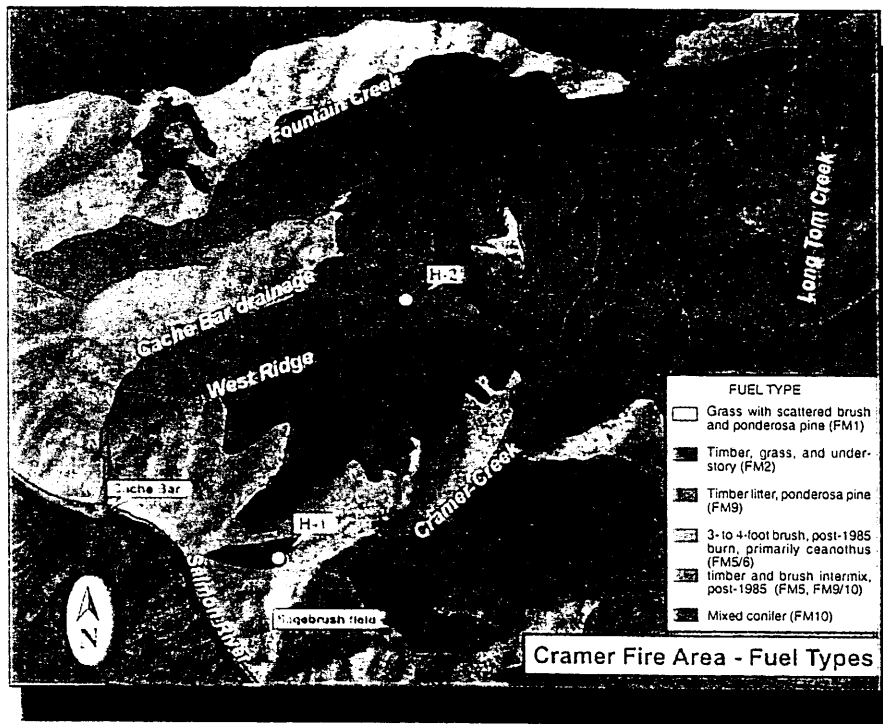


Figure 5—Fuel types in the Cramer Fire area.

merous in these brush fields, and many had fallen, contributing a significant down woody fuel component (figure 6). Where the Cramer Fire burned through the Cache Bar drainage, an examination of stem diameter at ground level of burned ceanothus brush, and comparison to green, unburned brush in Fountain Creek, indicated the average prefire ceanothus brush height to be 3 to 4 feet (figure 7).

Neither fuel model 5 or 6 alone represents the fire behavior in ceanothus on the Cramer Fire. Fuel model 5 represents the observed spread rates well from 1500 to 1520, but underestimates the flame length. Due to the presence of volatile oils in the green foliage, ceanothus brush can

burn intensely as live fuel moisture drops during the summer months, and extreme fire behavior is possible when the live fuel moisture falls below 100 percent. Fuel model 6 more accurately reflects the flame lengths observed under the weather conditions present on July 22. For the latter portion of the run through brush, from 1520 to 1525, fuel model 4 more accurately predicts the spread rates observed. However, the observed flame lengths were intermediate between what fuel models 4 and 6 predict.

In June and July 2003, forest personnel periodically measured live and dead fuel moisture levels. Sampling was not done to meet statistical standards, but

was intended to provide a general estimate of live fuel moisture levels. Live fuel moisture sampling was limited primarily to conifer species, though on July 30, they also included several prevalent brush species in the sampling to gauge the conditions present the first few days of the Cramer Fire. They noted that as of the end of July, live fuel moisture levels on the Forest were at or below levels recorded during the same time in 2000, considered to be a "benchmark fire year" on the forest.

Table 1 shows fuel moisture levels measured on July 15 and July 30, 2003, at various sites around the Cramer Fire.

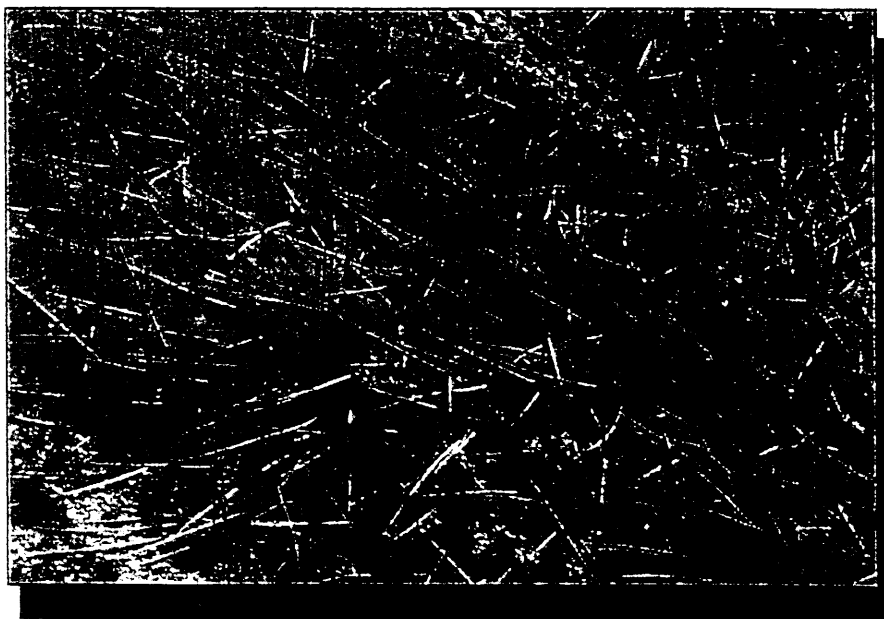


Figure 6—*Ceanothus* brush field in the Fountain Creek drainage, representative of prefire conditions in the Cache Bar drainage.

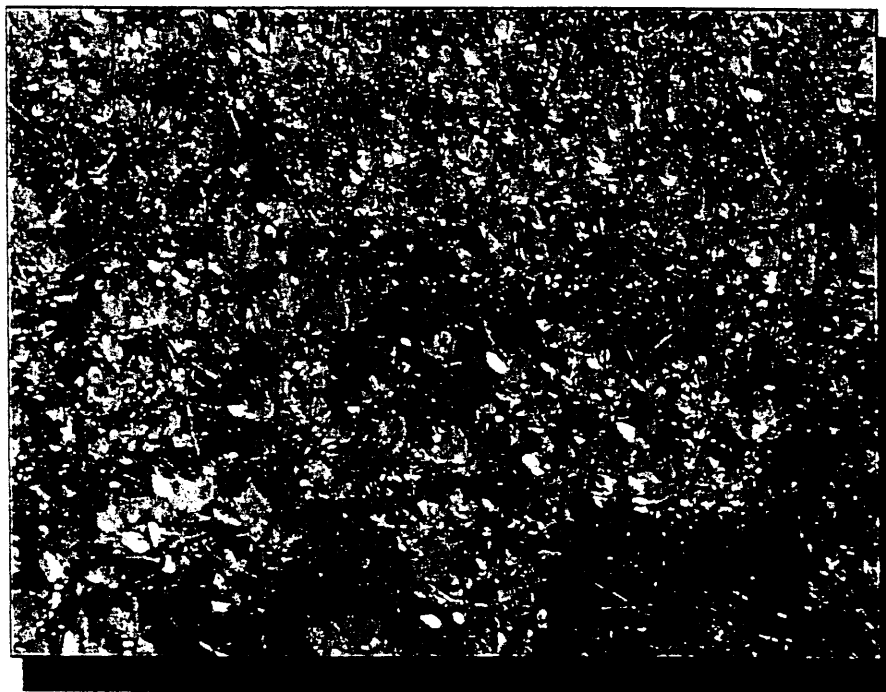


Figure 7—*Ceanothus* brush about 3 feet high.

Weather

Hot, dry conditions prevailed from the end of June through July. Daytime temperatures in the vicinity of the Cramer Fire peaked at over 100 °F at lower elevations, and into the mid 80s at Long Tom Lookout. Relative humidity (RH) from 10 to 15 percent was common at midslope locations, and night time RH recovery seldom exceeded 60 to 65 percent.

Night time inversions in the Salmon River drainage commonly produce a thermal belt effect at midslope elevations, promoting active burning conditions at night. Thermal belts were present on July 20 and 21, and resulted in active burning on the Cramer fire well into the late evening and early morning on these nights.

Remote Automated Weather Stations (RAWS) are located on seven sites on the forest and are routinely used to track weather and fire danger trends (figure 8). The Skull Gulch RAWS was in the location most representative of the Cramer Fire, but was found to have a bad temperature/humidity sensor during the initial stages of the Cramer Fire. It was also found to have a programming error that resulted in improper reporting of wind speeds. As a result, all data for the Skull Gulch RAWS was considered to be inaccurate and unusable. Of the remaining stations, Indianola (elevation 3400 feet) best represented weather conditions at the lower elevations of the Cramer Fire (H-1 and lower Cramer Creek), and Lodgepole (elevation 6100 feet) represented midelevation conditions reasonably well (H-2 and upper Cramer Creek).

Table 1—Fuel moisture levels measured around the Cramer Fire.

Vegetation species	Dates of moisture readings (percent)			
	July 9	July 21	July 26	July 30
Ponderosa pine (<i>Pinus ponderosa</i>)	—	—	—	104 to 107
Douglas-fir (<i>Pseudotsuga menziesii</i>)	—	112*	107	109
Lodgepole pine (<i>Pinus contorta</i>)	98	100 to 101	103	--
Shiny-leaf ceanothus (<i>Ceanothus velutinus</i>)	—	—	—	104
Ninebark (<i>Physocarpus malvaceus</i>)	—	—	—	85

* Thought to be high, possibly a bad sample.

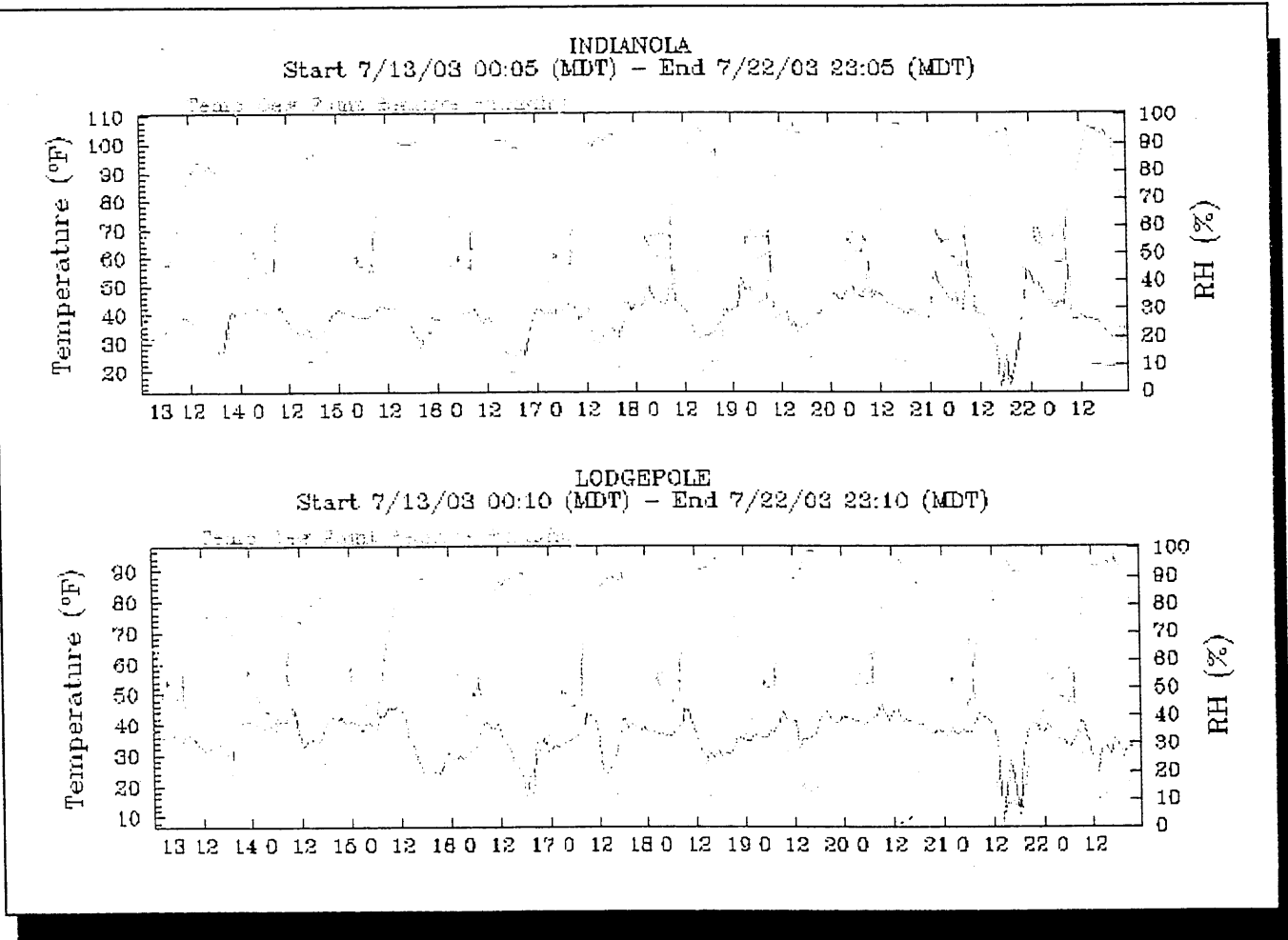


Figure 8—Temperature and relative humidity trends produced by the Indianola and Lodgepole RAWS 10 days before the fire.

Windspeeds and Direction

A large ridge of high pressure dominated central Idaho in mid to late July with a thermal trough of low pressure at the surface. Prior to July 22, 2003, the surface wind pattern was diurnal in nature with thermally induced slope and valley wind components.

Forecast models for the day of July 22, 2003 indicated that a weak "short wave," or weather disturbance, could move through the area. This would change the typical diurnal wind pattern to a more synoptic or large-scale pressure pattern with northwest-to-west winds over central Idaho. This would especially be evident in west-to-east or northwest-to-southeast-oriented valleys and drainages. This change in wind patterns was reflected in the fire weather forecast for zone 405 issued the morning of the 22nd, which forecast northwest winds 5 to 15 mph (figure 9).

Wind observations taken from the RAWS sites at Lodgepole and Indianola indicated the 20-foot, 10-minute average winds had turned west to northwest late in the afternoon. Afternoon and early evening 20-foot, 10-minute average windspeeds ranged from 2 to 11 mph at the Indianola RAWS site and from 6 to 14 mph at the Lodgepole RAWS site. This would result in one-minute-maximum peak eye-level windspeeds from 15 to 19 mph with possible gusts of 23 to 28 mph.

The afternoon upper-air sounding (figures 10a and 10b) taken at 0800 and 1800 MDT at Great Falls, MT, also indicated that surface wind directions had changed that afternoon to westerly in the lower levels, indicating a weak trough passage. Windspeeds were 5 to 15 knots (6 to 17 mph) below 12,000 feet mean sea level.

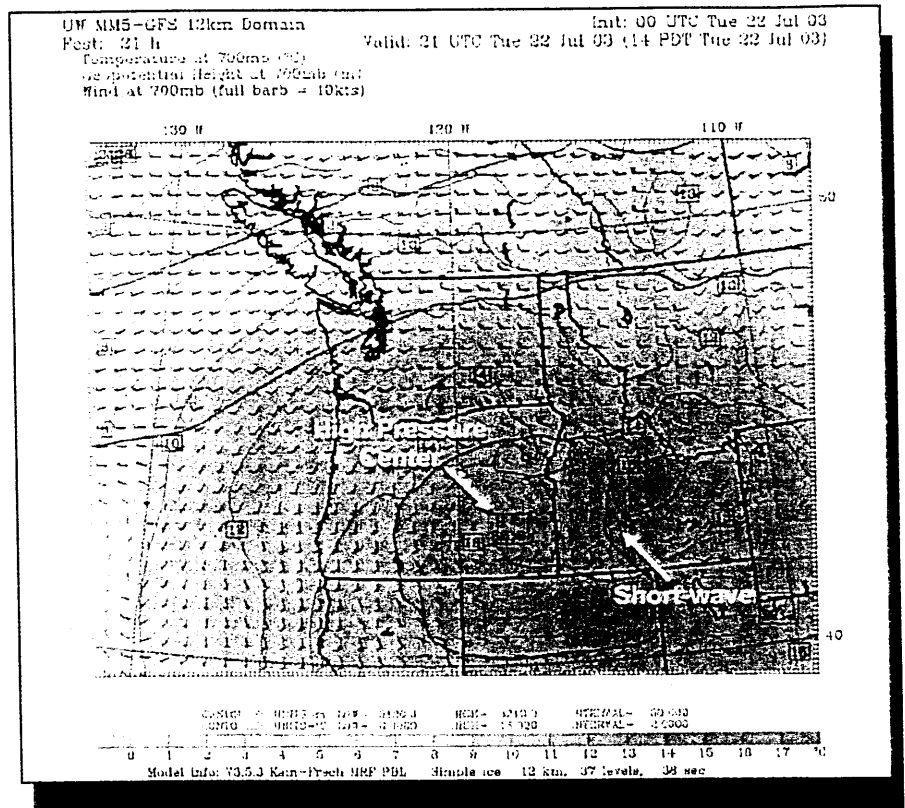


Figure 9—Shortwave disturbance and associated winds forecast for July 22, 2003.

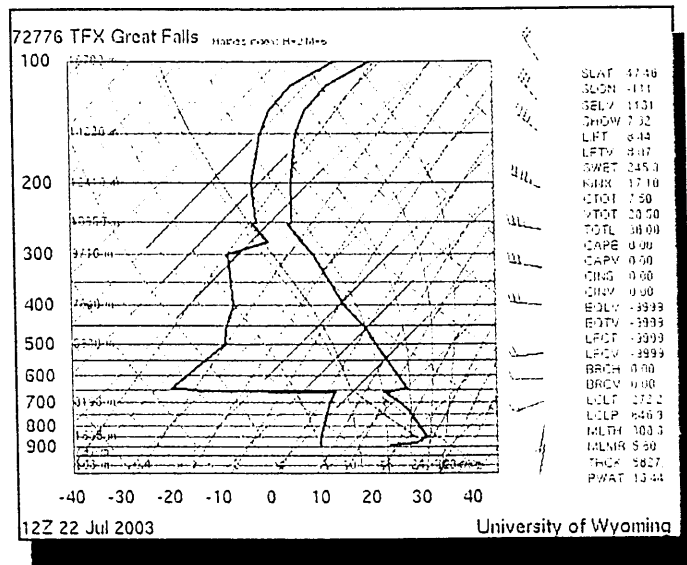


Figure 10a—Upper-air soundings (skew-t) from Great Falls, MT, at 0800 MDT.

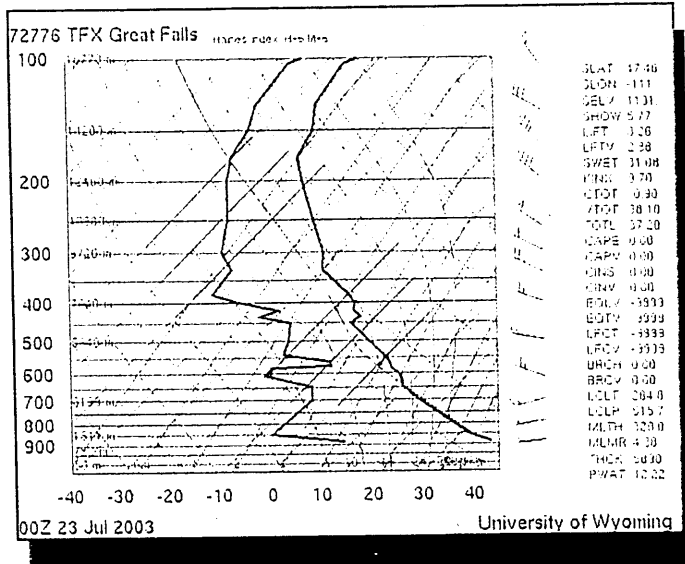


Figure 10b—Upper-air soundings (skew-t) from Great Falls, MT, at 1800 MDT, indicating a trough passage.

Seasonal Severity and NFDRS Indices

The forest uses the Energy Release Component (ERC) of the National Fire Danger Rating System (NFDRS) for initial fire sizeup, complexity analysis, and management response. It also uses the Burning Index (BI) as a standard index for predicting general fire behavior on the forest. The ERC relates to the potential available energy per unit area in the flaming front of a fire, while the BI reflects the potential fire intensity and difficulty of control. The BI is somewhat sensitive to changes in weather conditions, and the ERC much less so.

In July 2003, the overall BI level on the forest was well above the 90th percentile, and the ERC was in the 96th percentile, indicating extreme burning conditions. Both the Indianola RAWS (NFDRS fuel model C, open pine stands with grass understory) and Lodgepole RAWS (NFDRS fuel model G, dense conifer stands) indexes also indicated extreme burning conditions. ERC values for both stations were well above the 97th



44 Temperature and Relative Humidity

Temperatures for the previous 90-day period indicated surface temperatures in the area of the fire to be 3 to 6 °F warmer than normal. The week previous to the start of the Cramer Fire, Long Tom Lookout recorded an afternoon high temperature of 87 °F on Saturday, July 19th. Afternoon high temperatures for the period of July 20–22, 2003, at the Lodgepole and Indianola RAWS sites were in the mid-90s to low 100s with overnight lows in the mid-40s to low 50s at Lodgepole and in the lower 50s at Indianola.

The RAWS relative humidity (RH) data for July 20 through 22 indicated night time humidity recovery of 60 to 70 percent, although humidity values remained less than 60 percent until around sunrise on the mornings of the 20th through the 22nd. This, combined with the warm overnight temperatures in the thermal belt, contributed to a longer night-time period of active burning. The minimum afternoon RH at Indianola and Lodgepole on the

20th were 10 to 15 percent respectively, dropping to 3 and 4 percent on the 21st, and at 8 percent at both sites on the 22nd. Figures 11a, 11b, and 11c show detailed temperature and RH data.

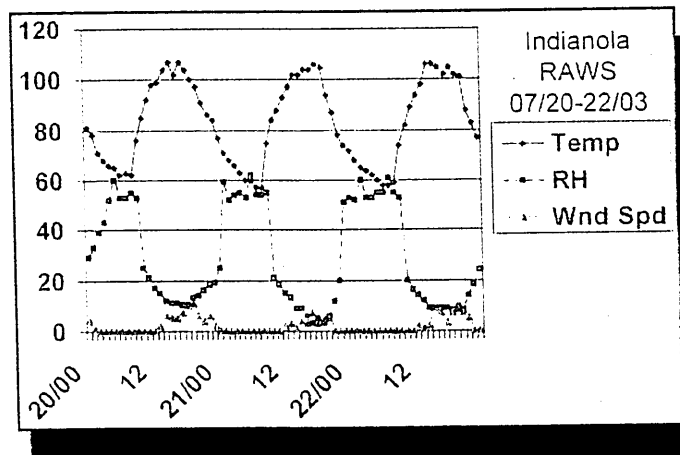


Figure 11a—Temperature and relative humidity data from the Indianola RAWS site for the first 3 days of the Cramer Fire.

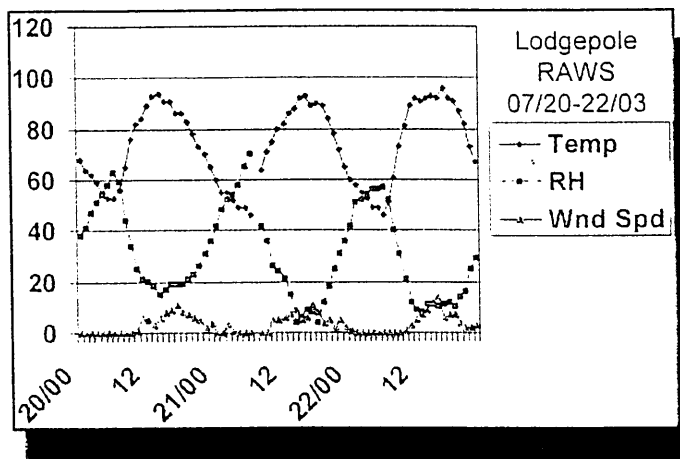


Figure 11b—Temperature and relative humidity data from the Lodgepole RAWS site for the first 3 days of the Cramer Fire.

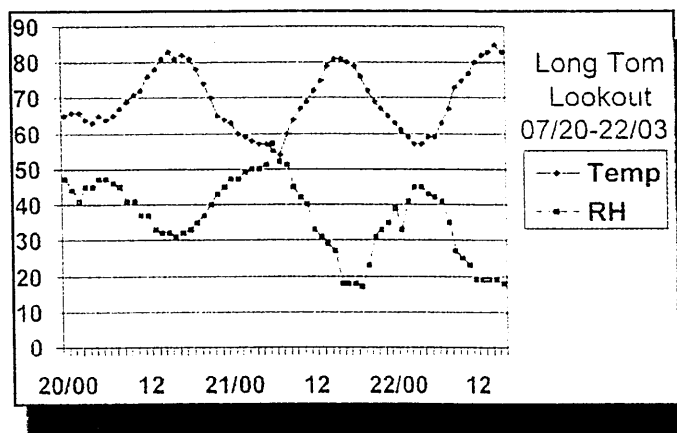


Figure 11c—Temperature and relative humidity data from the Long Tom Lookout RAWS site for the first 3 days of the Cramer Fire.

percentile, and for the previous three weeks, the Lodgepole ERC had been at or near the historical extreme. The Indianola station showed the BI to be at the 95th percentile, and for Lodgepole, the BI was well above the 97th percentile. Calculated 1,000-hour fuel moistures were 8 and 9 percent respectively, and for the previous month, had been at or near the historic extremes. Figures 12a, 12b, and 12c show graphs of NFDRS indexes from the Indianola and Lodgepole RAWS.

Topography

The Salmon River Breaks along the Salmon River are characterized as steep, dry, and rugged, with limited visibility because there are steep areas with very pronounced relief. Slope in much of the Cramer Fire area exceeds 60 percent, with more moderate slopes limited largely to the bottom of the Cramer Creek drainage (figure 13). These steep areas are 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. Additionally, night time inversions in the deep river canyon of the Salmon River often create a thermal belt effect at midslope, causing fires to remain active into the night and early morning (figure 14).

Appendix C—Fire Behavior and Weather

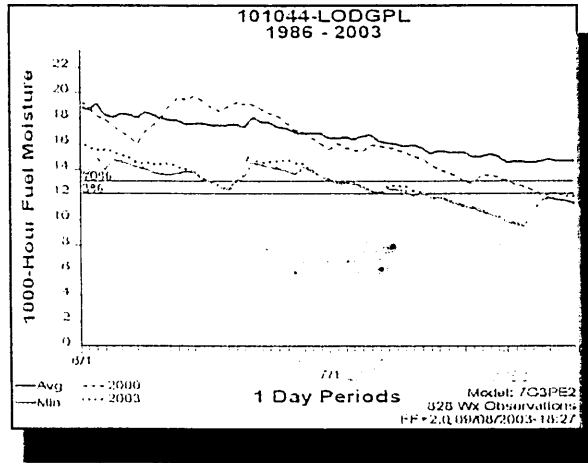
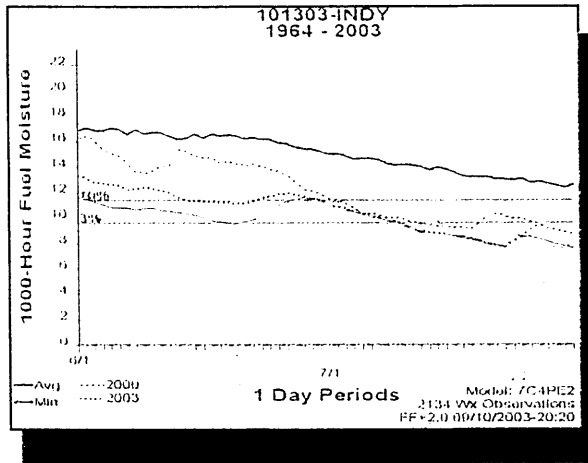


Figure 12a—Fuel moisture graphs from the Indianola and Lodgepole RAWS sites (2000 is included for comparison).

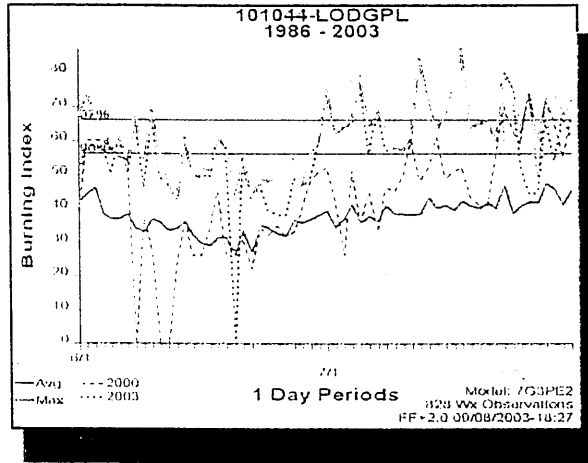
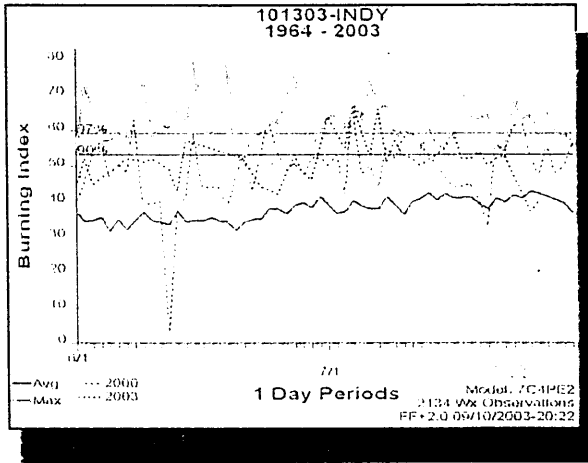


Figure 12b—BI graphs from the Indianola and Lodgepole RAWS sites (2000 is included for comparison).

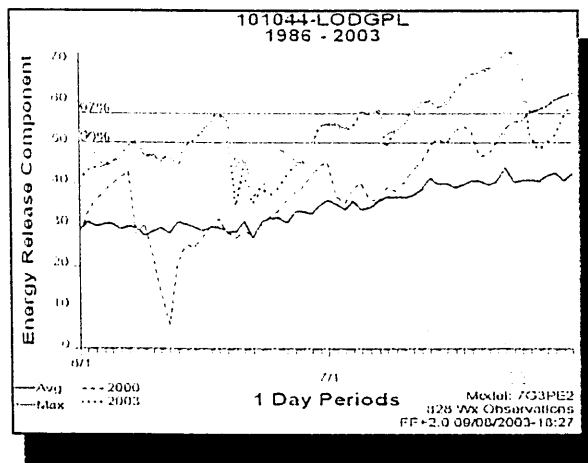
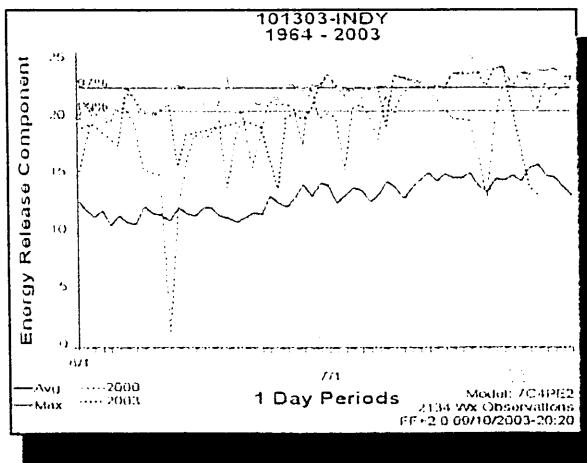


Figure 12c—ERC graphs from the Indianola and Lodgepole RAWS sites (2000 is included for comparison).

Fire Behavior, Initial Phase: July 19 (2100) through July 22 (1015)

July 19

Lightning was reported in the Cramer Creek area at about 2100. A single-tree strike ignited what was to become the Cramer Fire on a spur ridge running south of the West Ridge. The fire was not detected until the following afternoon.

July 20

The Cramer Fire was reported at 1630 by Long Tom Lookout. It was burning on the upper portion of a steep, rocky west-facing slope. A smokejumper plane (jumper 41) diverted to the Cramer Fire estimated it to be about 3 acres (figure 15) with high spread potential. The fire was burning primarily in grass and light ponderosa pine needle litter (fuel models 1 and 2). Fuels were sparse and light, and the fire was spreading by creeping, backing, and rolling burning material (rollouts). By the end of the day, it had burned up to the top of the spur ridge (figure 16) and was spreading downhill by backing and rollouts.

At 1938, the fire was 20 to 25 acres. It was burning through grass and sagebrush on the lower portion of the fire, and in open timber in the upper portion. In the timber stands, the fire was reported to be burning actively but spreading slowly. A thermal belt had set up late in the evening in the area, and conditions on the fire remained warm and dry. The fire remained active through late night and early morning. At 0130, the temperature on the fire was 73 °F with little humidity recovery. Rollouts were frequent, and included large trees which were reported rolling from the top to the bottom of the slope. The fire began to die down about 0230 with increasing RH.

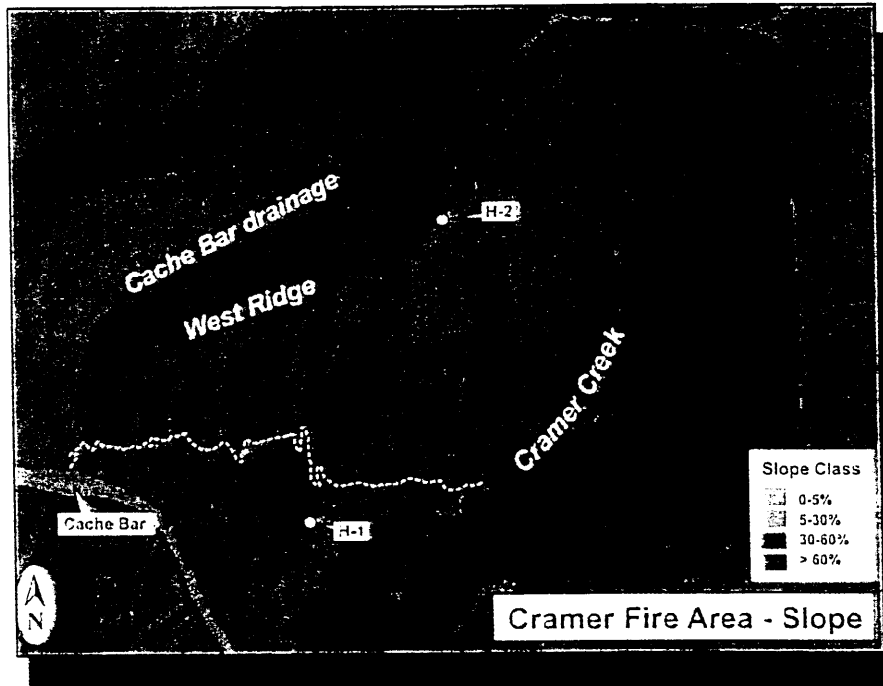


Figure 13—Slope classes (percent) in the Cramer Fire area.

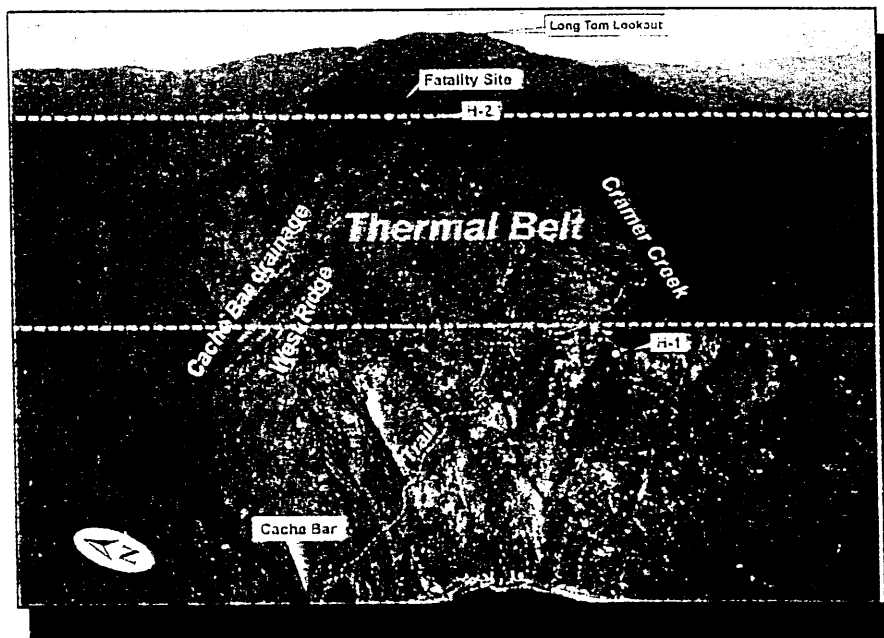


Figure 14—Schematic diagram of the general thermal-belt location in the Cramer Fire area.

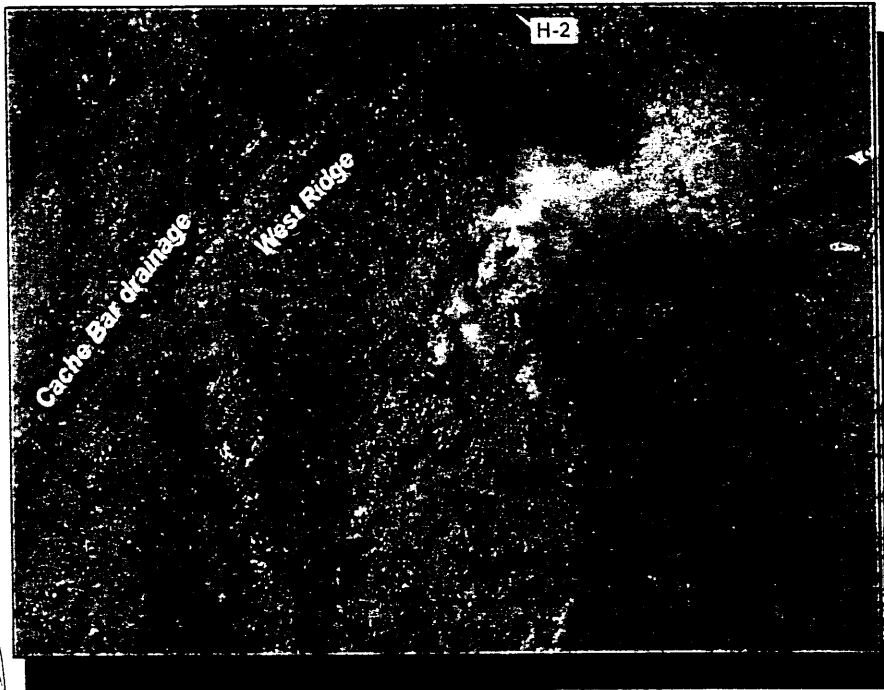


Figure 15—Cramer Fire from jumper #1 plane, July 20, 2003, at 1705.

July 21

Relative humidity recovery overnight was 63 and 66 percent at Indianola and Lodgepole RAWS, respectively. Fire activity was minimal in the morning, with only minor fire growth after 0300. At 1000, air attack estimated the fire size to be 40 acres. There was some fire activity on the northeast corner, but the western perimeter had burned into rocks and appeared cold.

A spot weather forecast was requested at 0710 and received on the fire at 0800. At 0800, fire personnel noted that winds the previous night were much stronger than they had expected, and the spot forecast for July 21 (figure 17) called for winds much lower than they were expecting.

After 0900, the RH began to drop steadily. Fire activity began to pick up by 1130, with RH values dropping into the low 20s at midelevations and into the teens at lower elevations. Most of the fire activity was on the north and east sides, and picked up through the afternoon with increasing, shifting winds. Gusts 15 to 20 mph were reported on the fire. The fire was moving to the south and west and backing east down into the main Cramer Creek drainage. By 1715, : estimated the fire to be about 60 acres. RAWS observations indicate this time was nearing the peak of the burn period. In the next 2½ hours, the fire burned actively with surface fire spread and rollouts, and isolated torching, and grew an additional 140 acres.

At 1830, the fire spread into the Cache Bar drainage. A retardant drop from the previous day, running approximately 100 yards down the West Ridge (toward the west), stopped the fire spread to the north of the West Ridge into the Cache Bar drainage. However, on July 21st, as the fire spread laterally westward below the West Ridge, it burned west of the end of the retardant drop. A small portion of the perimeter then burned over the West Ridge to the north, into the Cache Bar drainage immediately below

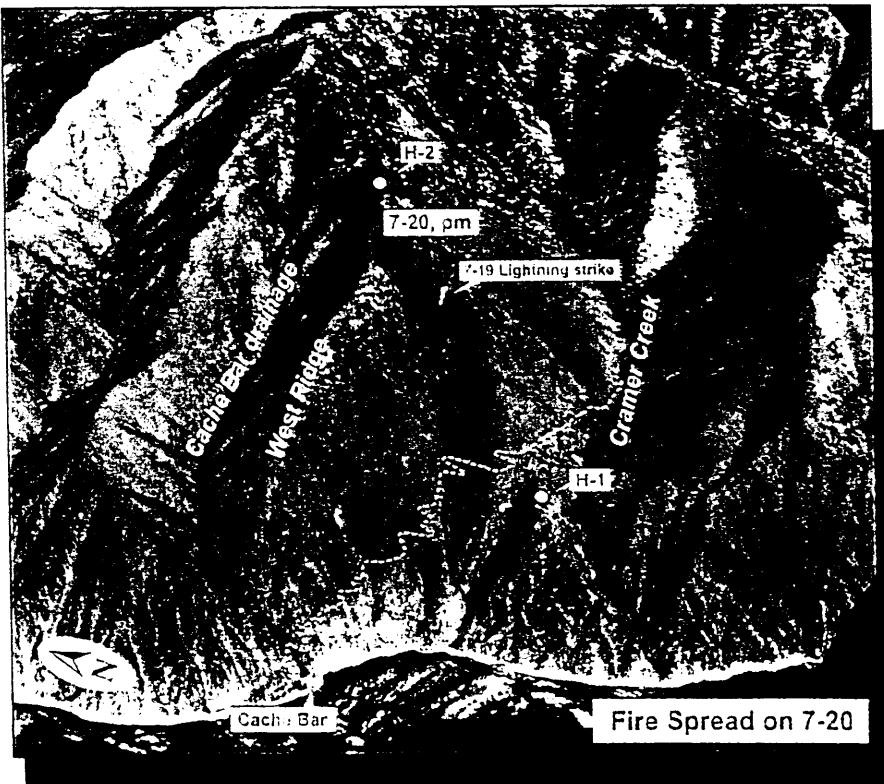


Figure 16—Cramer Fire perimeter and spread on July 20 later in the evening.

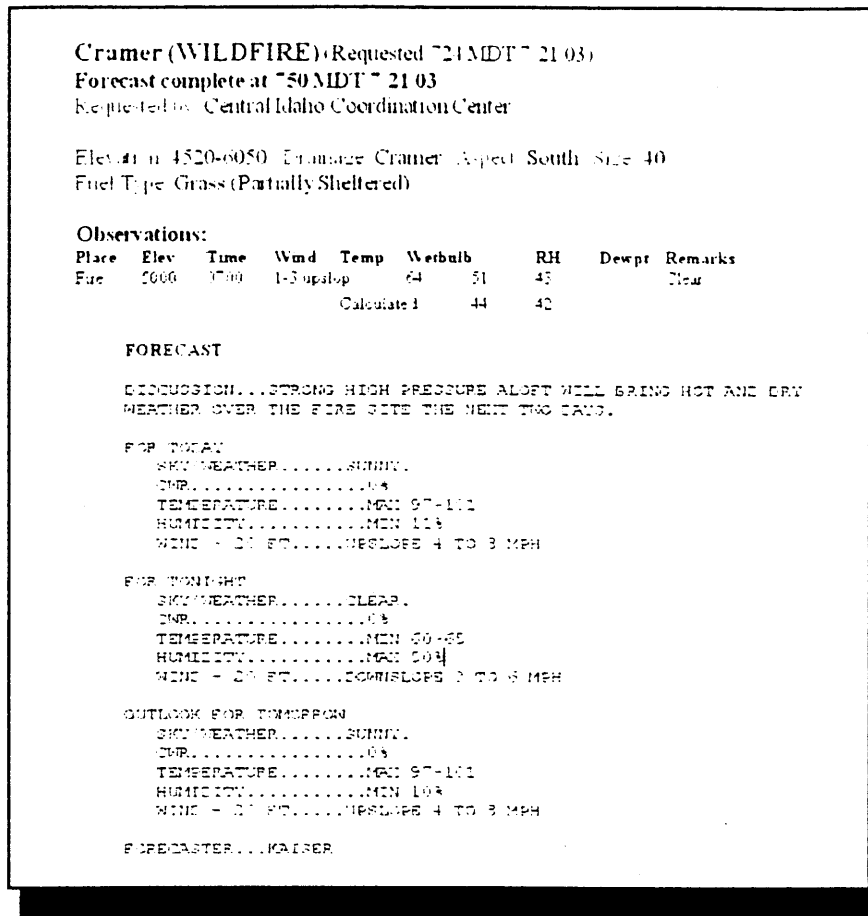


Figure 17—Spot weather forecast issued by the NWS Pocatello office for July 21.

the West Ridge. Fire activity was moderate in light fuels, and this slopover was evidenced by light smoke seen in the early evening during a recon flight over the area (figures 20 and 21).

At 1952, [redacted] estimated the fire to be 200 acres (figure 18). After 2000, the fire intensity to the east and northeast began diminishing, and the west side of the fire was reported to have appeared relatively quiet.

Through the late night and early morning, the fire was again under the influence of a midslope thermal belt. The fire continued to spread by backing (figure 19), rollouts, and short uphill runs. Fire behavior was limited to low- and moderate-intensity surface fire burning through grass and understory litter in open stands of ponderosa pine and Douglas-fir.

On July 22, the fire continued to burn actively until about 0300, when increas-

ing RH caused fire activity to slow substantially. After 0300, the valley inversion in the Salmon River drainage strengthened, and the entire fire area was under the inversion which was at 6500 feet. Fire activity after 0300 consisted of backing and creeping through grass, with scattered smokes in open timber. On the east side, fire intensity was low with flame lengths less than one foot in grass and open pine.



Figure 18—Cramer Fire late afternoon on July 21, showing typical fire activity for that day.



Figure 19—Cramer Fire early evening on July 21, showing backing and short surface fire runs.



Figure 20—Movement of the fire into the Cache Bar drainage late in the day on July 21.

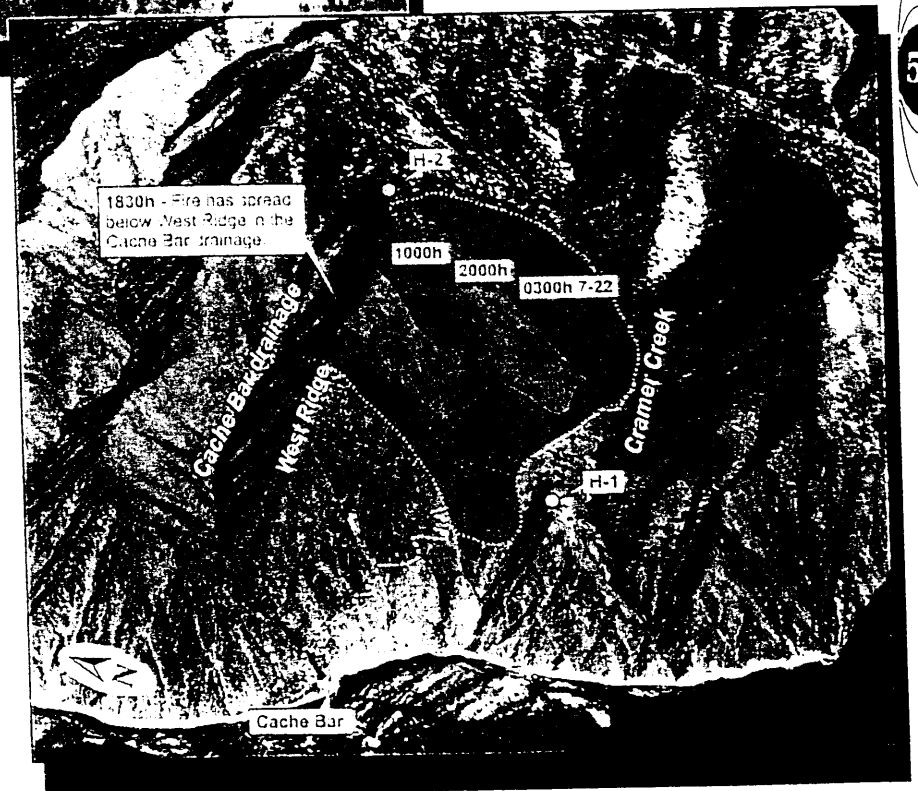


Figure 21—Cramer Fire perimeter and spread on July 21, 2003, and early morning on July 22.

Appendix C—Fire Behavior and Weather

There was some fire below H-2 to the east, but it was not very active. The inversion did not begin to break until about 1015.

No spot forecast was requested for July 22, but the fire weather forecast (zone 405) was discussed at the 0900 morning briefing. During this briefing, fire personnel were informed that conditions had been getting progressively warmer and drier the last few days. Crews on the forest often rely on persistence probability for fire behavior forecasting in the area, using the zone fire weather forecast and the previous days' weather and fire behavior to predict conditions for the current day.

Table 2 shows a comparison of zone fire weather forecast conditions forecast for the afternoon to RAWS observations.

Table 2—Zone fire weather forecast comparisons.

Source	Maximum temperature (°F)	Minimum RH (percent)	Twenty-foot winds (mph)
Forecast	86 to 95 (valley) 81 to 87 (ridges)	9 to 17	NW 5 to 15
Long Tom Lookout	81 to 85	18 to 20	N 2
Lodgepole	91 to 96	8 to 11	WNW 6 to 14
Indianola	98 to 106	8 to 12	ESE 1 to 9 (1300 to 1600)

more intense fire activity was just below H-1, with flame lengths from 4 to 6 feet, and increasing in intensity into the early afternoon. The fire started to heat up, roll out, and make short runs in the grass.

To the west, the fire had backed further into the Cache Bar drainage in 3- to 4-foot brush (shiny-leaf ceanothus, figure 22) below the West Ridge, seen as smokes and a low-intensity backing fire. As the fire backed through litter and grass

underneath the brush, the foliage was dried.

The following (table 3) shows temperatures recorded on July 22, 2003 from late morning through midafternoon. Observations shown are from the Indianola and Lodgepole RAWS stations, Long Tom Lookout, and the central Oregon regulars crew on the Cramer Fire, and are listed from higher to lower elevation at the observation site.



**52 Transition Phase:
July 22, (1015 to 1400)**

At 1021, light smokes were observed just below the West Ridge in the Cache Bar drainage where the fire had crossed the ridgeline the day before. Between 1030 and 1100, the fire was becoming active below H-1.

At 1130, the first weather observations were taken on the fire near H-1 at 4,300 feet: 84 °F, 12-percent RH, winds from the east at 3 mph with gusts to 11 to 15 mph. There were some light smokes below the West Ridge above the Cache Bar drainage where the fire had slopped over the day before, but activity there was also minimal.

Fire activity began to increase by 1330 as conditions became warmer and drier. The fire reached Cramer Creek to the east, and was active along the east and northeast flanks. Fire spread there was low intensity and backing downhill with 1- to 2-foot flame lengths. Most of the



Figure 22—Ceanothus foliage dried by a backing fire (Fountain Creek).

Table 3—Fire weather forecast comparisons at different elevations.

Time	Station/ source	Elev.	Temp. (°F)	RH (%)	Winds (mph)	Notes
1130	Long Tom	8,168	78	24		
	Lodgepole	6,100	90	12	3 to 5 E	Midpoint between 1100 and 1200 obs.
	Central OR	4,300	84	21	3 to 4 updrainage, S-SW	
	Indianola	3,400	92	16	0 to 2 SE to SW	Midpoint between 1100 and 1200 obs.
1230	Long Tom	8,168	80	19		
	Lodgepole	6,100	92	9	5 to 7	Midpoint between 1200 and 1300 obs.
	Central OR	4,300	98	18	2 to 3 updrainage, S-SE	
	Indianola	3,400	96	14	1 to 2 SE to SW	Midpoint between 1200 and 1300 obs.
1330	Long Tom	8,168	83	19		
	Lodgepole	6,100	91	10	7 to 9 W	Midpoint between 1300 and 1400 obs.
	Central OR	4,300	95	15	4 updrainage, S-SW	
	Indianola	3,400	102	12	1 to 2 S-SE	Midpoint between 1300 and 1400 obs.
1500	Long Tom	8168	84	19		
	Lodgepole	6100	93	12	12 W	
	Central OR	4300	—	—	Gusts to 20–25 reported near H-1	
	Indianola	3400	105	10	2 to 5 ENE	Missing 1500 obs; used midpoint between 1400 and 1500 obs.



Acceleration Phase, July 22 (1400 to 1500)

Between 1330 and 1400, the fire was making small runs in the grass with upcanyon winds and backing downslope into the main Cramer Creek drainage with low flame lengths. H-1 was being pressed by fire.

By 1400, the shortwave disturbance had started to move into central Idaho. This brought increased windspeeds and a strong flow from the northwest that began to overpower local diurnal winds. Fire activity began to increase dramatically

over the entire fire, as well as on other fires in the area. Winds were reported as “whipping back and forth,” and a large brown smoke column formed west of H-1. The fire burned with increasing intensity, moving east and downslope with stronger winds, overrunning H-1. To the west, fire continued to back down below the West Ridge into the Cache Bar drainage.

With hot conditions, increasing winds, and dried, preheated foliage from the backing fire, the smokes began to transition to an active fire front between 1430 and 1440. The general winds were over-

coming local diurnal winds in the canyon. Although the ridgeline between Fountain Creek and the Cache Bar drainage sheltered the bottom of the drainage from the northwesterly winds initially, the shift to a more westerly flow aligned with the east-west orientation of the Cache Bar drainage, and overall updrainage windspeeds began to increase. The fire in the Cache Bar drainage was building simultaneously to the fire buildup in Cramer Creek. See figure 23 for estimated perimeter growth and figure 24 for estimated backing spread into the Cache Bar drainage.

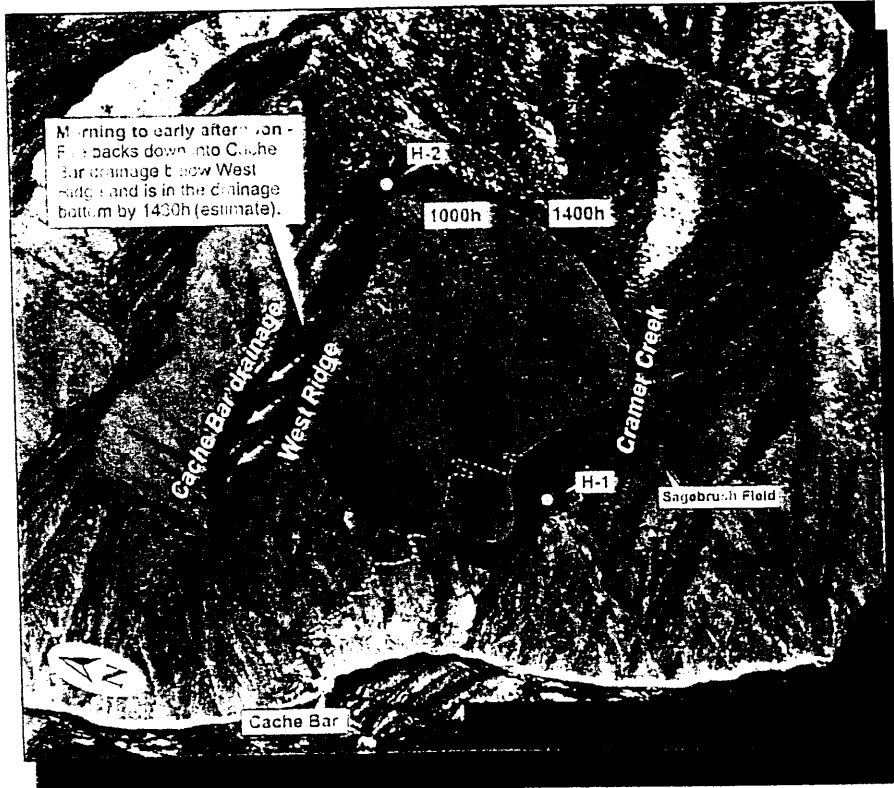
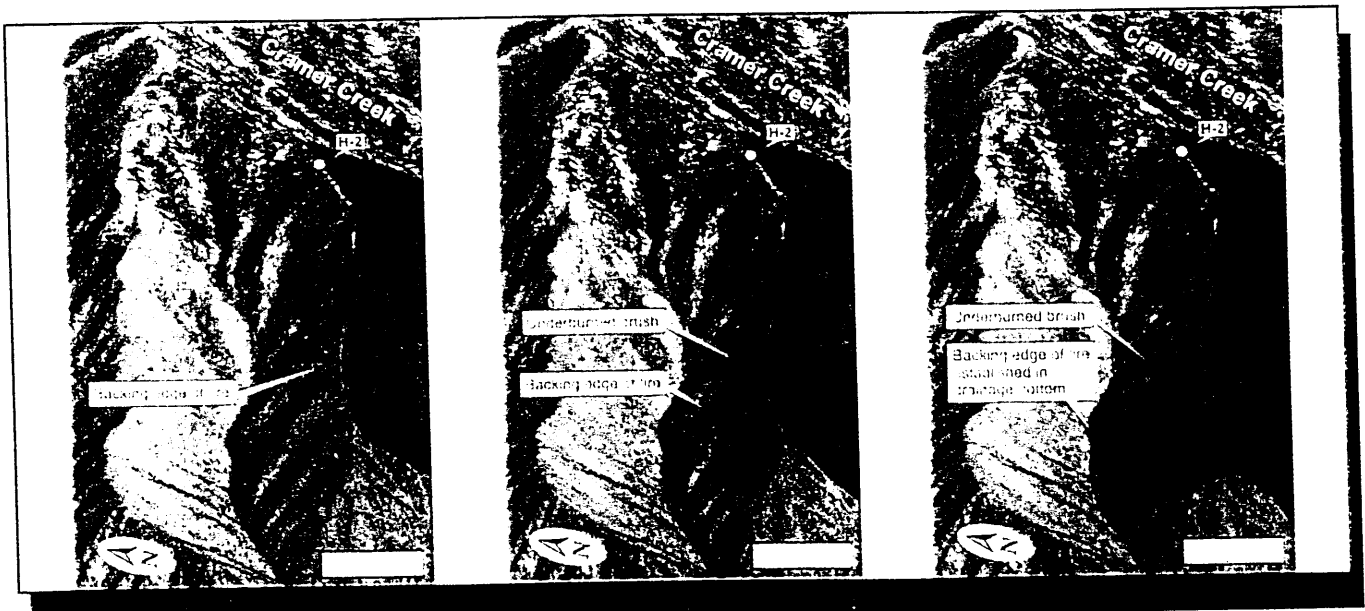


Figure 23—Cramer Fire perimeter and spread on July 22, 2003, by 1430 (estimate).



0830-0850: Smokes seen below West Ridge.

1300: Smokes and backing fire seen down to midslope below West Ridge.

1430: Fire estimated to have backed down to lower portion of drainage.

Figure 24—Fire spread estimates from backing and rollouts into the Cache Bar drainage.

Entrapment Phase, July 22 (1500 to 1524)

By 1500, the short wave disturbance had moved over the fire area. It brought strong winds from the northwest, shifting to westerly, that overpowered local diurnal winds. Driven by these strong winds, the fire began to make rapid, intense runs simultaneously in Cramer Creek and the Cache Bar drainages. At H-1, gusts up to 30 mph were reported, and crews in that area moved into the black as a safety zone. In Cramer Creek, the fire intensity was rapidly building on the northwest perimeter, and transitioned from a surface fire to a crown fire as windspeeds increased and the fire encountered more continuous crown fuels. A large, brown column formed in the Cramer Creek drainage, pushing vertically to 12,000 feet and moving eastward toward the town of Salmon, ID.

An active, moving fire front had become established in the bottom of the Cache Bar drainage (figure 25). Pushed by strong winds, the fire front began to move upcanyon toward H-2. As the wind shifted to a more westerly flow, winds aloft began to align with the Cache Bar drainage. The fire moved rapidly upcanyon (figure 26), with spread rates and intensities much greater than witnesses had expected. Preliminary modeling indicated that during the early part of the run in the drainage bottom, the fire was moving through the ceanothus brush at a rate of 80 to 90 feet per minute with flame lengths up to 9 to 12 feet.

As the fire advanced up the Cache Bar drainage, it began to burn up the slope below the West Ridge through green and underburned brush and downed woody fuels (figure 27). The entire upper portion of the Cache Bar drainage erupted into flames which ran uphill. Flame lengths averaged 20 feet in brush and 50 feet at the leading edge. The fire was not one solid front, but simultaneous movement of smaller fronts that followed stringers



Figure 25—Between 1430 and 1440, smokes in the bottom of the Cache Bar drainage turn into a flaming front.



Figure 26—At 1500, a fire front begins to move upcanyon and up to the base of the slope below the West Ridge.



Figure 27—Between 1513 and 1520, the fire front intensifies and continues to move up-slope below the West Ridge.

of more continuous fuels. When the fire encountered rocky areas on the slope, the fire front did not stop—flames swept over them as if the rocks were burning as well. Postfire modeling indicates the spread rate was 130 to 150 feet per minute (fuel model 6), consistent with witness descriptions of the event (figure 28). Actual flame lengths witnessed and evidenced by tree/snag bole scorch height exceeded that predicted for fuel model 6. This may have been partly due to the brush being dried and preheated by the backing fire earlier in the day.

At 1520, the fire reached the upper portion of the Cache Bar drainage that was more exposed to the prevailing winds. An elevation profile of this area shows the exposure of the slope below H-2 to prevailing northwest winds (figures 29 and 30). Winds at H-2 were estimated at 20 to 25 knots. The entire upper portion of the drainage appeared to erupt simul-



Figure 28—At 1520, the fire front, based on a model projection, reached the base of the ravine below H-2.

taneously into flames, moving rapidly upslope and updrainage as a “big flash front.”

The air attack pilot noted that as the fire in the Cache Bar drainage increased in intensity after 1500, strong indrafts were produced, indicating extreme burning conditions. At the leading edge of the fire, updrafts caused the plane to gain 1,000 feet, and at the trailing edge of the fire, downdrafts would cause the plane to drop 1,000 feet when the plane passed through those areas.

As the fire increased in intensity and speed and burned up the brush-covered slope in the Cache Bar drainage, it laid closely against the slope. The smoke movement also remained close to the slope rather than forming a more vertical column, rolling over the West Ridge and eventually joining the main column in Cramer Creek. When the fire front moved

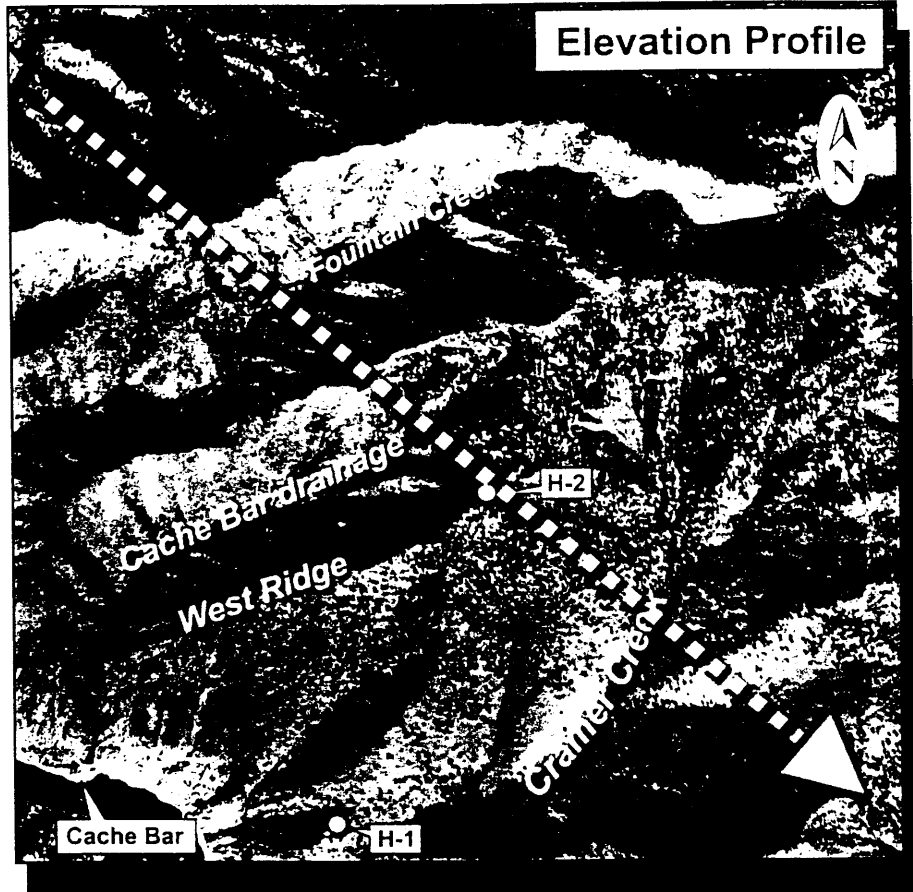


Figure 29—Location of elevation profile line in figure 30.

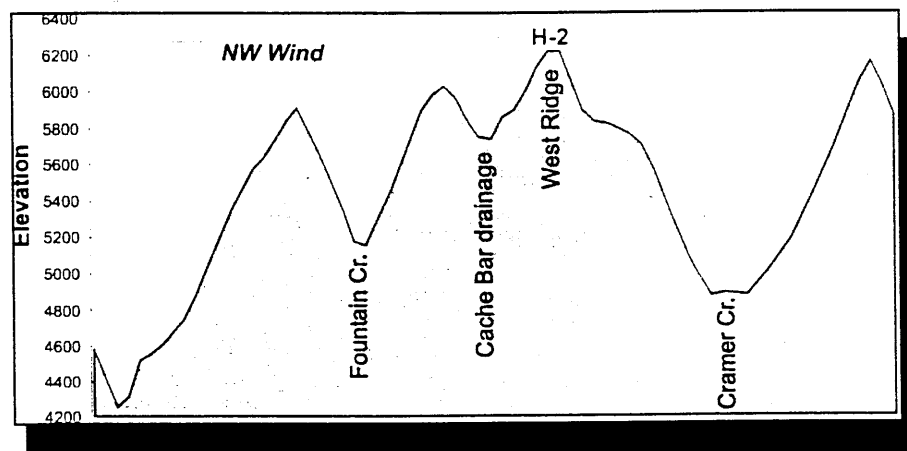


Figure 30—Elevation profile along a line from northwest to southeast, running through H-2.

into stands of trees in the upper part of the drainage, it did not immediately consume the canopies. Crowns at the lower end of these stands were dried, but not scorched. Bole and crown consumption indicate the flaming front remained close to the ground, gradually moving higher into the crowns as it progressed up the slope. The fire did not begin to fully involve the canopy until about halfway into the stands (figures 31, 32, and 33).

The descriptions and postfire signs of fire spread in the Cache Bar drainage indicate the possibility of a phenomenon Richard Rothermel described as "flame attachment" to a slope. This occurs when fire is burning on a steep slope and the convection from the fire cannot move away from the slope. The result is that convective heat and the main part of the flaming front stay closer to the surface, preheating the fuels and increasing the intensity of the flaming front as it passes through an area (figure 34). Figures 35 through 38 show crown drying, directional needle and branch freeze in conifers, and crown consumption patterns that indicate flame attachment on the slope below H-2.

When the fire front reached H-2, postfire site conditions indicate that surface temperatures were from 1,300 °F to potentially over 2,000 °F in the crowns. Flame lengths were reported to be 50 to 100 feet as the fire moved to the top of the stand of trees below H-2 (figure 39). Reports of spread rates in the upper part of the Cache Bar drainage vary, but are consistent with the preliminary modeled spread rate of 400 to 600 feet per minute (4.5 to 6.0 miles per hour) during the final run from the base of the slope below H-2 to H-2.

After reaching H-2, the fire continued to spread beyond the upper end of the Cache Bar drainage to the east, burning into part of Fountain Creek. By 1730, all of Cramer Creek had been burned and the fire had moved eastward into Long Tom Creek. Figure 40 shows the estimated fire perimeter at 1730 on July 22, 2003.

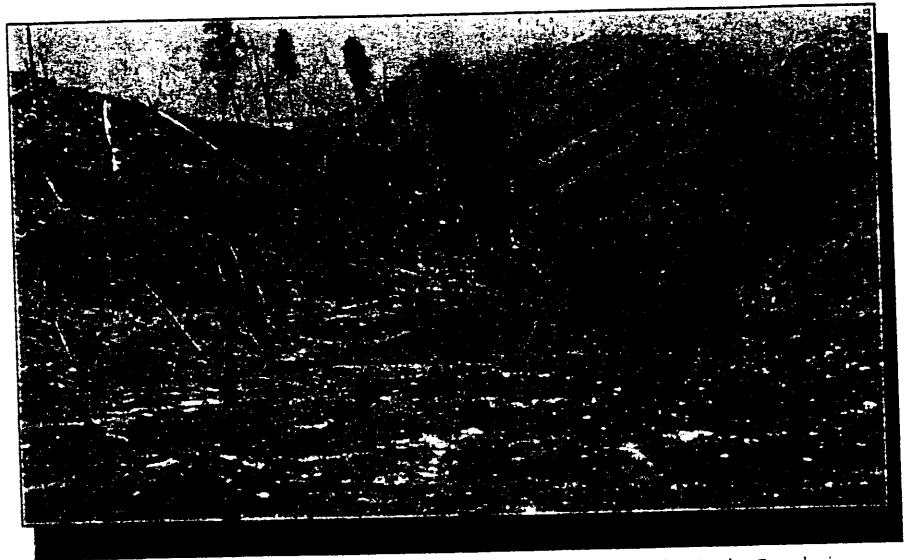


Figure 31—View of the ravine at the base of the slope below H-2 in the Cache Bar drainage, from below the stand of trees under H-2.



Figure 32—At 1523, the fire front, based on a model projection, reached the base of the stand of trees below H-2.



Figure 33—At 1525, the fire front, based on a model projection, reached H-2.

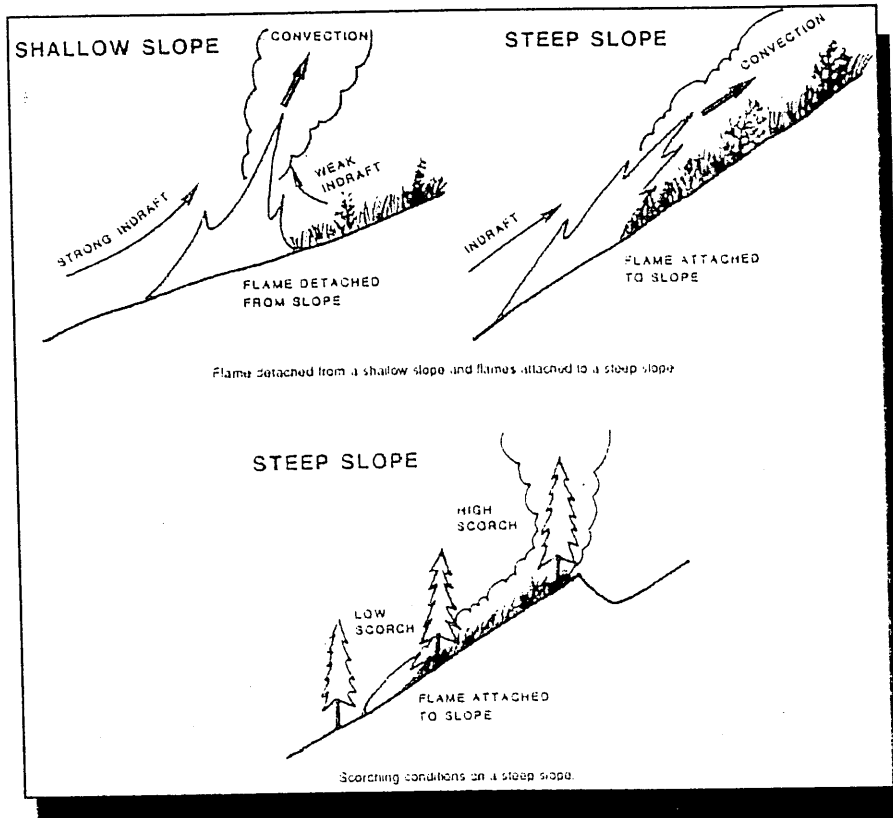


Figure 34—Description of the “flame attachment” phenomenon. —From Richard Rothermel, 1989 BEHAVE fire prediction and fuel-modeling system, BURN subsystem part 2.

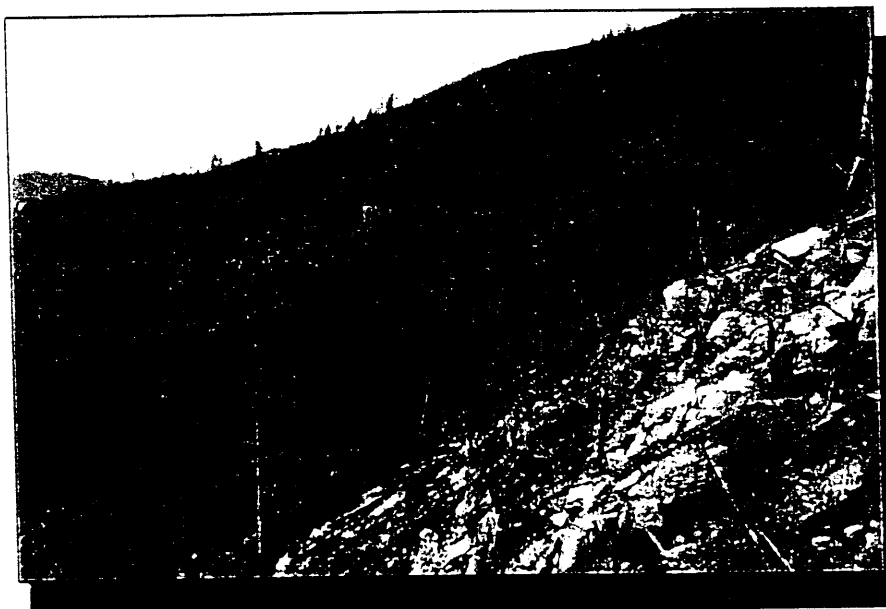


Figure 35—Crown scorch and consumption in the stand of trees below H-2 (foreground), indicating flame attachment as described in figure 34.

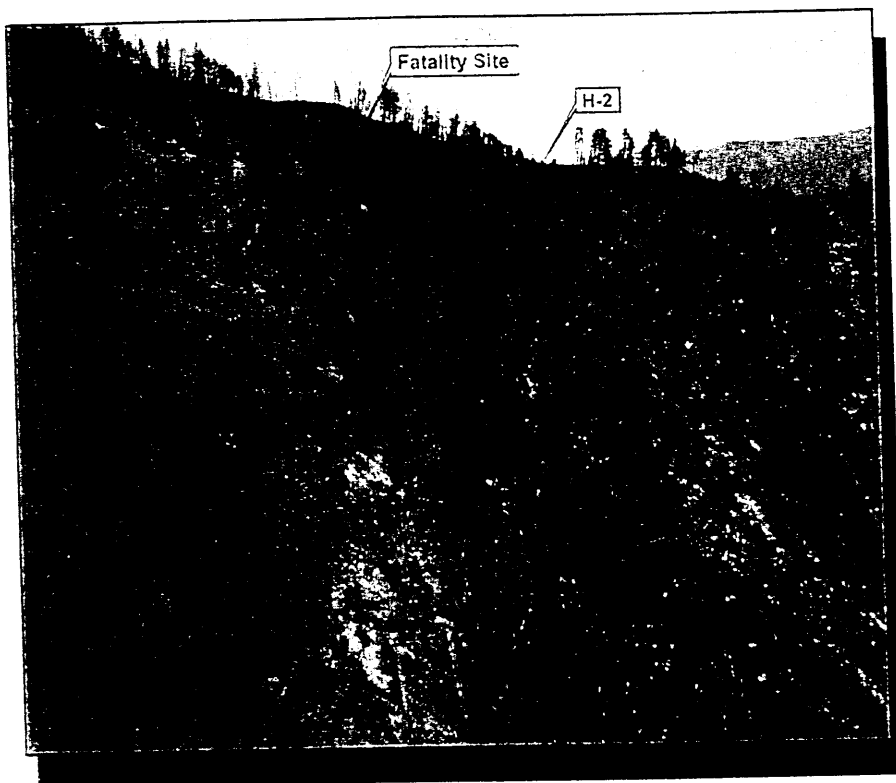


Figure 36—Crown consumption and directional needle freeze in the stand of trees below H-2.



Figure 37—Upslope needle freeze at the base of the stand of trees below H-2. Crowns were dried but not consumed by the fire in the lower portion of the stand.

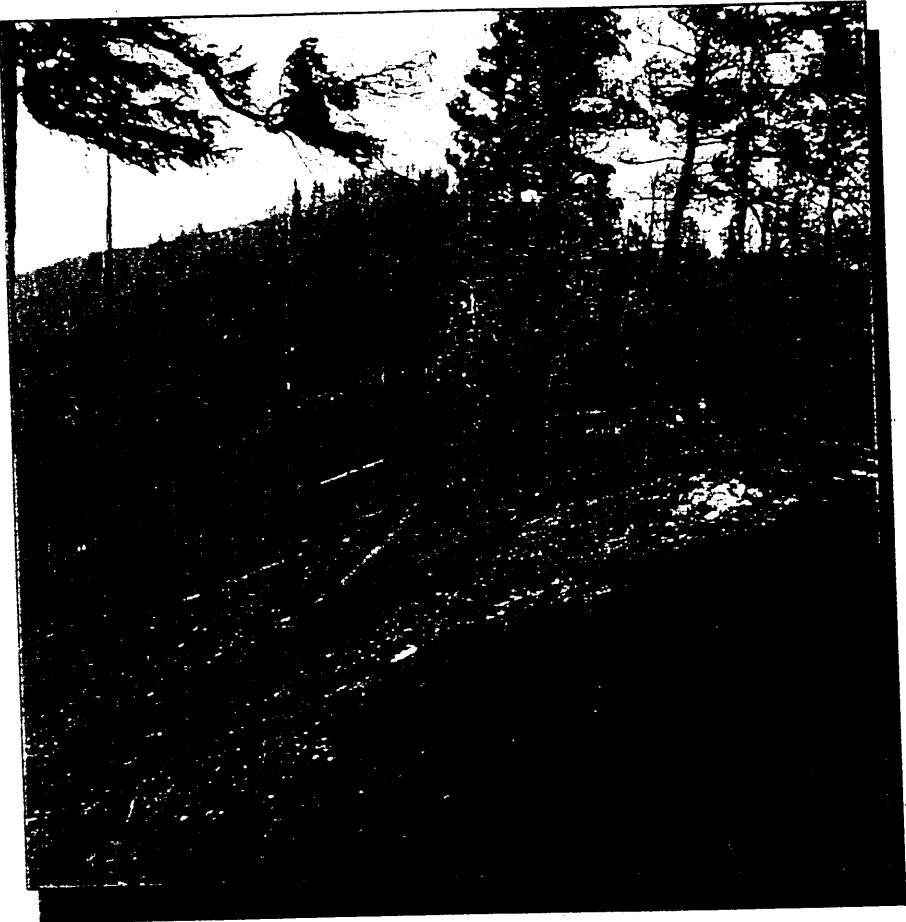


Figure 38—Upslope needle freeze on the ridgeline immediately west of H-2.

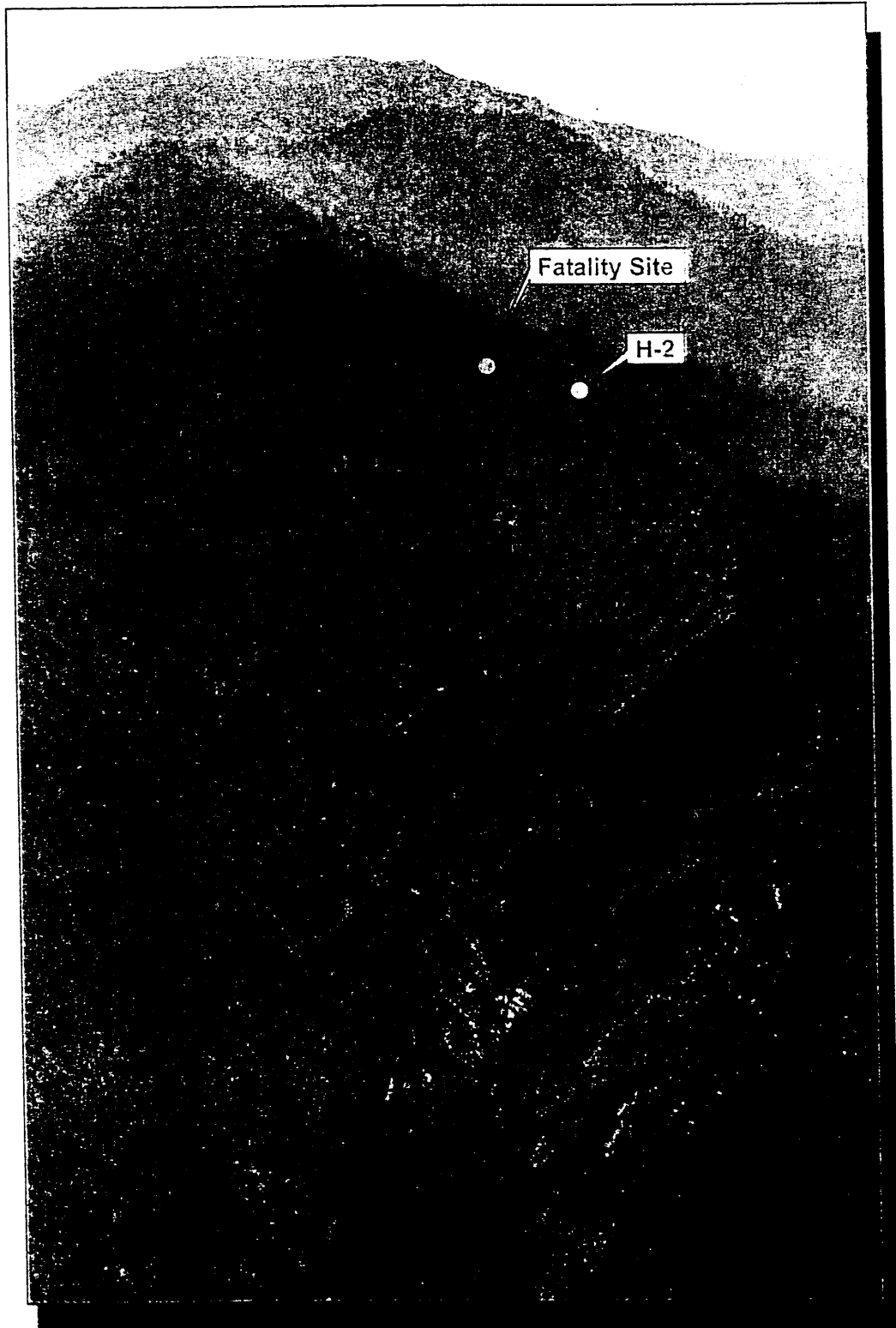


Figure 39—The upper Cache Bar drainage after the fire front passed.

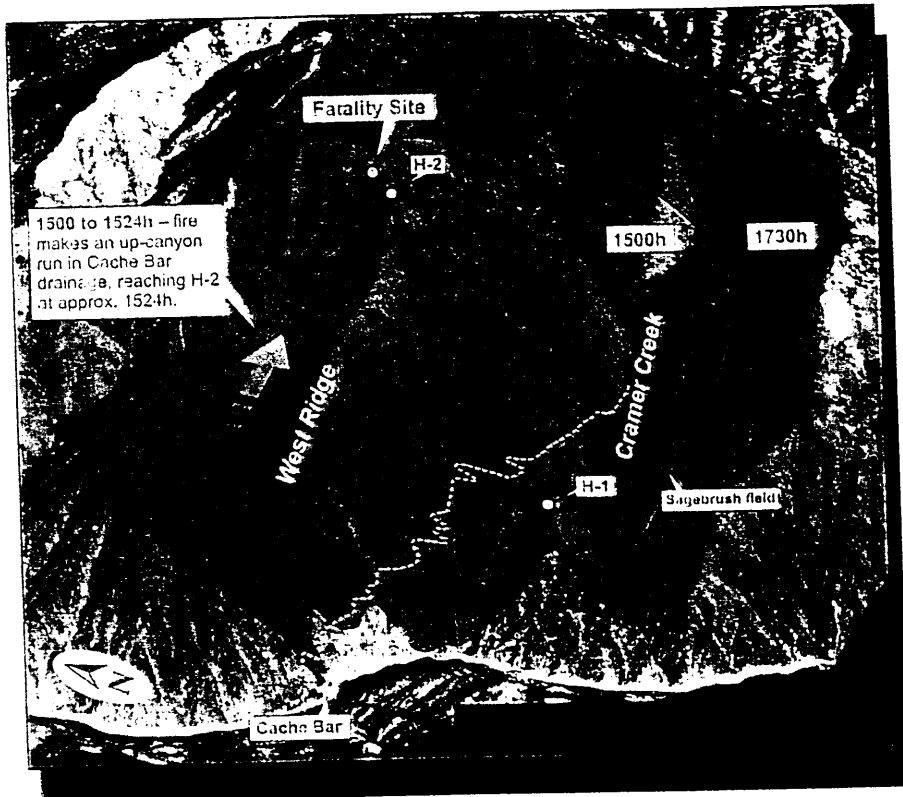


Figure 40—Cramer Fire perimeter and spread on July 22, 2003, from 1500 to 1730 (estimate).

Appendix D—Equipment Found at H-2 and the Fatalities Site

Equipment used by Jeff Allen and Shane Heath for rappelling from H-193 to the ground and for construction of the helispot was found at H-2. The equipment had been readied for transport. One of the saws had been wrapped with chain saw chaps, the hand tools had been wrapped in fiberglass tape, and all of the equipment was stacked in a single pile. Though severely damaged by fire, the stack appears to have contained helicopter rappel equipment, a radio, three hand tools, and two chain saws with associated maintenance tools. Only steel, glass, brass, and some aluminum were still intact. The rest of the material was either consumed or melted by the fire. Some pieces of cast aluminum melted, indicating material temperatures of at least 1,000 °F (photos 1 and 2).

The remains of two fire shelters, personal items such as watches, cameras, keys, and belt buckles, and work-related items, including a radio, carabiners, and batteries were found at the fatalities site. Only steel, glass, and brass items were intact. The glass watch face was distorted as if it had softened. Glass begins to soften when it reaches about 1,100 °F. Two flight helmets on the site were charred, easily compressed, and brittle (photo 3).

The fire shelters were the older style (NSN# 4240-01-121-8698, NFES# 0169), which meet agency requirements (photo 4). The shelters were separate from other materials, which indicates they had been removed from their packs. One of the shelters was accordion folded in the same shape in which it was packaged, indicating that it had not been unfolded prior to the burnover. The exposed top layers of the folded shelter had no remaining foil and the fiberglass layer was white and



Photo 1—H-2, chain saws, and rappel equipment.



Photo 2—H-2, chain saws, rappel equipment, and melted aluminum.

very fragile. Where foil was present on the more protected layers, it was completely delaminated from the fiberglass cloth. Aluminum used in the shelters melts at about 1,200 °F. The fiberglass used in the shelters softens between 1,350 and 1,611 °F. The condition of the exposed fiberglass indicates that material temperatures were within this range.

The second fire shelter was unfolded lengthwise but almost completely folded width-wise. This indicates that the shelter was removed from its plastic bag and partially unfolded prior to the burnover. The foil had melted from 10 of the 12 layers of the shelter and was present on the two layers that lay closest to the ground. Foil that remained had completely delaminated from the fiberglass layer. The fiberglass cloth was white and extremely brittle, indicating that it had reached a softening temperature between 1,350 and 1,611 °F.

Crown fires studied with instruments by MTDC have reached temperatures over 2,000 °F. Temperatures from approximately 1,300 °F have damaged fire shelters, melting aluminum, and fracturing and disintegrating fiberglass cloth. Conditions inside fire shelters tested in these conditions were not survivable. The condition of the partially unfolded fire shelter found at the fatalities site resembled fire shelters tested under these severe conditions. This indicates that the shelter was subjected to temperatures from 1,300 °F to potentially over 2,000 °F.



Photo 3—Fatalities site, fire shelters, and flight helmets.



Photo 4—Fatalities site where fire shelters were not deployed.

Appendix E—Fire Policy, Directives, and Guides

FSM 5100—Fire Management

5130—Wildland Fire Suppression

3. A Wildland Fire Situation Analysis (WFSA) shall be used to document suppression strategy decisions for an incident that is expected to exceed, or has exceeded, the action planned for in the fire management plan (FSM 5131.1)...Consider fire behavior, the availability of suppression resources, the values of natural resources and property at risk, direction in the Forest land and resource management plan, and the potential cost of suppression.

5131—Suppression of Wildfires

5131.03—Policy

4. Request the appropriate level of Incident Management Team based upon the complexity findings of the WFSA (FSM 5131.1). The responsible line officer shall ensure that the designated Incident Commander is briefed regarding wildfire suppression objectives, considerations, and constraints.

5131.11—Preparation Requirements

A WFSA must be completed when:

1. Wildfire escapes initial action or is expected to exceed initial action.

5133—Organization and Management of Wildfire Suppression Operations

5133.1—Wildland Fire Management Organization

Assign the appropriate level of incident management team based on a complexity analysis done within the WFSA.

5135—Fire Suppression Safety

All activities shall reflect a commitment to firefighter and public safety as the first priority.

5135.4—Safety Guidance

The Fire Orders, Lookouts/Communications/Escapes Routes and Safety Zones

(LCES), and Watch Out Situations contain important basic guidance for safe fire management activities. The FSH 5109.32a, Fireline Handbook, and FSH 6709.11, Health and Safety Code Handbook, list the Fire Orders and Watch Out Situations. During fire assignments, all employees shall be alert continuously for Watch Out Situations. Wildfire suppression actions must comply with the Fire Orders and incorporate appropriate mitigation measures based on the Watch Out Situations and LCES.

FSH-6709.11—Health and Safety Code Handbook

25—Protection and Development

25.13—Wildland Firefighting

25.13a—Safety Practices

Conduct risk assessments on an ongoing basis and take measures to mitigate risks to prevent accidents. Basic safety and health practices for wildland firefighting are:

1. The 10 Standard Fire Orders.

2. The Watch Out Situations.

7. Fire Situation Assessment.

a. Conduct continual situation assessment and followup, which is essential.

c. Ensure that firefighter safety is not compromised. Do not deviate from established safety practices.

d. Post qualified lookouts with adequate communication for crews and in position to see danger points.

Interagency Standards for Fire and Fire Aviation Operations 2003

Chapter 10—Incident Management

Introduction—The Incident Complexity Analysis and the WFSA assist the manager in determining the appropriate management structure to provide for safe and efficient fire suppression operations.

Incident Response Pocket Guide

There are eighteen decision points on the Extended Attack Transition Analysis dealing with fuels, weather, communications and resources. If you check yes on three or more items out of the 18 to consider ordering an incident management team. A quick run through of the analysis, brings up four yes answers.

Thirtymile Hazard Abatement Monitoring Plan

Implementation action—Prepare a complexity analysis on every plan at time of initial attack as part of the size up. Documentation Required.

Responsibility—Line officers, fire management officers, incident commanders.

Implementation action—Monitor the effectiveness of the planned strategy and tactics and to:

a. Immediately delay, modify, or abandon firefighting action on any part of a wildland fire where strategies and tactics cannot be safely implemented.

b. Execute suppression actions when and where they are safe and effective.

c. Ensure that all firefighting actions are in full compliance with the Ten Standard Fire Orders and that the mitigation of the applicable Watch Out Situations has been accomplished.

d. Maintain command and control of all fireline resources.

Responsibility—Incident commander.

Salmon-Challis National Forest Fire Management Plan

Section II—Relationship to Land Management Planning and Fire Policy

B. Management Policies Concerning Fire.

1. Firefighter and public safety is the first priority in every fire management activity.

2. Sound risk management is a foundation for all fire risk management activities.

The Salmon-Challis National Forest is well versed in the many policies following the Thirtymile Fire. These policies, aimed at improving firefighter safety and directing the implementation of actions in the Thirtymile Accident Prevention Plan of December 14, 2001 and the Thirtymile Hazard Abatement Plan of March 26, 2002, have been incorporated into the development of this Fire Management Plan. These plans and the recent Interim Directives (5100-2003-1, 5120-2003-2, and 5130-2003-3) for 2003 have been included in appendix p. Also included in the same appendix are the Monitoring

Plan and Incident Checklist for use in implementing the abatement actions of the Thirtymile Hazard Abatement Plan. These documents have been distributed to the districts for use in safety sessions, and to develop procedure for incident management.

Section III—Wildland Fire Management Strategies

B. Wildland Fire Management Goals. Achieve a program where firefighter and public safety is the highest priority in every fire management activity.

C. Wildland Fire Management Options.

1. Wildland Fire Suppression

All wildfire starts are sized up to determine fire cause, potential for spread and potential to cross jurisdictional boundaries.

An appropriate management response is implemented on all fires unless the fire is determined to be a wildland fire use incident.

All wildfires that escape initial attack will have a Wildland Fire Situation Analysis (WFSA) completed in a timely manner. The WFSA will serve as the decision record for the selection of the appropriate management response.

D. Description of Wildland Fire Management Strategies by Fire Management Unit

Control problems and dominant topographic features

Suppression Non-WUI FMU

The topography in steep areas has a significant effect on fire behavior, fuels and weather. Steep slopes predispose areas to rapid uphill fire growth as well as contribute to a major problem with rolling firebrands. Fire line construction at midslope is very dangerous and on these

slopes underslung fire lines are hard to secure and even more difficult to hold. Topography across the area has a very marked effect on fuels because of the differences in moisture and surface heating across the landscape; fuel type varies as a result of the differences in elevation, available moisture and differences in aspect. In addition to the direct physical affects that can be seen on fuels and fire behavior, topography also influences local weather conditions, specifically winds. Differential heating across the landscape results in the development of local upslope/upvalley breezes and these are very common often very pronounced during the summer months. Canyon topography in the area also tends to channel winds and often results in local wind conditions far different from those predicted in general area fire weather forecasts. Night time thermal zones are also common within the unit especially in deeper canyons. These thermal zones, which contribute to active fire behavior at night, are particularly common on fires burning in the lower Salmon River Canyon.

Topography also has a very significant effect on spotting. Firebrands lofted from elevated positions on slopes or ridges can travel very significant distances and can contribute to long range spotting during severe weather conditions. Rolling material is also common in these steep areas and can result in significant fire growth, in holding problems and jeopardize fire fighter safety.

Firefighter safety is a significant concern in this Unit as a result of the influences topography has on the way fires burn. Managers should consider safety as it relates to this topography when sizing up fires for suppression actions. Midslope fires are of particular concern and should be carefully evaluated to assure that firefighters safety is not compromised by fire below fire suppression personnel. Caution should also be taken with down hill line construction with close

attention given to the required safety measures prescribed in the downhill guides.

Values to be protected in this Fire Management Unit include structures, infrastructure, improvements, T and E species, wildlife habitat, commercial timber, range values, recreation areas, cultural resources and public safety. The objective for fire management within the Unit emphasizes suppression. Wildland fire use is not authorized and will not be used as a fire management strategy. Fires will receive aggressive initial attack, a Wildland Fire Situation Analysis (WFSA) will be prepared if initial action is unsuccessful in suppressing the fire.

Section IV: Wildland Fire Management Program Components

B. Wildland Fire Suppression

3. Initial Attack

Initial attack is an aggressive suppression action consistent with firefighter and public safety and with values to be protected. The Central Idaho Coordination Center uses WildCAD Run Cards to dispatch resources based on the current response level across the forest.

d. Response times

Responses in the Suppression non-WUI can be expected in the 20 to 45 minute range depending on the specific location of the fire. These locations are by nature more likely to be in remote locations accessible best by helicopter, or via backcountry road.

4. Extended Attack and Large Fire Suppression

A wildfire is considered to be in extended attack status when:

- Suppression efforts have not suc-

ceeded or are not expected to reach containment within 24 hours.

- The initial attack incident commander (ICT 4 or ICT5) requests additional resources that result in fire complexity attaining Type III status within or following the first 24 hours following the arrival of the first suppression resources.

b. Implementation Plan Requirements—WFSA development

Type III incident management.

A Type III incident commander (IC) will manage incidents that reach a Type III complexity level. This will be a full time dedicated IC with no collateral duties. The forest has assembled a Type III team to manage these incidents through to completion or until transition to a Type I or II incident management team.

7. Other Fire Suppression Considerations

Safety

Safety is the number-one priority for all personnel engaged in or supporting fire management activities on the forest.

Fire management work is one of the most hazardous jobs encountered by Forest Service personnel. The incident commander and all supervisors will always put the safety of his/her personnel first. There is no fire situation so serious that the life of anyone should be risked in order to get to the fire sooner, get the fire out quicker, or to keep the burned areas smaller.

All employees will abide by the *Safety First* policy. Each employee has a responsibility for his/her personal safety and that of fellow employees. It is also everyone's

responsibility to call attention to any unsafe practice that is observed.

1. All fire personnel will follow the *Ten Standard Firefighting Orders* and the *18 Watch Out Situations* and shall practice the principles of *Lookouts, Communications, Escape Routes, and Safety Zones (LCES)*. These basics of fire fighting survival will be utilized as a checklist for supervisory personnel on the fire, and as a source for other fire line personnel to pose questions to supervisory personnel whenever they have concerns about their personal safety. All firefighters will carry and utilize their *Incident Response Pocket Guide*.

2. All Type III and more complex incidents will be staffed with a qualified safety officer.

Ten Standard Firefighting Orders

All *Ten Standard Firefighting Orders* were violated or compromised.

1. Keep informed on fire weather conditions and forecasts.

Spot weather forecasts were not requested for July 22. Few weather observations were taken on the line during the entire fire. Fire personnel relied heavily on weather observations from Long Tom Lookout that did not represent the Cramer Fire site (IC Type III and Cramer Fire personnel).

2. Know what your fire is doing at all times.

Due to the steep terrain and multiple aspects, lookouts were not in vantage points to view the entire fire. The visibility at H-2 was limited due to terrain and vegetation. On July 22, the IC's view of the fire came from two reconnaissance flights. The rest

of the day he was at the Cove Creek helibase, 13 miles from the Cramer Fire (IC Type III and Cramer Fire personnel).

3. Base all actions on current and expected behavior of the fire.

Actions were based more on the observed fire behavior in the morning than what was predicted to occur based on the seasonal severity, weather forecast, and previous days' fire behavior (IC Type III and Cramer Fire personnel).

4. Identify escape routes/safety zones and make them known.

Three of the four safety zones identified by the IC and two crew bosses were not safety zones on the afternoon of July 22, during conditions of extreme fire behavior. Near H-1, the black was a safety zone, but the unburned sagebrush field was a survival zone. Near H-2, the black on the east side of the ridge during the uphill fire run was a survival zone, but the old burn/ceanothus brush field was neither a safety zone nor a survival zone (IC Type III, Central Oregon Regulars crew boss, Indianola assistant helitack foreman).

5. Post lookouts when there is possible danger.

The IC's plan for placement of lookouts was not clearly communicated to personnel assigned to the fire. No lookout with a view of H-2 or the Cache Bar drainage was posted on July 22 to monitor fire in the Cache Bar drainage and to communicate critical weather and fire behavior information to the rappellers. Aviation resources over the fire could not function full time as lookouts for ground crews given their other duties and responsibilities (IC Type III).

6. Be alert. Keep calm. Think clearly. Act decisively.

On July 22, when the IC made his decision to retrieve the rappellers from H-2, he did not act decisively by immediately removing the rappellers from H-2. During the critical period prior to, and after

contact was lost with the rappellers, the IC was functioning as the district FMO/AFMO, performing multiple collateral duties on the radio (IC Type III).

7. Maintain prompt communications with your forces, your supervisor, and adjoining forces.

On July 22, critical observations of fire activity in the Cache Bar drainage were not communicated to the IC and the rappellers at H-2. The IC did not update the rappellers on H-2 about revised strategy and tactics. More than 30 minutes elapsed after losing contact with the rappellers at H-2 before the IC became engaged in the search and rescue operation (IC Type III, air attack, lead plane 41).

8. Give clear instructions and ensure they are understood.

On July 22, the IC's instructions regarding the locations of lookouts were not well understood. The IC dropped off a helicopter crew person east of H-1 without a plan, a briefing, or a designated safety zone (IC Type III).

9. Maintain control of your forces at all times.

On July 22, the IC was not in control of his forces on the fireline, deferring operations to his strike team leader. He did not supervise and adequately contact, monitor, or coordinate with the H-2 operation (IC Type III).

10. Fight fire aggressively, having provided for safety first.

Initial attack suppression efforts on the Cramer Fire were inadequate on July 20 and 21, causing the fire to grow in size and complexity under extreme burning conditions. Midslope suppression tactics were used on July 21 and 22 during extreme burning conditions. There were significant safety lapses prior to the fatalities. The safety of the rappellers was compromised by focus on fire activity in the Cramer Creek drainage and the eventual

burnover of H-1 (North Fork/Middle Fork district ranger, forest FMO, zone duty officer, IC Type III).

18 Watch Out Situations

Nine of the 18 Watch Out Situations were present and not mitigated.

1. Fire not scouted and sized up (NA).

2. In country not seen in daylight (NA).

3. Safety zones and escape routes not identified (NA).

4. Unfamiliar with weather and local factors influencing fire behavior (NA).

5. Uninformed on strategy, tactics, and hazards (NA).

6. Instructions and assignments not clear.

On July 22, the IC's instructions regarding the locations of lookouts were not well understood. The IC dropped off a helicopter crew person east of H-1 without a plan, a briefing, or a designated safety zone (IC Type III).

7. No communication link with crew members/supervisor.

The IC did not supervise and adequately contact, monitor, or coordinate with the H-2 operation (IC Type III).

8. Constructing fireline without safe anchor point.

Anchor points were not established (IC Type III, strike team leader).

9. Building fireline downhill with fire below.

The tactics for the west side of the fire were for a crew to build downhill fireline from H-2 (IC Type III).



10. Attempting frontal assault on fire (NA).

11. Unburned fuel between you and the fire.

The rappellers at H-2 had two drainages of unburned fuel (Cramer Creek and Cache Bar) below them (IC Type III).

12. Cannot see main fire, not in contact with anyone who can.

The visibility at H-2 was limited due to terrain and vegetation. No lookout with a view of H-2 or the Cache Bar drainage was posted on July 22 to monitor fire in the Cache Bar drainage and to communicate critical weather and fire behavior information to the rappellers (IC Type III).

13. On a hillside where rolling material can ignite fuel below.

Rollouts were a common occurrence during all phases of the Cramer Fire. A combination of backing and rolling allowed fire to establish itself in the Cache Bar and Cramer Creek drainages. (IC Type III).

14. Weather is getting hotter and drier. Fire activity on the SCNF increased dramatically through June and into July from hot, dry weather and multiple lightning starts, indicating the potential for new starts.

Conditions had been getting progressively hotter and drier during the Cramer Fire (IC Type III, Cramer Fire personnel, North Fork/Middle Fork district ranger, forest FMO).

15. Wind increases and/or changes direction.

Wind gusts on the Cramer Fire increased markedly during the afternoon of July 22 and changed direction. Personnel on the fire did not account for the predicted changes in windspeed and direction for the afternoon (IC Type III and Cramer Fire personnel).

16. Getting frequent spot fires across line (NA).

17. Terrain and fuels make escape to safety zones difficult (NA).

18. Taking a nap near fireline (NA).