Breaks One Unit Four
Prescribed Fire Escape

Facilitated Learning Analysis

Salmon-Challis National Forest
North Fork Ranger District

September 2010

Contents

"The Facilitated Learning Analysis process helps us to maximize learning opportunities presented by unintended outcomes or near miss events. The intent is to improve performance by generating individual, unit, and organizational learning that capitalizes on shared experience—blaming is replaced by learning."

Facilitated Learning Analysis
Implementation Guide
August 2010

"Don't shy away from speaking up to others who out-rank you if you have a problem with the plan."

"Accept good advice from wherever you find it, even if it comes from someone with less experience, qualifications, or rank than you".

"Past good luck creates current bad habits."

Lessons Learned comments from burn participants noted by the Facilitated Learning Analysis Team.

[Acronyms and some technical terms used in this report are defined in the Glossary chapter.]

Paul Keller, technical writer-editor with the Wildland Fire Lessons Learned Center, helped with the editing and formatting of this report.

Paul Keller
503-622-4861
pkeller@fs.fed.us

1. Summary

On Saturday Sept. 25, 2010, the Breaks 1 Unit 4 Prescribed Fire was ignited southwest of the town of North Fork, Idaho. Firing operations progressed slowly, stopping and restarting in response to changing weather conditions and forecasts. On the afternoon of Sept. 28, winds increased well beyond forecasted strengths. Between 1830 and 1900, two spot fires occurred to the east below the unit boundary. The spots were on a very steep slope in mixed timber litter and grass fuels. They had the potential to run back up the slope toward the burn unit perimeter control line.

After careful assessment and consideration, a decision was made to move crews off the ridge for the night. Due to strong winds, very rugged terrain, reduced visibility, and fire located below the holding crew positions, the Burn Boss and District fire managers deemed it unsafe to attack the spot fires that evening.

The next morning—because crews could not safely construct direct handline around the spots—an assessment of opportunities for containment indicated that spot fire spread could not be halted before the end of the next burning period. Once this assessment was completed, the prescribed burn was declared a wildfire and named River Breaks. Total area burned outside of the planned burn unit amounted to less than 100 acres (all on U.S. Forest Service lands).

A. What Can We Learn from this Event?

The people who planned and implemented this burn are well-experienced, qualified, and competent wildland fire managers. Because of the escape outcome, a natural tendency exists to be critical of their decisions. This Facilitated Learning Analysis (FLA), however, will strive to answer why their decisions—at the time—made sense to them. Thus, this report will examine what can be learned from this event and what actions people might take in similar future events—to prevent such escape outcomes.

Via this facilitated learning process, the FLA Team and burn participants identified several factors which might have influenced the escape declaration. These factors (the potential risks of escape) were unseen or not nearly so obvious (as they might seem afterwards) to all or some of the people involved prior to the prescribed burn and during its implementation. Through these observations and analysis, this FLA report strives to accurately describe the circumstances leading up to the burn and the escape.

The Intermountain Region Director of Fire and Aviation Management convened the Facilitated Learning Analysis Team to review the factors surrounding this prescribed fire escape and subsequent wildfire declaration. The FLA Team interviewed personnel associated with the implementation of the burn and examined the written record of events and actions leading up to the escape.

2. Facilitated Learning Analysis Process

A. Requirements

Forest Service Manual 5140.42 (Forest Service 2008) states that Forest Supervisors are responsible for: "*conducting reviews of all prescribed fires that are converted to wildfire status*," and for "*reporting the review results to the Regional Forester within 60 days after the prescribed fire was declared a wildfire*". The goal of this requirement is to guide future program actions by minimizing future resource damage and to prevent future escapes from occurring by gathering knowledge and insight for incorporation into resource management and prescribed fire planning.

Consistent with this requirement, the Intermountain Region Director of Fire and Aviation Management convened a team of five people to conduct a Facilitated Learning Analysis (FLA) of the prescribed fire. The number of individuals assigned to the team and their functional expertise were commensurate with the scope and focus of this analysis.

B. The Breaks One Unit Four Prescribed Fire Escape Facilitated Learning Analysis Team

Tim Sexton, Team Leader, Fire Use Program Manager, U.S. Forest Service National Headquarters

Mesia Nyman, Team Member, Regional Fuels Specialist, Intermountain Region, Ogden, Utah

Frankie Romero, Team Member, Smokejumper Base Manager, Payette National Forest, McCall, Idaho

Nathan Lancaster, Team Member, Forest Fire Planner, Sawtooth National Forest, Twin Falls, Idaho

Keith Adams, Team Member, Forest Fuels Planner, Dixie National Forest, Cedar City, Utah

During October 5, 6, and 7, 2010, the FLA Team interviewed key personnel, including the people associated with the implementation of the prescribed fire; examined planning and decision-making processes; and reviewed materials relevant to the implementation of the prescribed fire, including written documentation of events and actions leading up to the declaration of the prescribed fire as a wildfire.

The level and scope of this review analysis were consistent with agency policy as stated in FSM 5140.42 (Forest Service 2008) and the *Interagency Prescribed Fire Planning and Implementation Procedures Guide* (NWCG 2008).

C. Facilitated Learning Analysis Objectives

The objectives of this report—consistent with the *Facilitated Learning Analysis Implementation Guide* (U.S. Forest Service 2010) produced by the Forest Service's Risk Management Council—were developed from: *Guidance in the Delegation of Authority to the Review Team Leader*, FSM 5100, Chapter 5140 (Forest Service 2008), the *Interagency Standards for Fire and Fire Aviation Operations* (USDI/USDA 2008), and the *Interagency Prescribed Fire Planning and Implementation Procedures Guide* (NWCG 2008).

Report objectives:

- Review the seasonal severity, weather events, and onsite conditions leading up to the wildfire declaration.
- Determine if the prescribed fire plan was adequate for the project and complied with policy and guidance related to prescribed fire planning and implementation.
- Determine if the prescribed fire prescription set forth in the prescribed fire plan was adequate.
- Determine if the prescription, actions, and procedures set forth in the prescribed fire plan were followed.
- Determine if the approving line officer's qualifications, experience, and involvement met required standards.
- Determine if the qualifications and experience of key personnel involved met required standards.
- Determine the level of awareness and understanding regarding procedures and guidance of the personnel involved.
- Identify and document the lessons learned factors that contributed to the escape and wildfire declaration.

Facilitated Learning Analysis History and Intent

In 2006, in an effort to help encourage a learning culture and a safety culture within the wildland fire community, the Forest Service Risk Management Council introduced a learning-focused approach into the accident investigation process. In 2007, the Council formalized this concept with two new safety analysis processes: The"Facilitated Learning Analysis" (FLA) and the "Accident Prevention Analysis" (APA). Since then, numerous FLAs and APAs have been conducted throughout the country on incidents that range from vehicle and equipment burnovers to entrapments and shelter deployments.

When used as intended, the APA and FLA will promote a learning culture and support organizational and individual performance, leadership, accountability, and responsibility. Concurrently, the FLA and APA analyses also serve to support program goals for developing a fundamentally sound and doctrine-based organizational safety culture.

The implementation guides for conducting both an FLA and an APA are available on the Wildland Fire Lessons Learned Center's website at: http://wildfirelessons.net/documents/Organizational_Learning_APA_FLA_Guides_2010.pdf .

3. Background

A. Physical Condition

The Salmon-Challis National Forest, located in eastern Idaho, contains six ranger districts. The North Fork Ranger District is the northern-most district on the Forest, situated around the town of North Fork.

Figure 1 – Breaks 1 Unit 4 Prescribed Fire implementation.

Throughout the North Fork Ranger District a need exists to reduce the current risk of losing ecosystem components such as large fire-resistant trees, native grasslands, and fire-dependent species. Ladder fuels, canopy closure, surface fuels and duff layers have increased in the project area, along with the occurrence of conifer and sagebrush encroachment and loss of the suckering response in aspen.

The existing situation of high departure (Fire Regime condition Class 3) from historic conditions has greatly increased the potential for high-severity surface fires and uncharacteristic crown fires. In response to this situation, the North Fork Ranger District has proposed and planned an aggressive prescribed fire project designed to:

- Improve plant vigor;
- Restore historic ecosystem composition, structure and function to a more diverse, productive and resilient condition;
- Reduce hazardous fuels;
- Promote fire resilient species; and
- Enhance existing barriers to fire spread by regenerating aspen stands.

These actions are consistent with goals and objectives outlined in the *Salmon National Forest Plan* (Salmon-Challis NF 1988 – 2004), the *Lemhi County Community Wildfire Protection Plan* (1997), and the *National Fire Plan* (USDA/USDI 2000).

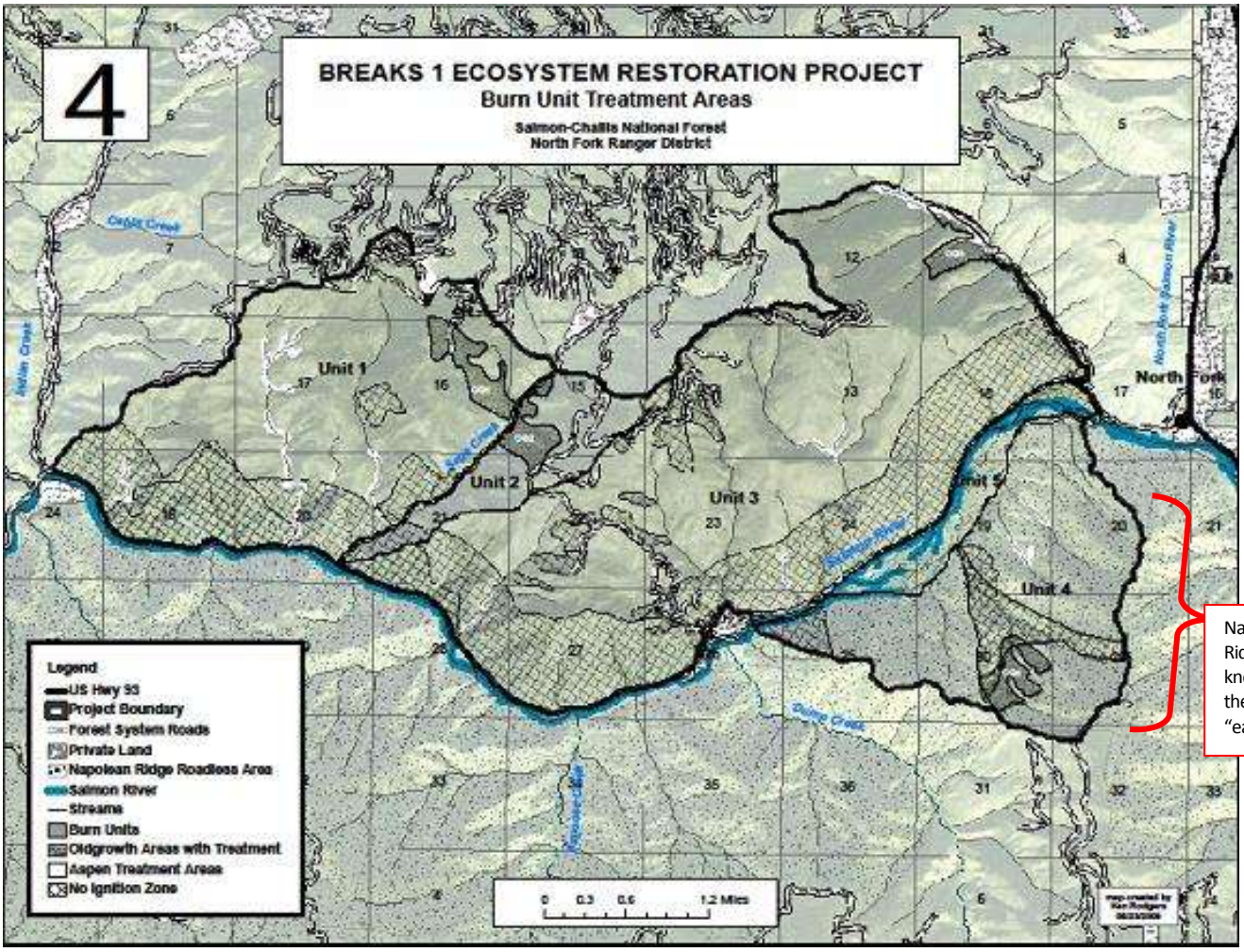
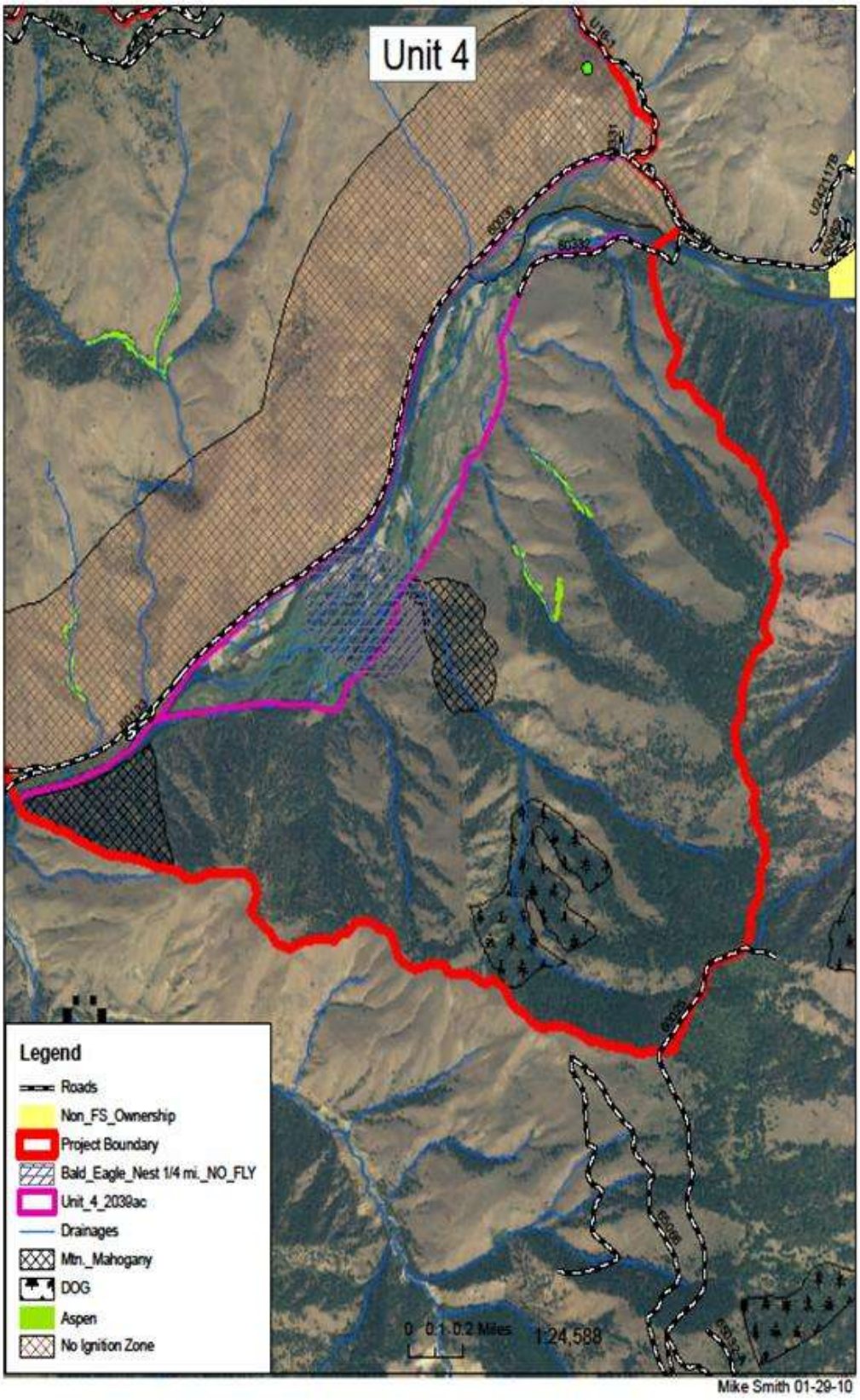


Figure 2 – Breaks 1 Ecosystem Restoration Project Area Vicinity Map.

B. The Breaks 1 Ecosystem Restoration Project

The Breaks 1 Ecosystem Restoration Project was developed by the North Fork Ranger District to implement prescribed fire treatments and associated activities to reduce hazardous fuels within the project area (Figure 3 on following page).

The planning area encompasses approximately 11,600 acres of National Forest System lands. The project area is located on both sides of the Salmon River to the west of the town of North Fork. It is located in T24N R21 E sections 19, 20, 29, and 30.



[**"DOG"**: Douglas-fir Old Growth. These areas were to be protected from high-severity fire. It was desired to limit mortality of individual "Old Growth" trees.]

Figure 3 – Breaks 1 Unit 4 Prescribed Fire Unit.

Figure 4 – Depiction of conifer stand conditions within the Breaks 1 Ecosystem Analysis Area.

C. Prescribed Fire Objectives

The Breaks 1 Ecosystem Restoration Project is consistent with and designed to accomplish objectives stated in the *Salmon National Forest Plan* (Salmon NF 1988-2004) and the *National Fire Plan* (USDA/USDI 2000).

The *Salmon National Forest Plan* (LRMP) contains the following direction related to the proposed project:

- Provide cost effective level of fire protection to minimize...cost, damages, and prevent loss of human life (IV-3 LRMP).
- Maintain adequate structural diversity of vegetation... (IV-1 LRMP).
- Multiple standards and guidelines for Management Areas 4A and 5A relating to the impact of prescribed fire on other resources (such as old growth stands, big game winter range, cultural resources, water quality, and riparian areas). These standards and guidelines were translated into project "design criteria and mitigations".

Objectives of the *National Fire Plan* include:

- Reduce the total number of acres at risk to severe wildland fire.
- Ensure communities most at risk in the wildland-urban interface receive priority hazardous fuel treatments.
- Expand and improve integration of the hazardous fuels management program to reduce severe wildland fires to protect communities and the environment.

In the Breaks 1 Ecosystem Restoration Project, the North Fork Ranger District proposed to introduce prescribed fire to reduce fuels and maintain native fire resistant plant species. This prescribed fire's actions were intended to reduce the probability of natural ignitions becoming intense stand-replacement fires.

The following objectives were identified for the Breaks 1 Prescribed Burn Unit 4 Prescribed Burn Project:

- Provide for firefighter and public safety in wildland fire situations.
- Reduce overstory and surface fuel loading in order to reduce fire severity, intensity, and rapid rates of spread.
- Modify fuel through vegetation treatments.
- Reduce crown fire risk in the Salmon River Corridor.
- Decrease likelihood of fire spread to private lands.
- Reduce the risk of losing ecosystem components such as large fire-resistant trees.
- Complement other treatments in the area that have been planned or implemented to protect at risk communities.

Additional information is available in the Breaks 1 Prescribed Burn Unit 4 Prescribed Fire Burn Plan (Salmon-Challis NF 2010).

4. Description of the Event

A. Chronology of Events and Actions Leading Up to the Wildfire Declaration

Friday, Sept. 10

On-the-Ground Assessment

Specific preparation for prescribed burning the Breaks 1 Unit 4 on the North Fork Ranger District begins Sept. 10, 2010 with an on-the-ground assessment of burning conditions. The designated Burn Boss and the Burn Boss trainee drive to the southwest corner of the unit and assess fuel conditions and take weather observations for a spot weather forecast. They also visually evaluate fuel moisture and other flammability factors inside and outside the unit.

Tuesday, Sept. 14

One-Mile Long Hoselay is Completed

On Sept. 14, a slingload is flown to the bottom of the burn unit with supplies for a hoselay along the bottom. The mile-long hoselay is completed this same day.

Implementation planning occurs during the next three days. Personnel and equipment resources are ordered with the intent of initiating firing on Sept. 17. (A type 1 helicopter is assigned to this burn starting Sept. 17—to be used for the duration of the burn.)

Thursday, Sept. 16

Interagency Hotshot Crew Assigned to Burn

On Sept. 16, an interagency hotshot crew (IHC1) is assigned to the burn. The initial briefing for all burn resources occurs this afternoon. After the briefing, the IHC1 superintendent and crew conduct a reconnaissance of the burn unit.

Friday, Sept. 17

Due to Dry Fuels and Spotting Potential, Additional Handline is Required

On Sept. 17, a discussion occurs between the IHC1 superintendent and the local unit fuels personnel. The IHC1 superintendent recommends construction of a handline on Napoleon Ridge on the east boundary of the burn unit prior to any ignitions. The prescribed fire plan had been developed with the intention of implementing this burn in the spring. Under spring conditions it was assumed that no control lines would be needed because fuels outside the burn unit would be too wet to burn. The burn plan preparer had worked on the North Fork District for several years and had observed that snow melted off the lower slopes before it left the upper ridges—where the unit boundary was located.

The IHC1 superintendent's reconnaissance identifies mistletoe-infested Douglas-fir with low-hanging limbs adjacent to the unit boundary. It is also pointed out that fuel under the fir and outside the unit boundary is relatively dry. The low-hanging limbs and dry fuel provide high potential for torching inside the unit—potentially leading to spot fire occurrence outside the unit boundary. It is agreed that handline is needed.

Saturday, Sept. 18

Handline is Constructed on Burn Unit's East Boundary

On Sept. 18, IHC1 begins constructing handline along the east boundary of the burn unit.

Sunday, Sept. 19

Original Burn Boss is Replaced

On Sept. 19, the original Burn Boss becomes unavailable and another Burn Boss from local District personnel is identified.

Monday, Sept. 20 thru Friday, Sept. 24

Critical Holding Issues are Identified

Between Sept. 20 and 24, work continues on Napoleon Ridge on the burn unit's east flank. Two additional hotshot crews (IHC2 and IHC3) and one engine are ordered. These resources are instructed to prepare additional units, and as contingency for Unit 4. One of the hotshot crews is assigned to replace the first hotshot crew which is due to "time out" in a few days.

At 1600 on Sept. 24, a briefing is conducted at the Salmon Airbase. Critical holding issues on the east line are identified. It is also stated that should spot fires occur, in most areas along the east line it would not be safe—due to steep and hazardous terrain—to attempt direct line construction.

Saturday, Sept. 25

Torching Slows Blacklining Operations – Spot Weather Forecast Predicts Unfavorable Winds

On Sept. 25 at 1511, the test fire is ignited and the Burn Boss indicates that the results are "good". Due to the green grass component, burning is spotty on the top and down to the saddle on the east flank. Mistletoe in trees contributes to torching and makes blacklining operations slower than anticipated.

The spot weather forecast for Sept. 26 predicts unfavorable winds (westerly at 7-12 mph). IHC1 finds a location to hang-up ignitions for the day and stops firing at about 2025. Due to a thermal belt, active fire behavior in the sage and grass is observed until after midnight. The Prescribed Fire Burn Boss - Type 2 (RXB2) and trainee and the Firing Boss (FIRB) discuss weather and operations for the next day. It is agreed that—due to a forecast for increased winds—the actions will be limited to holding.

Sunday, Sept. 26

No Firing Occurs – Crews Continue to Hold and Improve Portions of Fireline

On Sept. 26 no firing occurs. The RXB2 and trainee conduct aerial recon to determine how far the fire had backed down into the unit. Crews are assigned to continue holding and to improve portions of the fireline.

Monday, Sept. 27
Spot Fire is Contained

On Sept. 27, a decision is made to conduct ignitions at night to take advantage of down-slope/ down-canyon winds. IHC2 arrives and reconnoiters the burn area, preparing for transition on Sept. 28 with IHC1.

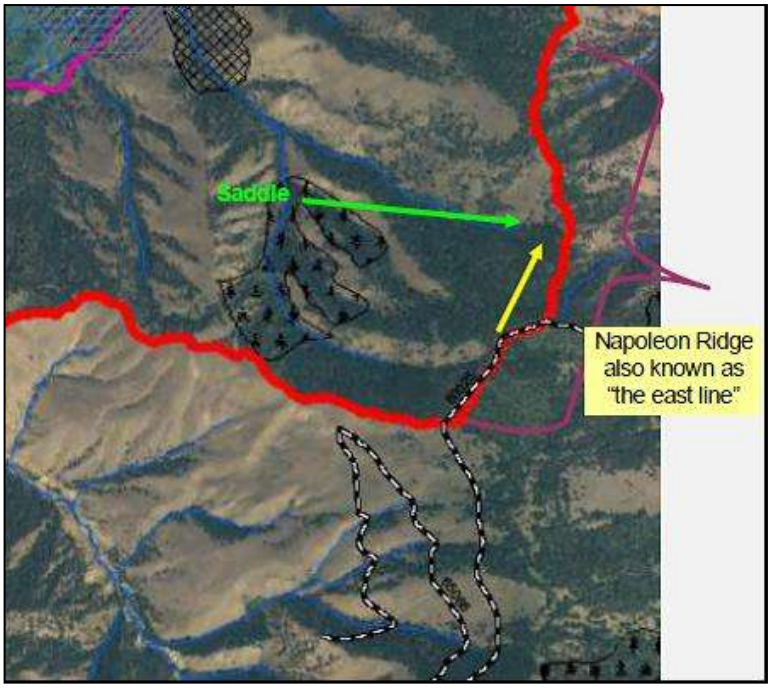


Figure 5 – The initial firing direction and distance on Sept. 25 is indicated by the yellow line.

On this day, firing resumes at 1740 to the north along the east ridge control line with the intention of keeping the blackline along the ridge even with—or ahead of—the fire below the ridge as it moves west in a flanking fashion. At approximately 1807, a spot fire occurs to the east of Napoleon Ridge. This causes the FIRB to halt ignition. The spot is contained and ignitions resume at 2007. At 2300, the RXB2 transitions with the night holding specialist.

Tuesday, Sept. 28
Hotshot Crews Transition into Burn Assignments

At 0800 on Sept. 28, IHC2 is briefed. At 1330, IHC1 begins transitioning with IHC2. IHC2 superintendent is assigned to be FIRB. IHC3 superintendent is assigned to the blacklining operations along Napoleon Ridge. IHC2 captain is assigned as holding boss along Napoleon Ridge. A District fuels person is assigned holding boss along the hoselay to the north at the bottom.

Firing continues throughout the night, morning, and early afternoon, stopping at 1500. At 1650, southwest winds at 10 mph, with gusts to 15, are observed. At 1815, the Burn Boss observes that the blackline *"looks good and is two chains deep off the handline"*.

At 1828, winds are observed at 15-20 mph—sustained out of the southwest. At 1830, a spot fire is reported near the helispot on the east flank. At 1840, a second spot is reported south of and higher up the ridge from the first spot. These spots are evaluated. Due to very steep terrain and the potential for upslope runs back toward the ridge, it is determined it would be unsafe to attempt direct control with handcrews without aviation support. (Aviation support is unavailable because the sun had set at approximately 1730.) At about 1900, the District Ranger is notified of the situation. He heads for Napoleon Ridge. At 1952, crews are pulled off the line. They start the long hike south to the road (spike camp). The District Ranger arrives at the top of the burn unit at approximately 2000 and is fully apprised of the situation. At 2155, all crews have arrived safely at the road. It is decided to assess the spot fires the next morning (Sept. 29) to determine if they can be contained—or, if it will be necessary to declare the burn a wildfire.

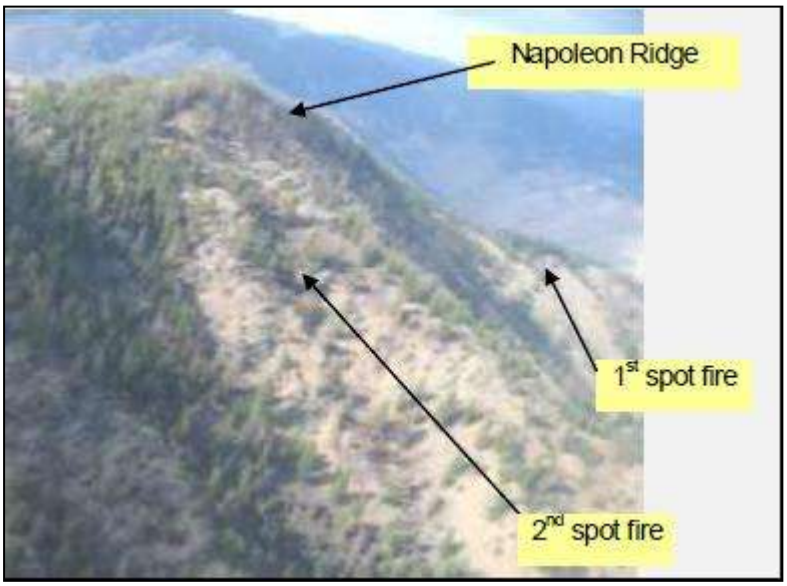


Figure 6 – The east side of Napoleon Ridge with Sept. 28 spot fire locations.

<u>Wednesday, Sept. 29</u>

The Burn is Declared a Wildfire

On Sept. 29, the District FMO consults with Fire Staff Officer, Forest FMO, District Ranger, Burn Boss/IC3, Burn Boss trainee, North Zone Fuels Specialist, Type 3 Operations Section Chief and his trainee and determines that the spot fires cannot be contained before the end of the next burn period. The burn is declared a wildfire and a plan for suppression of the spot fires is developed. The rationale for this decision: The area where the spots occurred is very steep and has numerous snags and rocks. It would therefore be unsafe to expose firefighters to these hazards. It is determined that a conversion to a wildfire would provide a much better outcome than trying to contain the spots without good visibility and possibly getting someone hurt.

Subsequently, a Type 2 Incident Management Team (IMT2) is assigned to manage the wildfire (now named River Breaks Wildfire). The IMT2 is given several objectives, including an objective to complete the firing of the Break 1 Unit 4. The IMT2 will contain the wildfire and complete firing the burn unit—achieving the original objectives identified in the burn plan.

5. Key Analysis Observations and Learning Elements

The Facilitated Learning Analysis (FLA) Team was tasked with addressing the specific elements for prescribed fire escape reports listed in the *Interagency Prescribed Fire Planning and Implementation Guide*. In addition, the team's task includes an accurate identification and description of the circumstances and organizational conditions leading up to the burn and the escape.

Most importantly, the FLA Team facilitated discussion among the participants to identify why decisions and actions made sense during the event, but can now be seen as areas for improvement in conducting future prescribed burns. These "lessons learned" are important for refining prescribed burn procedures among the participants, as well as serving as important considerations for the broader prescribed fire community in general.

The emphasis of the FLA Team's analysis is outlined in this section, described in terms of environmental, human, administrative, and process/system key elements—discussed as contributing directly or indirectly to the prescribed fire's escape.

The following seven key elements are discussed in this section:

1. An analysis of seasonal severity, weather events, and onsite conditions leading up to the wildfire declaration.

2. An analysis of the actions taken—addressing their consistency with the prescribed fire plan—leading up to the wildfire declaration.

3. An analysis of the prescribed fire plan for consistency with policy.

4. An analysis of the prescribed fire prescription and associated environmental parameters.

5. A review of the approving line officer's qualifications, experience, and involvement.

6. A review of the qualifications and experience of key personnel involved.

7. The level of awareness and understanding of prescribed fire planning and implementation procedures and guidance of the personnel involved**.**

A. Seasonal Severity, Weather, and Onsite Conditions

Seasonal Severity

The 2010 fire season started out wet on the Salmon-Challis National Forest. Until the middle of July, the National Fire Danger Rating System (NFDRS) indices were average to below average. Reoccurring wet storms kept fire behavior at moderate levels and limited fire size on the North Zone of the Salmon-Challis National Forest. Grasses had cured and the sagebrush live fuel moisture had dropped sufficiently to make it available to burn by the end of August. September and October were warm and dry.

The Breaks 1 Unit 4 Prescribed fire was located in Fire Weather Forecast Zones 475 and 476, forecasted from the Pocatello Office of the National Weather Service in Pocatello, Idaho. The Salmon-Challis National Forest uses four Remote Automated Weather Stations (RAWS) to track fire danger and potential fire severity for the mountainous area in the North Zone of the Forest, including the fire area. Bonanza RAWS, Little Creek RAWS, INDY RAWS, and the Skull RAWS are the four stations used for analysis. The National Weather Service in Pocatello was consulted on weather conditions for the burn on four occasions (September 15, 17, 28 and 30).

Overall Weather Situation

A strong ridge of high pressure centered over Idaho that dominated the region from Sept. 17 thru Sept. 28. This resulted in light winds and dry conditions over the prescribed fire area.

On Sept. 26, a system moved to the north of the prescribed fire area that brought high clouds and an increase in winds. The impact of this system to the burn area occurred during a four-hour time period (Sept. 28, between 1400 and 1800). During this time, winds shifted to westerly and increased to 10-15 mph, with gusts to 25 mph. These winds were significantly different from those predicted in the spot weather forecast (winds from the south at 5-9 mph in/around the Breaks 1 Unit 4 project area).

National Weather Service Fire Weather Forecasts

Issued 0623 a.m. MDT 9/17/10

The Fire Weather Forecasts (FWF) for Friday, Sept. 17: Temps Max 66, minimum RH values 37 percent, and for west winds at three mph—otherwise variable one to three mph, becoming northwest around six mph late in the afternoon. Slight chance of rain after midnight, winds variable one to three mph forecast for Friday night.

Issued 1440 p.m. MDT 9/17/10

The FWF for Friday night, Sept. 17: Temps Min 45, Max RH 73, winds becoming down slope four to six mph after sunset.

Issued 1633 p.m. MDT 9/24/10

FWF for Saturday, Sept. 25: Temps Maximum 72-77, Min RH 18-23 percent, winds variable two to four mph.

Issued 1031 a.m. MDT 9/26/10

The FWF for Sunday, Sept. 26: Temps Max 80-85 at 3,600 feet and 74-79 at 7,000 feet, RH Min 12-17 percent, Winds variable three to seven mph, becoming west 7 to 12 mph with gusts around 22 mph by 1300 MDT.

Issued 0928 a.m. MDT 9/27/10

The FWF for Monday, Sept. 27: Temps Max 76 to 81, Min RH 21 percent, winds variable two to four mph, becoming southwest six mph by afternoon.

Issued 0943 a.m. MDT 9/28/10

The FWF for Tuesday, Sept. 28: Temps 82-87, RH Min 15 percent, winds variable one to five mph, becoming south five to nine mph in the afternoon.

Forecast and Weather Information Conclusions

A thorough review of the available forecast and weather information—including an analysis of the spot weather forecasts and actual weather observations for the burn area—provided the FLA Team the following conclusions:

- All spot and general weather forecasts for the burn area indicated south winds into the afternoon when the winds would become light from the west.
- The expected southerly wind component predicted by the National Weather Service for the day of the escape was correct until 1400 when a westerly wind component surfaced on the burn area.
- The burn unit was located in an area which—because of the confluence of three major canyons—presented forecasting difficulties for the National Weather Service. However, the National Weather Service had been very accurate on all the previously issued spot weather forecasts for this prescribed burn. Local weather observations were collected hourly for the duration of the incident and were passed on to dispatch for preparations of the spot forecasts.

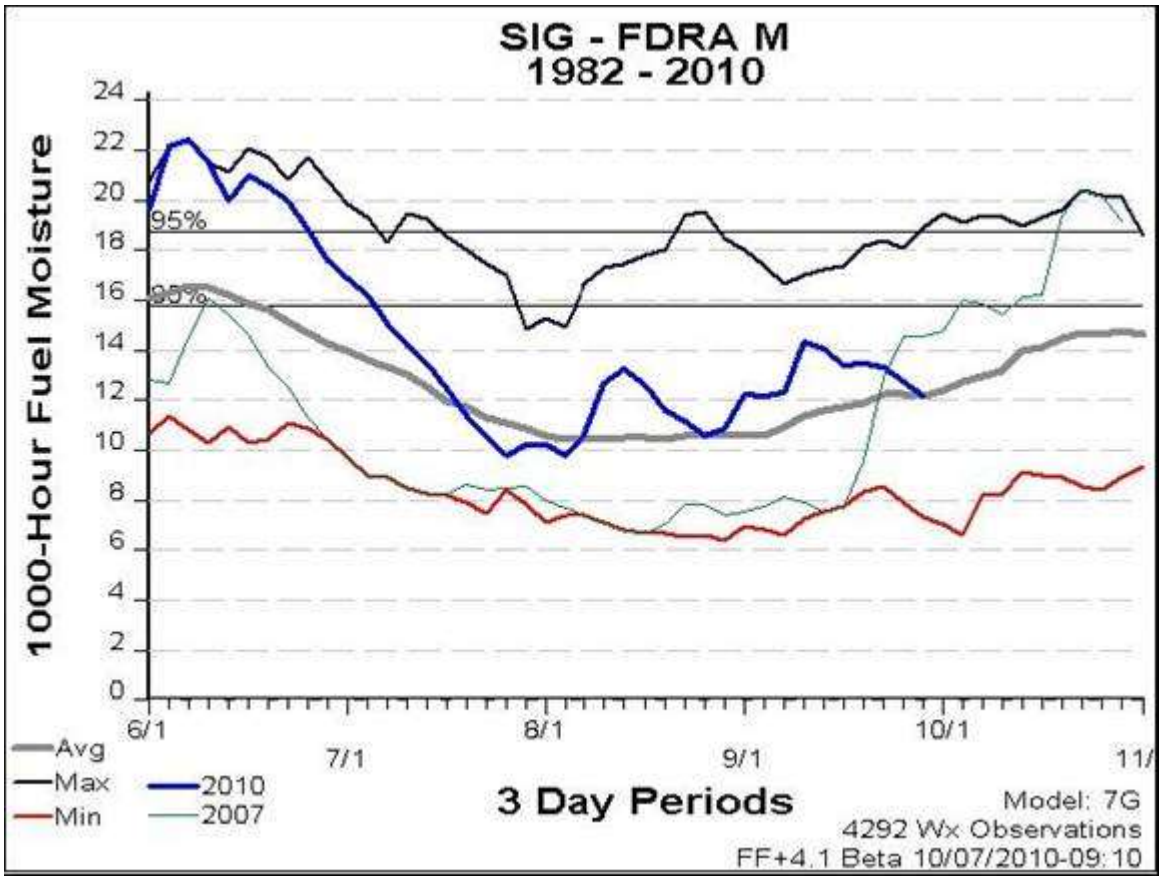


Figure 7 – Calculated 1,000-hour fuel moistures.

Fuel Moisture Analysis

The moisture content of woody debris greater than three inches in diameter (1,000 hour timelag fuels) is used as an indicator of drought severity and resistance to fire control. Figure 7 depicts the calculated 1,000-hour timelag fuel moisture from the weather observations for the North Zone.

The 2010 situation (blue line) shows 1,000-hour fuel moistures to be near average for this time of year. Higher values in fuel moistures indicate wetter fuels. The higher moisture values are evident when large-logs are not completely consumed in the fire.

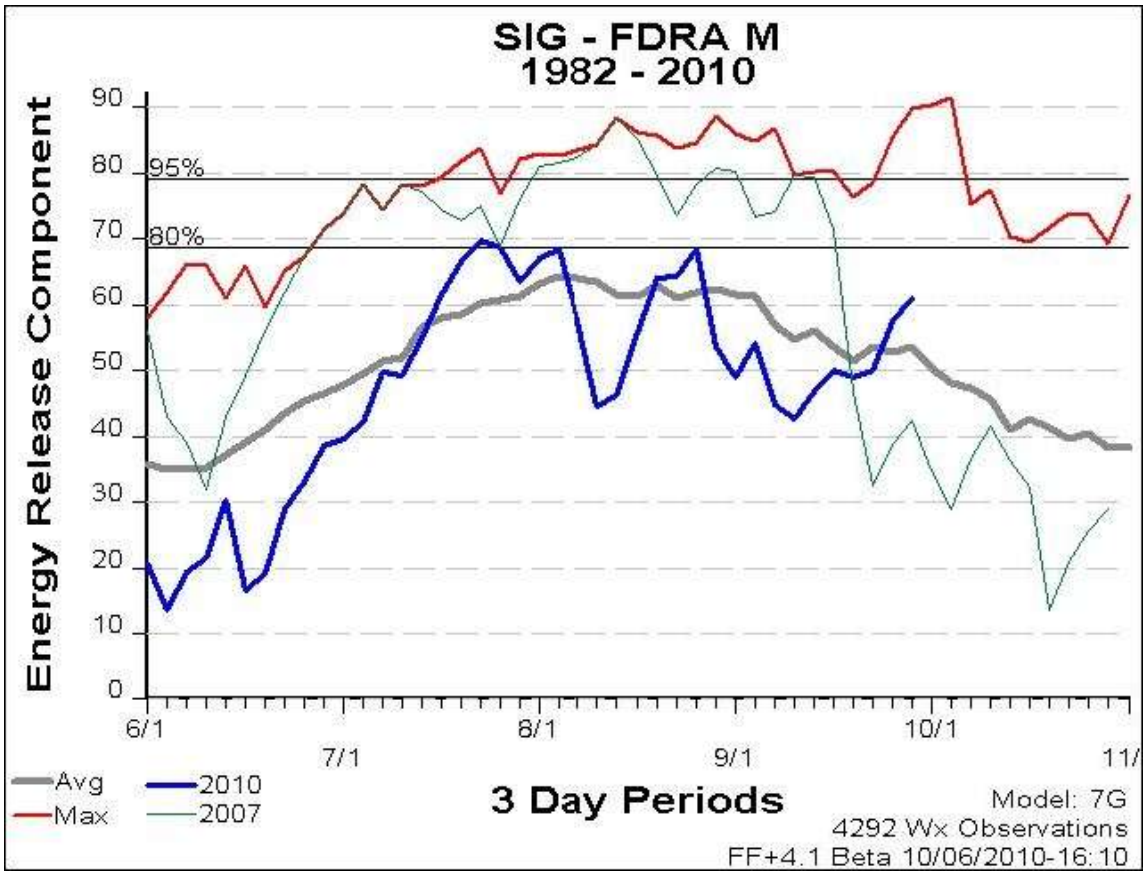


Figure 8 – Current Energy Release Component (ERC) values compared to historic readings.

Energy Release Component

The National Fire Danger Rating System (NFDRS) index used to track the combined effects of fuel dryness on fire potential is called the Energy Release Component (ERC). Figure 8 displays current ERCs (blue) and compares them to historic readings.

On the day the fire escaped, ERC values were near to, or just above, average for this time of year. Current ERC values are below peak fire season averages (July - August).

Because the NFDRS System fails to take into account the shorter days and colder nights, it should be remembered that this system is somewhat skewed this time of year. However, the trends compared to past years is important to note.

B. Analysis of Actions Taken—Addressing their Consistency with the Prescribed Fire Plan—Leading Up to the Wildfire Declaration

The burn plan was developed in March 2010 by a burn plan preparer qualified at the "moderate complexity" level. The burn plan preparer felt rushed to complete the plan and was not able to conduct a thorough reconnaissance of the burn unit during the burn plan development. (The unit was inaccessible by road due to snow blockage.)

All components of the burn plan were developed in accordance with policy. The burn prescription and contingency plan were developed with an intentionally broad range to ensure that the burn could be implemented under a wide range of "burn windows".

While this approach to burn plan development is within policy, it requires thoughtful consideration by the prescribed fire overhead (RXB, FIRB, etc.) immediately prior to the first ignition—and throughout the duration of the burn.

In this case, there was a strong desire by District personnel to get the burn completed prior to the end of the fiscal year. Consequently, when the Burn Boss and others started the pre-burn preparations, they gave less time and consideration to adjusting burn plan parameters to fit the specific conditions of late September 2010. When determining the numbers and types of contingency resources and specific prescriptions *after* it has been decided to burn, there is a tendency to make the weather situation and available resources fit the burn rather than objectively determining the *necessary* set of resources for the conditions, or for the *best* weather parameters for available resources. In this case, reliance on helicopters for attack of spot fires east of Napoleon Ridge did not anticipate strong winds and smoky conditions.

While spot weather forecasts were ordered and used to inform ignition and ongoing management of the burn, windspeed and direction became much more adverse than what had been predicted in the spot weather forecasts. Spot fires occurred in areas which were unsafe for direct attack by handcrews. Helicopter attack of the spot fires was impossible due to strong winds and smoky conditions.

C. Compliance and Consistency with the Prescription, Actions, and Procedures Set Forth in the Prescribed Fire Plan

Forecasted weather, RAWS readings, and NFDRS estimates for Sept. 25—the day of ignition—indicate that conditions were out of prescription (too dry) with respect to one-hour and ten-hour fuel moistures. Local personnel knew that the burn site was typically cooler and moister than the RAWS location. In fact, actual weather observations taken at the burn site show that conditions were within all prescription parameters.

Fuel moisture was not measured at the burn site prior to ignition. However, fine dead fuel moisture can be calculated from relative humidity and temperature with an adjustment for shading and aspect. The relative humidity (RH) range allowed in the burn prescription was 10-55 percent.

At the time of ignition (1511 on Sept. 25), RH was measured at 25 percent at the test fire site. The calculated moisture content of one-hour fuel (particles <.25 inches diameter) at the time of ignition was nine percent, which is well above the six percent minimum allowed by the prescription. (See Table 1 below.)

When calculating fuel moisture from charts, it is standard practice to add one percentage point to the one-hour fuel moisture to obtain the 10-hour fuel (particles .25 inches -1 inch diameter) moisture. In this case, the 10-hour fuel moisture would have been 10 percent—once again, well above the seven percent low threshold specified in the prescription. (See Appendix C – Weather Observations.)

Table 1 – Key Prescription Elements and conditions on the Breaks 1 Unit 4 prescribed fire.

Key Prescription Elements	Prescription Range	Ignition: Observations on 9/25/10 @ 1500	Spot Fire: Observations on 9/28/10 @ 1830
Temperature	35–85 deg. F	64 deg. F	82 deg. F
Relative Humidity	10-55%	40%	25%
Mid-Flame Wind	0–10 mph (any direction)	0-2 mph East-Northeast	12-15 mph Gusts to 25 West

Although no specific fire behavior observations were quantified and documented, the test fire documentation indicates that fire behavior parameters were within prescription ranges. Recording actual observed behavior would provide a clearer indication to an outside reviewer that actual observed behavior was indeed within the acceptable fire behavior range contained within the plan. All actions after the ignition on Sept. 25 appear to be consistent with the prescribed fire plan, including: Implementation of the contingency plan, declaration of a wildfire, and subsequent initial management as a Type 3 Incident. (See Appendix D – Test Fire Documentation.)

D. Compliance with Policy Related to Prescribed Fire Planning and Implementation

The burn plan package is complete and well organized. All necessary elements are addressed and related documents are present and in order. The burn plan has some well-written, detailed elements. Some elements (such as Contingency Resources) provide general direction and allow the Burn Boss to determine specific parameters or details in an ad hoc manner immediately prior to, or during, burn implementation.

The review of the burn plan for the Breaks 1 Unit 4 Prescribed Fire indicates that the plan was developed for implementing the burn under a spring window. However, the plan states that the project can be implemented as a spring *or* fall burn, "***if snow or higher moisture content is present***".

E. Prescribed Fire Plan Elements, Observations and Comments, and Potential Contributions to Prescribed Fire Escape

PRESCRIBED FIRE PLAN ELEMENTS:	OBSERVATIONS AND COMMENTS	DID THIS PLAY A ROLE IN ESCAPED FIRE?
1. Signature Page	This was complete.	NO
2. GO/NO-GO Checklists	This was completed. The GO/NO-GO was approved by the qualified Agency Administrator.	NO
3. Complexity Analysis Summary	The complexity analysis is complete. The analysis summary identifies that the probability of escape is low if burned early in the spring. It did not address expectations for fall implementation. A handwritten mitigation on the complexity analysis summary signature sheet stated: *"Moisture to limit fire spread. We have had higher than average precipitation this fall and last spring."* This handwritten mitigation was not provided by the preparer of the complexity analysis and was provided on same day as signature.	**Potential Factor**
4. Description of the Prescribed Fire Area	Complete physical description. Project Boundary identifies, in local terms, the general project well. However, project boundary does not identify any physical, natural or human made barriers. Vegetation/Fuels description was adequate, except for lack of identification of the presence of mistletoe pockets both inside and outside of project boundaries.	**Potential Factor**
5. Goals and Objectives	Most objectives of the burn stated in measurable terms. Objectives of all burn plans should be "S.M.A.R.T." (Specific, Measurable, Achievable, Relevant, and have a Timeframe) in design and provide a description or reference to end state at time of accomplishment.	NO
6. Funding	Good.	NO
7. Prescription	Good. A wide range of weather parameters were used to accommodate varying spring conditions. (Temperature 35 to 85 deg, RH 55 to10%, mid-flame wind 0 to 10 mph, wind direction N/A, 1-hr fuel moisture	**Potential Factor** Although the burn was within prescription parameters, the narrative associated

		[FM] 12 to 6%, 10-hour FM 14 to 7%, 100-hr FM 22 to 9%.) A seasonal severity indicator may have assisted in determining if conditions for fall implementation were appropriate. A wide range of fire behavior parameters were also used to accommodate a spring window for fuel models 2, 8 and 10. (Rate of spread 1 to 134 chains per hour, Flame length 1-8 feet, Scorch height-1 to 93 feet, Probability of ignition18 to 56%, and spotting distance 0 to 2/10th of a mile.) Included in the "additional comments" for the fire behavior prescription: *"The Breaks 1 project will most likely be implemented when snow or higher moisture content is present on north and easterly aspects. An early spring or late fall burn will provide these kinds of conditions. Experience shows that snow will be present; under these conditions spread is limited and easily contained within wetter aspects."*	with prescription clearly identified less risky conditions ("…*snow will be present*…") than were present when the burn was implemented. Actual conditions were not as described in the prescription.
8.	**Scheduling**	Element 8 states: *"Spring/fall, anytime that allows for prescription parameters, goals and objectives to be met with adequate resources."* Prescription parameters were developed for spring. Separate parameters needed to be developed for fall implementation.	**Potential Factor**
9.	**Pre-Burn Considerations**	General in nature: The burn plan delegates responsibility to the Burn Boss for field check for favorable conditions, site/structure preparation, fire line construction, hose lays, and water source determination prior to implementation. The Burn Boss completed these items. However, site preparation, fire line construction, hose lay placement, and water source determinations should be identified within the burn plan at predetermined locations as part of project development.	**Potential Factor**
10.	**Briefing**	Good. Easy to follow and understand.	NO
11.	**Organization and Equipment**	The organization and equipment list was developed for a spring burn window. The minimum identified personnel ranged from low at 1-RXB2, and 2-FFT2 to High at 1-RXB2, 1-FIRB, 1-Hold specialist (single resource qualified), and 20- FFT2. The burn plan also called for 1-HMGB and 1-PLDO (if utilizing aerial ignition at any time). Equipment for all ranges included: 1- type 3 helicopter with PSD machine (if utilizing aerial ignition), 1 drip torch per lighter, and 1 boat (if not utilizing helicopter). The "notes" section states: *"Seasonal variability, as well as individual burn-unit variability and weather outlooks will dictate resource needs on a given burn day. Needs should be evaluated by the Burn Boss prior to each burn event"*. Modeling for a fall burn window, using a seasonal severity indicator and determining suppression production rates	**Potential Factor**

		are appropriate for developing burn plan parameters and in this case may have indicated the project required an RXB1 based upon day of escape burn organization at 70 personnel. One participant indicated that approximately a 90-person organization under implementation conditions may have been desired. Other participants have suggested that: *"…hindsight tells us that we probably needed 20 more firefighters for holding. However, even if we had written this for a fall burn (without hindsight) we still probably would have identified a 70-person organization."* "*Another key point to be made is it would not have mattered how many crews we had, spots would not be able to be contained because of the safety hazards.*"	
12.	**Communications**	Communications Plan is adequate for the project.	NO
13.	**Public, Personnel Safety and Medical Procedures**	Covers firefighter safety in depth. Identified the need for press releases and road signs and notifications.	NO
14.	**Test Fire**	Test fire was documented. More detailed observations would be beneficial	NO
15.	**Ignition Plan**	This element is good.	NO
16.	**Holding Plan**	The holding plan is sufficient for a springtime burn. Critical holding points are identified but are delegated to Burn Boss to mitigate without specific direction, tactics, or strategies.	**Potential Factor**
17.	**Contingency Plan**	The burn plan did not identify specific contingency resources or fire line production rate capabilities required for containing unwanted fire at any range fire behavior. The burn plan delegated the Burn Boss the responsibility to determine the type, amount, location and availability of contingency resources daily. For this burn, the contingency resources were onsite and assigned to specific non-critical tasks during the burn, with instructions to remain ready to take contingency actions. The location of the identified critical holding points on Napoleon Ridge in relation to the east control line/project boundary were identified as infeasible to safely use ground resources to contain any spots over the line. A helicopter was identified but was unable to fly when the spots occurred. Fire behavior modeling for	**Potential Factor**

		the conditions under which the burn will be conducted produces the parameters for using the fire line handbook or matrix in the regional prescribed fire plan template to determine the appropriate amount and type of resources. Identified resources were not enough. The burn plan calls for 48 hours to bring fire back into prescription while the current policy is "*cannot be contained by the end of the next burning period*."	
18.	**Wildfire Conversion**	This element is good.	NO
19.	**Smoke Management and Air Quality**	This element is detailed and understandable.	NO
20.	**Monitoring**	Good. Not completed. Not required to be completed at the time of this analysis.	NO
21.	**Post-Burn Activities**	Good. Not completed. Not required to be completed at the time of this analysis.	NO

F. Analysis of the Prescribed Fire Plan

As previously explained under this section's *B. Analysis of Actions Taken—Addressing their Consistency with the Prescribed Fire Plan—Leading Up to the Wildfire Declaration*, all components of the burn plan were developed in accordance with policy. The burn prescription and contingency plan were developed with an intentionally broad range to ensure that the burn could be implemented under a wide range of "burn windows". This approach to burn plan development is within policy but requires thoughtful consideration by the prescribed fire overhead (RXB, FIRB, etc.) immediately prior to the first ignition and throughout the duration of the burn.

In this case, there was a strong desire by District personnel to have the burn completed prior to the end of the fiscal year. Consequently, when the Burn Boss and others started the pre-burn preparations, they gave less time and consideration to adjusting burn plan parameters to fit the specific conditions of late September 2010.

When determining the numbers and types of contingency resources and specific prescriptions *after* it has been decided to burn, there is a tendency to make the weather situation and available resources fit the burn rather than objectively determining the *necessary* set of resources for the conditions or the *best* weather parameters for available resources. In this case, reliance on helicopters for attack of spot fires east of Napoleon Ridge did not anticipate strong winds and smoky conditions.

Resource design criteria, derived from the project's Environmental Assessment, called for retention of 50-60 percent surface vegetation, litter, or duff to prevent surface soil erosion. Other criteria included a constraint on tree mortality of less than 25 percent for overstory pine and fir. No specific prescription parameters were identified as necessary to meet these design criteria.

This burn plan was developed with the philosophy of providing the Burn Boss with ample flexibility to meet the objectives under a wide range of conditions by adjusting firing rate and pattern as fuel moisture and weather conditions changed. While this is a legitimate method for planning and implementing landscape-scale burns which require multiple days to complete, it also increases the workload and complexity of tasks for the Burn Boss.

Prescription parameters, burn staffing and equipment needs, and contingency actions were developed for spring conditions—which would have used snow on the ridgelines to contain fire spread. However, snow was not present and the wetter-than-average fire season had provided the local fire managers an incorrect impression of moist, low-risk fuel conditions.

Figure 9 – Fuel and topography outside (to the east) of the planned prescribed burn unit.

The burn plan modeled surface rate of spread for fuel models 2, 8, and 10, as well as probable spotting distance at the low, medium, and high-end prescription categories (predicted to be up to 0.2 of a mile). The fuel models used were representative of the fuels both inside and outside the burn unit. However, the presence of numerous mistletoe-infected Douglas fir trees was not known by the burn planner (nor could they have been modeled for fire behavior).

This unusual vegetation complex created a fuel structure where the "brooms" of the infected trees draped down to the ground. This condition created a ladder-fuel that is not well represented by the standard fuel models. The prescribed burn participants identified this condition as a major factor in the increased incidence of tree torching along Napoleon Ridge.

Figure 10 – Canopy fuel conditions representative of those along Napoleon Ridge. Upper left photo depicts a mistletoe "broom". Upper right photo depicts crown structure of many of the trees (extending to near ground level). The low crowns contributed to the surface fire transitioning to torching, and the mistletoe brooms contributed to prolific ember production. The combination resulted in many embers crossing the fireline and creating spot fires.

Discussions with burn participants revealed a mix of comfort levels with fall implementation. A representative comment: "*We felt comfortable switching to a fall burn because our mindset was that, it was so wet all year that we were not in a normal September pattern. We felt conditions were closer to a late fall window and that higher moisture content was present."*

Representative comments from those with a different perspective: *"Experience shows that fall is not the appropriate time of year for burning these fuel types." "The project should be postponed until the conditions are appropriate and preparation work was complete."*

G. Qualifications and Experience of Key Personnel Involved in the Prescribed Fire

Line Officer's Qualifications, Experience, and Involvement

The line officer is the North Fork District Ranger. He was actively engaged in the planning, analysis, and implementation of the prescribed burn. His experience with prescribed fire is extensive, from carrying a drip torch to burn plan preparation, and serving as Agency Administrator on 15 prescribed burns. His qualifications: Agency Representative (AREP), Public Information Officer (PIOF), and Firefighter Type 2 (FFT2).

A May 25, 2010 letter from the Forest Supervisor delegates authority to the District Ranger for approving "moderate" complexity prescribed fire plans.

Key Positions on the Prescribed Fire and Their Qualifications

Position	Qualification Date	Meets Requirements	Other Qualifications
Burn Boss Type 2	RXB2 – June 2006	Yes	FIRB, ICT3, STCR, STDZ, TFLD
Burn Boss Type 2 Trainee	RXB2(t) – Task Book activated September 2010	Yes	CRWB, ENGB, FIRB, ICT4, STEN
Burn Plan preparer	RXB2 – September 2008	Yes	ICT 3, TFLD, FIRB, HMGB
Burn Plan technical review	RXB1 – June 2007	Yes	FIRB, ICT3, DIVS, SOFR, SOPL, SOF2 (trainee).

H. The Level of Awareness and Understanding of Prescribed Fire Planning and Implementation Procedures and Guidance of the Personnel Involved

The development of the Breaks 1 Unit 4 burn plan followed the Interagency Burn Plan Template included in the *Interagency Prescribed Fire Implementation Procedures Reference Guide* (2008). The plan was prepared during March 2010 when snow prevented access to the unit. The burn plan preparer indicated that there was strong local desire to have the burn plan completed before the spring burn season.

Consequently, the plan was prepared without on-the-ground reconnaissance. Instead, the plan was developed with GIS mapping technologies and remotely sensed imagery informed by the plan preparer's years of experience in the local area. Participants and local leadership recognized that there is a drawback in relying too heavily on easily accessible sources of information such as GIS without ground-truthing. Many of the participants agreed that thorough field reconnaissance of the unit and site-specific estimation of fire behavior and desired fire effects is critical to successful burn implementation

The contingency plan stated: *"If a prescribed fire exceeds the parameters within the written prescription, the available resources identified in the contingency plans may be used to bring the prescribed fire back within written prescription guidelines during the 48-hour timeframe."* Current policy states: *"A prescribed fire must be declared a wildfire when the fire has spread outside the project boundary, or is likely to do so, and cannot be contained by the end of the next burning period"* (*Interagency Prescribed Fire Planning and Procedures Guide* 2008).

Despite this statement in the burn plan (above), the actions taken were in compliance with policy. The fire was declared an escape by the next burn period. All indications confirm that a good awareness of policy existed. This statement in the burn plan had no effect on the escape or declaration.

6. Summary of Organizational Conditions that Contributed to the Prescribed Fire Escape and Wildfire Declaration

A. Organizational Conditions that May Have Contributed to the Escape – Identified by the Prescribed Fire Participants

Unit Boundary was Problematic

The project and unit boundary established during the NEPA process was identified by most of the prescribed fire participants as a fundamental problem which greatly increased the difficulty of successfully conducting this burn.

The southeast unit boundary along Napoleon Ridge was also the project boundary. This ridge/control line was situated above a very steep east-facing slope (outside the unit) that was dominated by grassy fuels with scattered timber litter. This west side of the ridge (inside the unit) was dominated by mixed conifer and grass fuels with pockets of mistletoe-infected fir. The mistletoe infected fir provided an excellent ladder for surface fire to climb into the crowns and cast embers into the stronger winds above treetop for downwind deposition.

This condition was recognized by planners and implementers and was mitigated by conducting firing operations only when winds were from the east (sending embers back inside the unit). When forecasted winds occurred from the west, embers were cast to the east onto receptive fuels on the east-facing slope outside of the unit.

The plan preparer and Burn Boss assumed that there was no option of moving the control line along Napoleon Ridge to a more favorable location because it would have required a new NEPA decision along with additional interdisciplinary analysis of effects. Moving the control line would therefore have made the burn unit unavailable for the fall 2010 burn season.

Self-Imposed Pressure to Attain Hazard Fuel Reduction Targets

There was an assumption that the hazard fuel allocation to the District or Forest would decline if targets weren't achieved each year. This led to self-imposed pressure within the local unit to attain the hazard fuel reduction target before the end of the fiscal year.

Some participants believe that there was a lack of critical discussion with "old-timers" and newcomers to the District concerning how fire behaves in the vicinity of the Breaks 1 Unit 4 burn unit. While some participants believe adequate discussion occurred, several of the participants and other local unit personnel are convinced that meaningful discussion about fire behavior and holding and containment issues did *not* occur.

Explained one participant: *"Once the decision to burn Unit 4 was made, it felt like we were on a wildfire. The rate of activity picked up and we felt rushed to get it done before the end of the year. We couldn't spend the time we'd like to have on reconnaissance and contingency planning because of the fiscal year deadline coming up fast."*

Another participant comment: *"Between the budget limitations and the tight timeframes to get the burn completed we felt like we 'short-cut' planning, preparation, and organization/staffing that we might have done had timing and budget not been an issue. We tried to make the burn fit the budget and the timing rather than find the right time and fund the right organization."*

Prescribed Fire Plan Increased the Complexity for Burn Boss

The prescribed fire plan relegated several elements to the Burn Boss to determine at the time of the burn. While this approach provides flexibility, it also increases the complexity for the Burn Boss position.

Surface cover retention and tree mortality limit objectives, daily assessment and arrangement for contingency resources, budget uncertainties, and year-end target accomplishment pressures were among the issues which added complexity to the Burn Boss workload.

Figure 11 – Implementing the Breaks 1 Unit 4 Prescribed Fire on the west side of Napoleon Ridge. Photo was taken inside the burn unit prior to the escape.

B. Organizational and Physical Conditions that May Have Contributed to the Escape – Identified by the Facilitated Learning Analysis Team

Factor	Description	Consequences
Windspeed Increase [Primary]	South to east (down slope) winds were desirable for successful completion of the burn unit. Between 1400 and 1500 hours on Sept. 28, 2010, an unforecasted wind shift occurred. Wind characteristics changed from moderate strength, easterly downslope, to strong, westerly upslope. The wind increase and change in direction triggered a decision to stop ignition operations. Almost immediately, embers began crossing the control line along Napoleon Ridge. Eventually, two large spot fires developed well below the control line to the east.	Spot fires developed from embers reaching non-target fuels well below the control line on Napoleon Ridge. The strong winds, very steep terrain, fire below crew positions in flashy fuels, and limited visibility due to smoke and approaching sunset, all made it unsafe to attack the spots with helicopters or handcrews that evening.
Unit Layout [Primary]	The unit boundary/containment line along Napoleon Ridge on the east side of the unit was situated precariously with very steep terrain outside the unit. Both the fuels specialist providing input to the NEPA process and the burn plan preparer were faced with no options for moving the unit boundary due to establishment of the project boundary along Napoleon Ridge. The project boundary was established along Napoleon Ridge to avoid extending the analysis into an additional watershed. It was recognized that it would be difficult or impossible to contain spot fires in some areas to the east of the ridge due to safety exposure concerns. The Burn Boss recognized that helicopters were the only feasible option to keep the spots in check until the weather would change.	Prior to ignition it was recognized that spots to the southeast could only be contained with aviation support. Helicopter bucket work was unsafe and ineffective due to smoky, windy conditions. Handcrews could not attack the spot due to their downhill location in flashy fuels with potential for rollout followed by rapid upslope runs toward crew positions. Snag and rock hazards were also present.
Spring Planning and Fall Implementation [Secondary]	The prescribed fire plan was developed for spring burning with snow or wet conditions present along Napoleon Ridge.	Increased area of receptive fuel bed. Control line placement in locations with limited ability to hold.

On-the-Ground Assessment in Planning and Prior to Implementation [Secondary]	An assessment of holding lines and critical holding points prior to deciding to implement project would have allowed more time to assess feasibility of project.	Determining holding lines on the fly, determining resource needs (implementation and contingency) and making on-the-spot decisions rather than predetermined actions.
Burn Boss Workload/Complexity [Secondary]	The plan relegated several elements to the Burn Boss to determine at the time of the burn. While this approach provides flexibility, it also increases the complexity of the Burn Boss position. Achieving surface cover retention and tree mortality objectives, performing daily assessments of and planning for ignition and holding personnel, equipment ordering and support, planning for contingency resources, budget uncertainties, and year-end target accomplishment were among the issues which—because they were assigned to the Burn Boss' discretion—also contributed to increased complexity of the Burn Boss' workload.	The holding/contingency plan developed by the Burn Boss relied on helicopter buckets to hold Napoleon Ridge. The weather and visibility conditions present when the spot fires occurred precluded safe use of aerial resources.
Sense of Urgency to Complete the Burn [Secondary]	Burn plan writers felt rushed to complete the plan to take advantage of the upcoming spring burning window, resulting in shortcuts in field work and reliance on map data rather than field recon. The fiscal year's end was approaching, project funds were exhausted, and new money from the Region was requested. There was a strong desire to expend FY10 funds and achieve targets due to the belief that failure to expend the funds and accomplish the target would reflect poorly on the program and result in reduced fuels funding the next year.	Participants consistently reported that there were pressures to produce and execute the plan—both fiscal and production pressures, some external and some self-imposed. These pressures conspired to cause the burn participants to rush through the planning process and served to minimize plan review and field reconnaissance efforts.

C. Summary of Prescribed Fire Escape Potential Contributing Factors

Burn Unit Layout

The south and east unit boundaries were located on ridgelines with poor vehicle access and difficult holding conditions.

On-the-Ground Reconnaissance

Only limited on-the-ground reconnaissance was conducted during the NEPA planning phase and up to the assignment of handcrews to implement the burn.

Unforecasted Wind Increase

An unforecasted windspeed increase during a four-hour period resulted in spot fires on the east side of the burn unit that led to the escape declaration.

Change from Spring to Fall Burn

Holding and contingency actions identified in the burn plan were based on spring conditions.

Sense of Urgency to Complete the Burn

The fiscal year end was approaching. A strong desire existed to expend FY10 funds and achieve targets. This created an atmosphere which led burn managers to (unknowingly) devalue information which might have led to a delay or cancellation of the burn.

Burn Boss Workload/Complexity

The burn plan relegated several elements to the Burn Boss to determine at the time of the burn. While this approach provides flexibility, it also increases the complexity of the Burn Boss position. Surface cover retention and tree mortality limit objectives, daily assessment and arrangement for contingency resources, budget uncertainties, and year-end target accomplishment pressures were among the issues which added complexity to the Burn Boss's workload.

7. Lessons Learned

A. Lessons Learned Identified by the Participants

- "Put boots on the ground when you're the Burn Boss, don't get all excited about burning until you are familiar with the unit and the plan."

- "Walk the ground when building the plan…the plan is only as good as the information that goes into it…so go get the best info possible by getting out on the ground."

- "When you know you have a burn in an area that the National Weather Service has trouble forecasting for, that's probably a clue to set up a portable weather station." Another participant informed that: "We had two available in our cache we could have used". However, local fire managers stated that none were available (non-functioning or already assigned to BLM burns).

- "Would be good to have primary and back-up Burn Bosses identified and visit the burn site as a group so that any one of us might be able to step in when the windows arrive and we should be familiar with the burn."

- "NEPA analysis areas need to exceed [be larger than] the planned treatment area to allow room to maneuver and contain spot fires without having to declare a wildfire."

- "The budget was a huge distraction. There was always uncertainty as to how much money we had to work with. And we were constantly changing the plan to fit the budget."

- "Allow [adequate] time for planning and preparation for a burn rather than scheduling the burn implementation based on the end of the fiscal year."

- "Don't shy away from speaking up to others who out-rank you if you have a problem with the plan."

- "Accept good advice from wherever you find it, even if it comes from someone with less experience, qualifications, or rank than you".

- "Past good luck creates current bad habits."

B. Lessons Learned Identified by the Facilitated Learning Analysis Team

Mitigate Impacts from Unforecasted Weather Conditions

In some cases, the weather forecast will not be accurate (the wind will blow the wrong way or too hard, or the relative humidity will drop below predicted levels). On future burns, when these unforecasted conditions could potentially contribute to an undesired outcome, we should evaluate how to mitigate the impacts from unforecasted weather conditions.

In addition, in the aftermath of this event, we should follow-up by seeking ways to improve the forecasting for future prescribed burns.

Suggestions for Prescribed Fire Planners

Pressure to meet timelines should not force a planner to "shortcut" data collection, field reconnaissance, or any other part of the burn plan's development process. Planners should formulate prescriptions from the objectives by first collecting data to characterize the fuels, topography, potential weather, and other factors associated with the area to be burned. Desired fire behavior for achieving the objectives should be modeled to determine weather parameters needed to achieve objectives—while still retaining control of the burn.

Mathematical computer models can be useful, but they need to be used in conjunction with experience with fire in the area of the burn.

Consultation with mentors and other successful prescribed fire specialists should also be a component of the development of a burn plan.

We Need to Factor in a Realistic Orientation Process During New Employee Transition

When a local unit experiences a high percentage employee turnover, it should be recognized that it will require more time or effort to achieve the same level of output at the same level of quality and risk management. Consequently, exerting pressure to maintain high outputs will likely result in a reduced ability to identify and mitigate risk factors and a higher likelihood of undesired outcomes.

The Uncertainty of Funding Impacted the Prescribed Fire's Implementation Team

The uncertainty of sufficient funds available for the project at critical time periods created stress on this prescribed fire's implementation team. The burn project was given a budget of $50,000, available throughout the initial planning period. Explained one employee: *"Where things went awry was when we got the $50 thousand spent and still had not started ignition. We asked for additional funds from the Region to continue operations. We had them for one day and then they were taken back. The real issue is the large swings in dollar availability rather than not having funds available early."*

The Hazards of Targeting a Prescribed Fire for Completion by End of Fiscal Year

Targeting a prescribed fire for completion prior to the end of the fiscal year introduces pressure to diminish the importance of any of the burn plan elements or burn-specific risk factors which might require more time to address than is available to meet the targeted completion date.

Burn Plan Elements with Wide Parameters can Jeopardize Risk Mitigation When Burn Boss Lacks Experience in the Targeted Burn Area

Several burn plan elements were developed with wide parameters, leaving much discretion to the Burn Boss.

This concept in burn plan preparation can be very effective when both planner and Burn Boss are intimately familiar with weather and fire behavior characteristics for the burn area.

When the Burn Boss lacks in-depth experience in the burn area, broad parameters may leave too much discretion to the Burn Boss to ensure adequate risk mitigation.

Even if the Burn Boss is familiar with local factors, any planning that can be pre-defined helps to alleviate the workload on the Burn Boss, allowing them more capacity to focus on what remains to be sorted out on a day-to-day basis.

8. Recommendations

A. Burn Plan Development

- NEPA for prescribed fire should be developed based on thorough on-the-ground reconnaissance and intimate knowledge of weather and fire behavior characteristics for the burn area for any time period the burn might be conducted.
- NEPA planning should delineate unit boundaries based on ease of containment with potential fire intensity, spotting production, spotting distance, and receptivity of outside fuels as critical factors.
- Develop and review burn plan for specific season and conditions for implementation.
- Consider multiple plans or multiple burn plan elements (prescription, contingency plan, etc.) for differing times of the year (spring vs. fall), and for stages of the burn (blacklining vs. interior unit burnout).
- Contingency resources should be determined based on the high end of the prescription and should be described in the prescribed fire plan. Alternatively, contingency resources may be identified based on a range of low to high and tied to conditions present during actual implementation (e.g. spring vs. fall burn).
- Identify critical holding points and provide mitigations within the prescribed fire plan.
- Along with flexibility comes increased complexity. When constraints or prescriptive elements are purposely broad, complexity for the Burn Boss position increases. The Burn Boss must conduct more ad hoc assessments and adjustments to ensure objectives are met when the plan is "flexible". To reduce complexity for the Burn Boss, consider refining needs for preparation work, contingency resources, and mitigations for critical holding points in the plan.
- Include a form of seasonal severity measure into the prescribed fire plan.

B. Pre-Burn Preparations

- Assure that site has been prepared and that site conditions are within plan parameters *prior* to implementation.
- Allow Burn Boss the time to review plan and assess site *prior* to determining when project will be implemented.

C. Regional and National Recommendations

- ❖ Enhance communication and local-level understanding of budget availability at end of fiscal year and of consequences (or lack thereof) for failing to meet a target for a single fiscal year.
- Improve prescribed fire planner and implementer understanding of:
  - "Stage burning" and how to address this in burn plan prescriptions and complexity analyses. (It is often advisable to develop separate prescriptions, complexity analyses, and contingency plans for "blacklining" operations vs. main-unit firing.)
  - Contingency planning.
  - Burn unit layout.

9. Commendations

General

The Facilitated Learning Analysis Team could not have completed its assigned task without significant support from Salmon-Challis National Forest and North Fork Ranger District personnel. The Team wishes to thank all individuals who assisted for their support.

Line Officer Involvement

Line officers on the Salmon-Challis National Forest demonstrated high levels of interest and participation in the burn program. They also demonstrated an eagerness to learn from experience and to adapt. Continued support in this manner will contribute to success in the future.

Prescribed Burning Program

The burn program on the Salmon-Challis National Forest and North Fork Ranger District has a well-experienced, highly trained staff. Many of these personnel are new to the Salmon-Challis but have great potential to conduct a productive and successful burn program.

Public Communication and Involvement

While there were localized expressions of dissatisfaction with U.S. Forest Service prescribed burning as a result of this escape, there were also local persons who spoke up for the agency and its efforts in protecting private lands.

Decision Making and Leadership

The decision to complete the burn as the wildfire was being contained was a wise and mindful decision which undoubtedly saved the agency considerable monies by avoiding the need to re-plan and reassemble a burn team at a future time. This decision successfully ensured that the original objectives of the burn were achieved.

- The decision to not commit personnel to certain parts of Napoleon Ridge because of hazards that could not be mitigated was an insightful and appropriate decision made prior to ignitions. The Forest should be commended for respecting that decision after spot fires were established in one of those pre-identified areas.
- The decision to make the incoming Incident Management Team responsible for completing the prescribed burning project while also managing that portion of the fire which escaped was wise and commendable. The results of the burn appear to have achieved the objectives which were intended by the project. The undesired fire was addressed and the desired outcome of the burn project was still accomplished.
- The implementation team recognized the technical problems with burning this unit as they encountered them and made appropriate adjustments as needed rather than just implementing the plan as written.

10. References

Forest Service. 2002. Forest Service Manual 5100 Fire Management. Chapter 5140 – Fire Use. R3 Supplement No. 5100-2000-2. U.S. Forest Service, Southwestern Region. Albuquerque, NM

Forest Service. 2007. Forest Service Handbook, FSH 5109.17, Training & Qualifications Standards. U.S. Forest Service, Washington, D.C.

Forest Service. 2008. Forest Service Manual 5100 Fire Management. Chapter 5140 – Fire Use. U.S. Forest Service, Washington, D.C. http://www.fs.fed.us/fire/fireuse/rxfire/rxfireguide.pdf .

Lemhi County, Idaho. 2006. Lemhi County Wildland Fire Hazard, Risk, & Mitigation Plan, Lemhi County, Salmon, ID. http://www.fs.fed.us/r4/sc/projects/#Plans .

NWCG. 2008. Interagency Prescribed Fire Planning and Implementation Procedures Guide. National Wildfire Coordinating Group. National Interagency Fire Center, Boise, ID.

Pyne, Stephen J.; Andrews, Patricia; and Laven, Richard D. 1996. Introduction to Wildland Fire, 2nd ed. Wiley & Sons. NY.

Salmon NF. 1988. Land and Resource Management Plan for the Salmon National Forest. U.S. Forest Service. Salmon National Forest. Salmon, ID. http://www.fs.fed.us/r4/sc/projects/#Plans .

Salmon-Challis NF. 2010. Breaks One Unit Four Prescribed Fire Burn Plan. U.S. Forest Service. Salmon-Challis National Forest. Salmon, ID.

U.S. Forest Service. 2010. Facilitated Learning Analysis Implementation Guide. http://wildfirelessons.net/documents/Organizational_Learning_APA_FLA_Guides_2010.pdf .

U.S. Forest Service. 2000. National Fire Plan, U.S. Forest Service, http://www.fs.fed.us/r1/nfp/ .

USDA/USDI. 2000. Managing the Impact of Wildfires on Communities and the Environment, A Report to the President In Response to the Wildfires of 2000. U.S. Department of Agriculture, U.S. Department of the Interior. Washington, D.C. http://www.forestsandrangelands.gov/ .

USDI/USDA. 2008. Interagency Standards for Fire and Fire Aviation Operations (Red Book). U.S. Department of the Interior/U.S. Department of Agriculture. National Interagency Fire Center, Boise, ID. http://www.nifc.gov/policies/guides.htm .

11. Glossary of Acronyms and Terms

Escaped Prescribed Fire – A prescribed fire that has exceeded or is expected to exceed prescription parameters or otherwise meets the criteria for conversion to a wildfire. Criteria are specified in the *Interagency Prescribed Fire – Planning and Implementation Procedures Reference Guide*.

FIRB (Firing Boss) – The Firing Boss reports to the Prescribed Fire Burn Boss and is responsible for supervising and directing ground and/or aerial ignition operations according to established standards in the prescribed fire plan.

FFT1 (Fire Fighter) – A working leader of a small group (usually not more than seven members), who is responsible for their performance, safety, and welfare.

Fuel Moisture – A measure of the water content of a particular fuel particle or class of fuel particles (see "Timelag Fuels" on following page) which has a direct effect on the particle's ability to initiate and sustain combustion. Expressed as a percentage (10 percent fuel moisture means that water makes up 10 percent of a particle's current weight).

GIS – Geographic Information System which is any system which captures, stores, processes, and displays computerized map data.

Ground-Truthing – The act of visually inspecting the treatment area in order to verify that actual conditions match those depicted in the treatment plan.

Helibase – The main location within the general incident area for parking, fueling, maintenance, and loading of helicopters.

Incident – An occurrence either human-caused or natural phenomenon that requires action or support by emergency service personnel to prevent or minimize loss of life or damage to property and/or natural resources.

ICT1/ICT2/ICT4/ICT5 (Incident Commander) – The Incident Commander position is responsible for overall management of the incident. The Incident Commander reports to the Agency Administrator for the agency having incident jurisdiction.

Interagency Hotshot Crew (IHC) – A 20-person crew that specializes in wildland fire operations. An IHC maintains the highest level of skill , expertise, and ability of any hand-crew type recognized in the United States.

Mistletoe – The common name for a group of parasitic plants that grow attached to and within the branches of a tree or shrub.

Mop-Up – Extinguishing or removing burning material near control lines, felling snags, and trenching logs to prevent rolling after an area has burned; to make a fire safe; or, to reduce residual smoke.

NEPA – The National Environmental Policy Act (NEPA) requires Federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.

NFDRS – National Fire Danger Rating System. A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.

Prescribed Fire – A wildland fire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which NEPA requirements (where applicable) have been met prior to ignition (see *Planned Ignition*).

RAWS – Remote Automatic Weather Station. Portable weather stations with ability to transmit weather observations to a national database for analysis and archival. Weather observations and calculated fire danger indices are made available to field personnel in "near-real time" via Internet.

RXB2 (Prescribed Fire Burn Boss – Type 2) – Person responsible for supervising a prescribed fire from ignition through mop-up. (See definition for "Type" below.)

Spot Weather Forecast – A special weather forecast requested through the nearest office of the National Weather Service. These forecasts are issued upon request of the user agency and are more detailed, timely, and site-specific than regular zone forecasts. Frequently requested by a Burn Boss before igniting a prescribed fire.

Timelag Fuels – Dead fuels are categorized into fuel diameter classes named according to the timelag principle (Pyne and others 1996). This principle is based on the fact that the proportion of a fuel particle exposed to weather is related to its size. Small diameter fuels can change rapidly in response to weather changes, while larger diameter fuels are slower to respond. A timelag is the time required for a fuel particle to reach 63 percent of the difference between the initial moisture content and the equilibrium moisture content (or equilibrium with changed atmospheric conditions). The categories are named for the "midpoint" of the response time of each fuel category: 1-hour fuels respond in less than 2 hours, 10-hour fuels respond in 2 to 20 hours, 100-hour fuels respond in 20 to 200 hours, and 1,000 hour fuels respond in greater than 200 hours.

Type (1/2/3) – Refers to resource capability. Resource typing provides managers with additional information in selecting the best resource for the task.

12. Appendices

Appendix A – Burn Plan

Breaks One
Unit 4
Prescribed Fire Burn Plan
Salmon-Challis National Forest

PRESCRIBED FIRE PLAN

Breaks One Unit 4	Salmon-Challis NF, North Fork RD

Prepared By: ***S-C NF personnel*, RXB2** **Date:** **March 31, 2010**

(Name, Qualification)

Technical Review By: _____ **Date:** _____

(Name, Qualification)

Technical Review By: _____ **Date:** _____

(Name, Qualification)

Complexity Rating: **Moderate**

Approved By: _____ **Date:** _____

(Agency Administrator)

***ITEMS IN RED MUST BE REVIEWED AND SIGNED THE DAY OF THE PRESCRIBED FIRE.**

***ITEMS IN YELLOW MUST BE REVIEWED AND SIGNED PRIOR TO IMPLEMENTAION.**

***ITEMS IN GREEN MUST BE ADDRESSED NO LATER THAN TWO WEEKS AFTER THE PRESCRIBED FIRE IS COMPLETE.**

ELEMENT 2: AGENCY ADMINISTRATOR PRE-IGNITION APPROVAL CHECKLIST

The Agency Administrator is required to complete the Agency Administrator Pre-ignition Approval Checklist. The Agency Administrator's Pre-Ignition Approval Checklist evaluates whether compliance requirements, RXBPs elements, and internal and external notification(s) have been completed and expresses the Agency Administrator's intent to implement the Prescribed Fire Plan. The checklist establishes the expiration date for the implementation of the Prescribed Fire Plan. The Prescribed Fire Burn Boss will not implement the RXBP without completion of the Agency Administrator's Pre-Ignition Approval Checklist.

YES	NO	KEY ELEMENT QUESTIONS
		Is the Prescribed Fire Plan up to date? *Hints: amendments, seasonality.*
		Will all compliance requirements be completed? *Hints: cultural, threatened and endangered species, smoke management, NEPA.*
		Is risk management in place and the residual risk acceptable? *Hints: Prescribed Fire Complexity Rating Guide completed with rational and mitigation measures identified and documented?*
		Will all elements of the Prescribed Fire Plan be met? *Hints: Preparation work, mitigation, weather, organization, prescription, contingency resources*
		Will all internal and external notifications and media releases be completed? *Hints: Preparedness level restrictions*
		Will key agency staff be fully briefed and understand prescribed fire implementation?
		Are there any other extenuating circumstances that would preclude the successful implementation of the plan?
		Have you determined if and when you are to be notified that contingency actions are being taken? Will this be communicated to the Burn Boss?
		Other:

Recommended by: _____ Date: _____
FMO/Prescribed Fire Burn Boss

Approved by: _____ Date: _____
Agency Administrator

Approval expires (date): _____

ELEMENT 2: PRESCRIBED FIRE GO/NO-GO CHECKLIST

Prior to all ignition operations, the assigned Prescribed Fire Burn Boss will complete and sign the Prescribed Fire GO/NO-GO Checklist. For each day of active ignition on a prescribed fire, a separate daily GO/NO-GO Checklist is required.

	YES	NO
A. Has the burn unit experienced unusual drought conditions or contain above normal fuel loadings which were not considered in the prescription development? If NO proceed with checklist., if YES go to item B.		
B. If YES have appropriate changes been made to the Ignition and Holding plan and the Mop Up and Patrol Plans? If YES proceed with checklist below, if NO STOP.		

NO	YES	QUESTIONS
		Are ALL fire prescription elements met?
		Is ALL smoke management specifications met?
		Has ALL required current and projected fire weather forecast been obtained and are they favorable?
		Are ALL planned operations personnel and equipment on-site, available, and operational?
		Has the availability of ALL contingency resources been checked, and are they available?
		Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?
		Have all the pre-burn considerations identified in the Prescribed Fire Plan been completed or addressed?
		Have ALL the required notifications been made?
		Are ALL permits and clearances obtained?
		In your opinion, can the burn be carried out according to the Prescribed Fire Plan and will it meet the planned objective?

If all questions were answered "YES" proceed with a test fire. Document the current conditions, location, and results.

_____ _____

Prescribed Fire Burn Boss Date

ELEMENT 3: COMPLEXITY ANALYSIS SUMMARY

ELEMENT	RISK	POTENTIAL CONSEQUENCE	TECHNICAL DIFFICULTY
1. Potential for escape	Low	Moderate	Low
2. Number and dependence of activities	Low	Low	Low
3. Off-site Values	Moderate	Moderate	Low
4 On-Site Values	Low	Low	Low
5. Fire Behavior	Moderate	Moderate	Low
6. Management organization	Moderate	Moderate	Moderate
7. Public and political interest	Low	Moderate	Low
8. Fire Treatment objectives	Low	Low	Moderate
9 Constraints	Low	Low	Low
10 Safety	Moderate	Moderate	Moderate
11. Ignition procedures/ methods	Moderate	Moderate	Moderate
12. Interagency coordination	Low	Low	Low
13. Project logistics	Moderate	Moderate	Moderate
14 Smoke management	Moderate	Low	Low

COMPLEXITY RATING SUMMARY	
	OVERALL RATING
RISK	Moderate
POTENTIAL CONSEQUENCES	Moderate
TECHNICAL DIFFICULTY	Moderate
SUMMARY COMPLEXITY DETERMINATION	**Moderate**
RATIONALE: Breaks One, Unit #4 is rated for a moderate complexity prescribed burn. This unit is located south of the Salmon River which will make access difficult, but provides a safety margin for personnel and Forest users with regards to the Salmon River Road. Probability of escape is low if the unit is burned in the early spring. Resource objectives are straightforward and attainable. Limited ground forces are needed for holding. Aerial Ignition puts this unit into moderate complexity due to logistical needs and extra safety concerns associated with this operation. Smoke impacts are expected to be short-duration.	

Prepared by: ***S-C NF personnel*** Date: March 10, 2010

Approved by: _____ Date: _____
(Agency Administrator)

ELEMENT 4: DESCRIPTION OF PRESCRIBED FIRE AREA

A. Physical Description

Breaks Number One, Unit 4

Legal description: (Boise Meridian)	T:	24N	R:	21E	Sec:	19, 20, 29, 30
Latitude:		N 45°	Longitude:			W 114°
Project Acres:		12,000	County:			Lemhi
Primary Unit Acres:		2039	Drainage:			Salmon River
Low elevation:		3500	Average aspect:			North
High elevation:		6700	Average slope:			60%

Project Boundary
This project is within the boundary of the North Fork Ranger District, Salmon-Challis National Forest. It is located on the south side of the Salmon River drainage from Napoleon Ridge downriver to the hydrologic divide northeast of Dump creek. It excludes Unit 5, which is the grassy flat (floodplain) which lies between Unit 4 and the Salmon River.

B. Vegetation/Fuels Description

On-Site Fuels Data					Adjacent Fuels Data	
NFDRS Fuel Model(s):		2	8	10	NFDRS Models	Same as unit
Fire Regime(s)		1	1	1	Fire Regime(s)	1&2
Fire Condition Class(es)		3	3	3	Fire Condition Class(es)	3
Fuel Loading tons/acre	1 hour tlf	**2.0**	**0.4**	**0.8**	General Description of Adjacent Fuels	
	10 hour tlf	**1.0**	**0.9**	**1.8**	Vegetation outside the burn unit is the same as within.	
	100 hour tlf	**0.5**	**1.2**	**3.7**		
	1000 hour tlf	**NA**	**5.3**	**9.9**		
	Litter depth:	**NA**	**NA**	**NA**		
	Duff depth:	**NA**	**NA**	**NA**		
	Live woody:	**NA**	**NA**	**NA**		
	Live herbaceous:	**.5**	**NA**			
	Total fuel loading:	**3.5**	**7.8**	**16.2**		

Comments:

Fuel types in this unit range from bunch grasses and sparse sage brush to open dry Douglas-fir with grass and litter ground fuels, to heavier pockets of mixed-conifer, to mid-successional Douglas-fir overstory with brush understory. There are pockets of aspen which will be treated with fire to promote regeneration; and pockets of mountain mahogany, which will generally be excluded from burning operations.

Unit 4 is best represented by fuel models 2 (timber, grass and understory), 8 (timber, closed timber litter), and 10 (timber, litter and understory). The fuel loading within the unit ranges from 1-20 tons per acre. Loadings were determined with the Photo Guide for Appraising Downed Woody Fuels in Montana Forests (Fischer, 1981) and Aids to Determining Fuel Models (Anderson, 1982). The above fuel loadings represent an average of the concentrations found in the units.

C. Description of Unique Features

1. An active bald eagle nest at deadwater requires a ¼ mile no-fly buffer.
2. The Charlie Rose homestead is located on a large terrace at the bottom of the unit. This site will be protected by avoiding all ground disturbance within the site boundary and by creating a blackline around the site, if necessary, to avoid loss of the site by fire.
3. No ignition in or below mountain mahogany stands.
4. No ignition in riparian areas, though backing fire is acceptable.

ELEMENT 5: GOALS AND OBJECTIVES

Goals: The Breaks Number One Environmental Assessment is the NEPA document supporting this project. The purpose of the Breaks 1 Ecosystem Restoration Project is to improve plant vigor and restore the historic ecosystem composition, structure and function to a more diverse, productive and resilient condition by reducing hazardous fuels and promoting fire resilient species while enhancing existing barriers to fire spread such as regenerating aspen stands.

Objectives:

PROJECT OBJECTIVES	
RESOURCE OBJECTIVES	**PRESCRIBED FIRE OBJECTIVES**
Reduce the current risk of losing ecosystem components such as large fire-resistant trees, native grasslands, and fire-dependent species in the Breaks 1 project area	Provide for public and firefighter safety.
Alter the existing fuel profile to facilitate fire suppression activities while providing for human safety, community protection and stand maintenance over time**.**	Underburn 50-80% of project area.
	Limit tree mortality to less than 25% of residual overstory pine/fir trees across the unit.
	Reduce duff and timber litter in timber stand, and sagebrush and conifer encroachment by 40-60 %.

ELEMENT 6: FUNDING

FISCAL YEAR	2011	**ESTIMATED COST/ACRE**	20.00	**MANAGEMENT CODE(S)**	WFHF13
BENEFITING ACTIVITY	To preserve ecosystem components and alter the curent fuel profile to facilitate fire suppression.				

	ACRES	DOLLARS PER ACRE	TOTAL DOLLARS
KV Collected			
BD Collected			
Appropriated $	2039	$20.00	$40,780
Other $			
TOTALS	2039	$20.00	$40,780

ELEMENT 7: PRESCRIPTION

	Acceptable Prescription Range			
	Low Fire Intensity	Desired Fire Intensity	High Fire Intensity	outside area at critical holding point minimum acceptable moisture
Weather Parameters				
Temperature (°f)	35	60	85	
Relative humidity (%)	55	18	10	
Mid-flame wind speed (mph)[1]	0	5	10	
Wind direction (azimuth°)	N/A	N/A	N/A	
1 hour fuel moisture (%)	**12**	**7**	**6**	**6**
10 hour fuel moisture (%)	**14**	**10**	**7**	**7**
100 hr. fuel moisture (%)	**22**	**16**	**9**	**9**

Additional Comments:

No ignition will take place unless all of the prescription parameters as defined above have been met. Any deviation from the current prescription will require a new fire behavior modeling to address any changes in predicted fire behavior. In addition, those individuals providing signatures on the front of this document will need to sign the addendum to the burn plan and its modifications of the prescription parameters. A spot weather forecast for the site will be requested prior to a test fire, ignition of the unit or any black lining. A copy of the spot weather forecast or notes from the radio transmission from Central Idaho Dispatch will be attached to the working copy of the burn plan.

Fire Behavior Prescription	Acceptable Fire Behavior Range									Outside area at critical holding points		
	Low Fire Intensity			Moderate Fire Intensity			High Fire Intensity					
Fuel model(s)	**2**	**8**	**10**	**2**	**8**	**10**	**2**	**8**	**10**	**2**	**8**	**10**
Rate of spread - chains/hour	5	1	1	40	3	8	134	5	25	134	5	25
Flame length (in feet)	2	1	2	6	1	5	12	2	8	12	2	8
Scorch height (in feet)	5	1	4	32	1	20	93	1	49			
Probability of ignition - %	18			44			56					
Spotting distance (in miles)	0			.1			.2					

The Breaks 1 project will most likely be implemented when snow or higher moisture content is present on north and easterly aspects. An early Spring or late Fall burn will provide these kinds of conditions. Experience shows snow will be present; under these conditions fire spread is limited and easily contained within wetter aspects. IF THE PRESCRIPTION LIMITS ARE EXCEEDED, THE PRESCRIBED FIRE BURN BOSS MUST EVALUATE FIRE CONTROLLABILITY AND WHETHER FIRE EFFECTS WILL MEET OBJECTIVES. THE PRESCRIBED FIRE BURN BOSS MUST TAKE ACTION TO ENSURE OBJECTIVES ARE BEING MET, OR TAKE APPROPRIATE ACTIONS TO MAINTAIN CONTROL OF OR SECURE THE FIRE.

Behavior Narrative

The information in each prescription table was determined by using the BehavePlus 4 fire behavior model. These numbers assume an upslope, wind-driven head fire, using standardized fuel values per model. In real life, ignition patterns allow for backing fire, downslope and/or into the wind, or small strip-head fires, which do not generate these high outputs. In addition, fuel models are really intermixed and patchy in these units, and not continuous as the BehavePlus model assumes. This is especially true for fuel model 2, which shows the highest outputs for rate of spread, flamelength, and scorch height. Finally, it is rarely the case that all the environmental conditions fall into the 'high' end of the acceptable range at any one time.

In any event, the burn boss will not ignite if safety, resource objectives, or likelihood of an escape are in question.

If all environmental factors are maximized such that fire behavior would cause undesired effects, ignition will not take place.

ELEMENT 8: SCHEDULING

Ignition Time Frames/Season(s)	Spring/Fall (Anytime that allows for prescription parameters, goals and objectives to be met with adequate resources).
Projected Duration	This burn may be implemented anytime under this burn plan until one year after the line officer's signature. After one year it must be reviewed and signed again. Ignitions are expected to last 1-3 days. Depending on fuel moistures and season, residual burning is expected to last a few days to several weeks.

Constraints

If burning occurs between 1 December and 15 April the Wildlife Biologist must be consulted to discuss impacts to Big Game Winter Range. The Montana/Idaho Airshed Group guidelines will be adhered to. If ventilation conditions are deemed unsatisfactory by the Group, burning may be postponed. Refer to element 19: Smoke Management and Air Quality. No other known constraints exist.

ELEMENT 9: PRE-BURN CONSIDERATIONS

A. Considerations

1. On Site
The Prescribed Fire Burn Boss will conduct a field check of the unit to determine if on site conditions are favorable to successfully implement the burn. Site/structure preparation, fireline construction, hose lays, and water source identification will be completed as deemed necessary by the Prescribed Fire Burn Boss prior to ignition. Prior to ignition the Prescribed Fire Burn Boss will make sure notifications are complete as indicated in Block C below. The Prescribed Fire Burn Boss will monitor and record weather and fuels data before, during and after the burn.
2. Off Site
Prior to implementing the prescribed fire, the responsible dispatch office (Central Idaho) will be notified. Warning signs will be placed at primary Forest System road junctions or if smoke is expected to impact vehicle traffic on nearby roads. The public will be notified no earlier than 30 days prior and no later than two days in advance of the burn.

B. Method and Frequency for Obtaining Weather and Smoke Management Forecast(s)

Proximity to nearest RAWS	Indianola (INDI1), N 45.4008 W114.1633			
Need for on-site RAWS		Yes	X	No
Additional Information				
A Spot Weather Forecast from the National Weather Service will be requested prior to ignition to determine trends and evaluate conditions. A spot weather forecast can be requested online at http://spot.nws.noaa.gov/cgi-bin/spot/spotmon?site=pih, Central Idaho Dispatch 208-756-5157 or over the radio. Projected weather beyond the ignition operation should be taken into account in order to minimize the risk of a later escape. Within Idaho, smoke approval must be granted from the Montana/Idaho Airshed Group. The Prescribed Fire Burn Boss must submit the request no later than 1200 the day before the burn. The Program Coordinator will post burn recommendations and airshed restrictions to the web page by 1600. A general weather forecast may be obtained one day prior to ignition, a spot weather forecast will be obtained the day of ignition, and each day after if ignition operations are still underway or if the fire continues to spread on its own. Weather will be provided to the National Weather Service each day while prescribed fire operations are underway and on location as deemed necessary by the Prescribed Fire Burn Boss. Fuels data will be collected as indicated in Element 7 of this RXBP. All relevant weather and fuels data will be attached to this RXBP. Smoke management will be conducted as indicated in Element 19 of this RXBP.				

C. Notifications

It is the Prescribed Fire Burn Boss's responsibility to make a reasonable effort to notify adjacent agencies, land owners, impacted publics, etc. Notifications will be documented with date and method by the Prescribed Fire Burn Boss or their delegate.

Who	Fax	Phone	Note	Responsibility
Salmon-Challis PAO		756-5100		
Forest Visitors		Post Signs		
Recorder Herald		756-2221		
KSRA Radio		756-2218		
Central Idaho Dispatch		756-5456		
Lemhi County Sheriff		756-4201		
North Fork Rural Fire		865-2321		
North Fork General Store				
Original Burn Plan listed numerous persons with contact information				

ELEMENT 10: BRIEFING

Operational Briefing (Responsibility – Prescribed Fire Burn Boss)

- ☐ Burn Organization
- ☐ Burn Objectives
- ☐ Description of Burn Area
    1. Acres
    2. Fuels
    3. Slope
    4. Map
- ☐ Expected Weather & Fire Behavior
    1. Forecast
    2. Spot Weather
    3. Expected Fire Behavior
- ☐ Communications
- ☐ Ignition plan
    1. Ignition Pattern
    2. Organization
- ☐ Holding Plan
    1. Expected Fire Behavior From Escape
    2. Critical or Points of Concern
    3. Organization
- ☐ Contingency Plan
    1. Trigger Points
    2. Resources and Response Time
- ☐ Wildfire Conversion
- ☐ Safety
    1. JHA
    2. LCES
    3. Medical Plan
    4. Snags, Slopes, Smoke, Driving

SI_____**E** _____

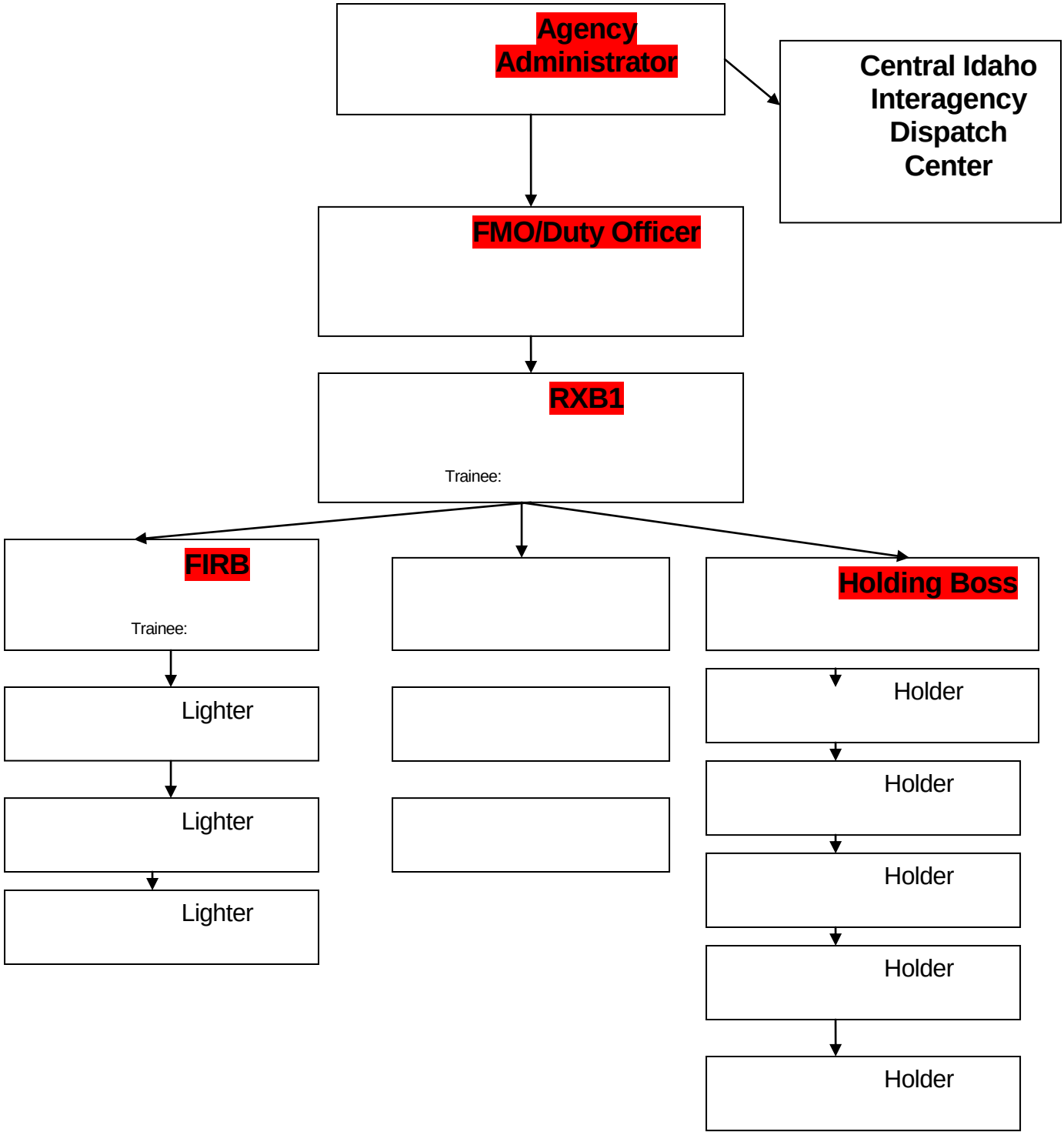
Prescribed Fire Burn Boss

ELEMENT 11: ORGANIZATION AND EQUIPMENT

Personnel				
Position	ICS Code	Total low-end Rx	Total mid-range Rx	Total high-end Rx
Prescribed Fire Burn Boss Type 2	RXB2	1	1	1
Firing Boss	FIRB	0	1	1
Prescribed Fire Holding Boss	SRB-any	0	1	1
Lighters/Holders	FFT2	2	5-10	20
Helicopter Manager	HMGB	1- If utilizing aerial ignition		
PSD Operator	PLDO	1- If utilizing aerial ignition		

Equipment			
Description	Total low-end Rx	Total mid-range Rx	Total high-end Rx
Type 3 helicopter & PSD machine	1- If utilizing aerial ignition		
Driptorches	1 per lighter		
Driptorch mix	1 gallon per acre handlit		
Boat	1- If not utilizing helicopter to shuttle personnel across river		

Note: This is a minimum recommendation. Personnel and equipment needs may vary according to time of year, number of acres, weather, site conditions, and availability of contingency resources. Seasonal variability, as well as individual burn-unit variability and weather outlooks will dictate resource needs on a given burn day. Needs should be evaluated by the burn boss prior to each burn event.


Agency Administrator
Central Idaho Interagency Dispatch Center
FMO/Duty Officer
RXB1
Trainee:
FIRB
Trainee:
Lighter
Lighter
Lighter
Holding Boss
Holder
Holder
Holder
Holder
Holder

ELEMENT 12: COMMUNICATION

A. Radio Frequencies

1		TX:172.27500 RX: 172. 27500		SCNF North Zone Direct	Group 2
2		TX: 164.50000 RX: 172. 27500		SCNF North Zone Repeater	Group 2
		TxCG:123.0 TxCG:167.9 TxCG:100.0 TxCG:146.2	Tone 4 Tone 9 Tone 1 Tone 7	Long Tom Stormy Peak Oreana Stein	Group 2
TACTICAL					
11		TX:168.6125 RX:168.6125		Common Use	Group 2
12		TX:171.52500 RX:171.52500		SCNF TAC	Group 2
AIR OPERATIONS					
9		TX:172.40000 RX:172.40000		Air to Ground	Group 2
OTHER					
		TX: RX: RxCG: TxCG:			

B. Telephone Numbers:

Central Idaho Dispatch Center: 208-756-5157/208-xxx-xxxx (on-call evenings)

North Fork Ranger District: 208-865-2700

District Ranger: 208-xxx-xxxx

Several Job Safety and Health Hazard Analysis's (JHA's) are attached to this RXBP. Any unusual or site-specific hazards are addressed in the attached JHA's.

The Prescribed Fire Burn Boss will conduct a site-specific pre-burn briefing with all burning personnel. This briefing shall be held each day when firing and/or holding operations are occurring. Any safety hazards, mitigation measures, emergency medical procedures, evacuation methods and emergency facilities will be discussed.

The Burn Boss will identify any 1st Responders/EMT's on the day of the burn and add the contacts to the organization chart. The briefing will also identify escape routes and safety zones to all personnel and clarify the burn organization, chain of command and communications.

A. Safety Hazards:

Safety hazards associated with the implementation of this RXBP and the measures taken to reduce those hazards are discussed in the site-specific Job Hazard Analysis (JHA) attached to this RXBP.

Safety hazards include:

- Snags and rolling debris
- Helicopter Operations
- Limited visibility due to smoke
- Driving to and from project area
- Personnel fatigue
- Smoke and Carbon Monoxide inhalation
- Rugged terrain

B. **Measures Taken to Reduce the Hazards**:

All personnel who are within the active burn area are required to wear personal protective equipment (PPE). All personnel participating in the burn will review and sign the attached JHA. All personnel participating in the burn will review and/or be briefed on the helicopter operations. The Prescribed Fire Burn Boss must contact the local agency administrator prior to igniting the burn. It is recommended that public notification be conducted no earlier than **30** days prior and no later than **two** days in advance of the burn. Several days prior to ignition, public information signs will be posted at district information kiosks, trailheads within the project area, road junctions, and other public interest points. Additionally, the Prescribed Fire Burn Boss will ensure that press releases go to the local media relating to prescribed burning activity (recommend utilizing Forest PIO). Affected roads and/or trailheads will be signed to warn the public of prescribed burning activity. Smoke will be visible from some major Roads in the area to include Salmon River Road (030), FS Roads 036, 005 and 443. Warning signs along these roads will mitigate the effects of reduced visibility for vehicles on these routes. Signs will also inform the public of the hazardous conditions and increased activity of fire personnel in the area.

C. Emergency Medical Procedures:

In the event of a serious accident or injury, the Prescribed Fire Burn Boss will be notified immediately. The Burn Boss will initiate on-site response (with any pre-identified First Responders) and coordinate additional response needs.
An emergency medical procedure results if an injury occurs that is severe enough to require medical attention beyond the skill level that is available on site. All emergency medical procedures will be implemented by following the chain of command. The Burn Boss will be responsible for overseeing the implementation of emergency medical procedures in response to an emergency. The Burn Boss will also be responsible for the management of the fire. An injury that requires medical attention will become the priority operation. If an injury occurs, ignition may need to be suspended until the emergency situation has been dealt with.

D. Emergency Evacuation Methods:

The first option is to transport the injured person(s) via on-site vehicles to:
Salmon River Road, then east to Hwy 93, then south approximately 20 miles to Salmon. Take a left at the stop sign onto Main and Steel Memorial Hospital is approximately ½ mile on the right.
The second option is to transport the injured person(s) to meet an ambulance at :
Ideally the best option would be to bring the injured person to the bottom of the unit and out to the junction of Salmon River Road and Hwy 93 in the parking lot of the North Fork Store.
The third option is to transport the injured person(s) to the nearest helispot to be evacuated via air ambulance.
There are numerous helispots in and around the unit that could be used at the time of an accident; Indianola Guard Station can be used **ONLY IN THE EVENT OF AN EMERGENCY**.
The fourth option is to care for and protect the injured person(s) while emergency services respond on-site to extract and transport the injured. Send personnel to meet and lead emergency services to the site.
The victim would be cared for on scene by pre-determined medical personnel and then transported as directed by emergency services.

E. Emergency facilities:

EMERGENCY TRANSPORTATION						
NAME	**TELEPHONE**	**LOCATION**			**PARAMEDICS**	
					YES	**NO**
Lemhi County (Ground Ambulance)	**911 (208)756-4201**	-- --			**X**	
State Emergency Comm.	**(800)632-8000**	-- --				
Air Idaho Rescue	**(800)247-4324**	Idaho Falls, ID			**X**	
Boise Life Flight	**(800)521-2444**	Boise, ID			**X**	
Portneuf Life Flight	**(800)237-0911**	Pocatello, ID			**X**	
Missoula Life Flight	**(800)991-7363**	Missoula, MT			**X**	
St.Luke's Medical Center	**(877)785-8537**	Hailey, ID			**X**	
HELISPOT CLOSEST TO PROJECT (Indianola Guard Station)	**LAT.**	**N 45° 24' 1.44"**	**LONG.**	**W 114° 9' 57.04"**		

HOSPITALS								
NAME	**ADDRESS**	**TRAVEL TIME (MIN)**		**PHONE**	**HELI-PAD**		**BURN CENTER**	
		AIR	**GROUND**		**YES**	**NO**	**YES**	**NO**
Steele Memorial Hospital	707 Van Dreff Salmon, ID	10	30	**(208) 756-5655**	X			X
St. Patricks Hospital	500 West Broadway Missoula, MT	45	180	**(800) 228-7271**	X			X
St. Alphonsus	1055 N. Curtis Boise, ID	60	360	**(877) 341-2121**	X			X
Eastern Idaho Regional Med. Cntr.	3100 Channing Way Idaho Falls, ID	60	210	**(208) 227-2000**	X			X
University of Utah Medical Center	50 N. Medical Drive Salt Lake City, UT	90	480	**(801) 581-2121**	X		X	

ELEMENT 14 TEST FIRE

A. Test Fire Provisions and Planned Location:

A test fire will be completed prior to unit ignition in an area where fuels and fire effects are representative (slope, fuels, and exposure) of the entire treatment area. The purpose of the test fire is for the Prescribed Fire Burn Boss to verify that the observed fire behavior characteristics will meet management objectives stated in the RXBP. In many applications, analysis of the initial ignitions may provide adequate test fire results. On multiple-day projects, evaluation of current active fire behavior, in lieu of a test fire, may provide a comparative basis for continuing. If the evaluation of current fire behavior is used as a test fire, the Prescribed Fire Burn Boss will document the decision in the Test Fire Documentation table below. Prior to ignition of both the test fire and ignition operations, the Burn Boss will compare the RXBP prescription parameters to weather forecasts, and the actual weather conditions onsite. Observations from the test fire will be documented by the Burn Boss.

B. Test Fire Documentation:

Location:

Date and Time:

Weather/Fuels Conditions	
Cloud Cover %	
Temperature:	
Relative Humidity:	
Fine Dead Fuel Moisture:	
Wind Speed:	
Fuels:	

Test Fire Results	
Comments	

The test fire meets the prescription parameters	**Yes**		**No**	

S **E**

Prescribed Fire Burn Boss

C. ELEMENT 15: IGNITION PLAN

Firing Methods & Devices:
Areas will be ignited utilizing a PSD or Helitorch and hand/ground firing methods, most likely with drip torches or fusees.
Ignition Techniques:
The specific firing techniques can be determined by the Prescribed Fire Burn Boss on the day of the burn. The Prescribed Fire Burn Boss should utilize local knowledge including topography and weather to conduct a burn that accomplishes resource objectives. In general, firing techniques should move into the wind when favorable to reduce smoke exposure to personnel. The firing technique will be continually evaluated to account for condition changes and the frequency of ignition be monitored.
Patterns & Sequences:
Firing operations generally will commence from or near the highest point of the unit to be ignited. A strip head firing pattern is the preferred method for ignition, however other methods such as the chevron may be necessary to generate desired fire behavior results. The firing pattern will vary depending on fuel, environmental, and topographic features. The Burn Boss and Firing Boss will direct the ignition crew on the appropriate ignition pattern throughout the entire ignition procedure. Location of crews and all resources will be identified prior to ignition. Individual ignition sequence plans or maps should be developed prior to ignition for each sub-unit within the project area. Firing patterns and techniques may be adjusted by the Burn Boss to meet specific needs.
D. Ignition Staffing
A minimum of one Firing Boss will be utilized. The Firing Boss and Holding Boss will work closely together. For example, the holding crew may be responsible for transporting burn fuel. If a slop-over should occur the ignition crew may work for the holding boss in order to contain the slop-over.

ELEMENT 16: HOLDING PLAN

General Procedures for Holding:

The Holding Boss will place his/her personnel along control lines and/or areas needing protection as necessary. The Prescribed Fire Burn Boss will determine the duration after ignition has stopped for personnel to stay on location based on local factors and using the guidelines listed below. Fire personnel will remain on location after ignition has stopped until at least one of the following parameters has been met.

1) A steady decrease in temperature of 10 degrees as determined by the hourly weather.
2) A steady increase in relative humidity of 8 percent as determined by the hourly weather.
3) Flame lengths less than 1 foot as determined by the Prescribed Fire Burn Boss.
4) Rates of spread less than 1 chain per hour as determined by the Prescribed Fire Burn Boss.

Patrols and monitoring of previously burned acres will commence the day following the burn and continue until the Prescribed Fire Burn Boss determines that patrols or monitoring are no longer necessary. If active burning continues the next day, a spot weather forecast should be obtained, otherwise the daily zone forecast will be sufficient.

Category 3 Mopup standards apply: Patrol and monitor until weather conditions eliminate the need or the burn is declared out.

Critical Holding Points and Actions:

Critical holding points include around the Charlie Rose Homestead at the bottom of the unit, and the East flank of the unit (Napoleon Ridge) in the event of a Fall burn.

Critical holding points will be re-evaluated the day of the burn. The Burn Boss, Holding Boss and Firing Boss shall assess and plan actions according to environmental conditions on the day of the burn to address holding concerns.

Actions to take will be determined by local site factors but will result in taking appropriate action of spot fires or slopovers. Adjoining units may be burned in the event of slopover to appropriately contain the prescribed fire. A spot or slopover on property other than Forest Service will be extinguished immediately. The FMO, District Ranger and Forest FMO will be notified as soon as possible to determine course of action for any notifications.

Minimum Organization or Capabilities Needed:

Minimum capabilities needed for holding are identified under Element 11 - Organization and Equipment.

ELEMENT 17: CONTINGENCY PLAN

A. Trigger Points:

This RXBP identifies resources needed to safely and successfully implement the prescribed fire throughout the range of prescriptive parameters.

If a prescribed fire exceeds the parameters within the written prescription, the "available resources" identified within contingency plans may be used to bring the prescribed fire back within written prescription guidelines during the 48 hour time frame.

If any of the following situations occur, the Prescribed Fire Burn Boss may consider contingency actions.

- Fire threatens the project boundary.
- More than three simultaneous spot fires and/or slop overs occur, each greater than .25 acres or larger.
- Fire outside of the primary unit boundary.
- Smoke impacting sensitive areas.
- Potential for costs to control exceed available project funds.

B. Actions Needed:

The burn unit is targeted to be burned under prescribed conditions. If the fire leaves a burn unit(s) and spots or spreads into adjacent fuels, firing operations may be halted. An appropriate strategy will be implemented as determined by the Holding Boss and Prescribed Fire Burn Boss. The appropriate strategy may be quick and aggressive containment; or it may be to monitor the situation.

*If contingency actions fail and a prescribed fire is declared a wildfire; acres burned **outside** of the planned prescribed fire area (wildfire) will have an overarching objective of suppression/protection. If prescribed fire objectives are still being achieved within the planned prescribed fire area, the Prescribed Fire Burn Boss can continue managing these acres as a prescribed fire. Wildfire acres must have an overarching suppression/protection objective because the ignition source is "human-caused".*

C. Additional Resources and Maximum Response Time(s):

Resource	Agency & Location	Maximum Response Time	Conformation of Availability*	
			Yes/No	Date

* To be completed within one day of the burn and adjusted during course of extended burning conditions

ELEMENT 18: WILDFIRE CONVERSION

Wildfire Declared By:

The Prescribed Fire Burn Boss with consultation of the Line Officer will have the authority to declare the prescribed burn a wildfire. If any of the following situations occur, the burn may be declared a wildfire, initial attack could occur, and appropriate management response would take place.

- Contingency actions have failed or are likely to fail and cannot be mitigated.
- Fire outside of the Project Area.
- Costs for control exceed available project funds.
- Fire cannot be contained in the first operational period.

B. IC Assignment:

Should a wildfire be declared, the Prescribed Fire Burn Boss will become the Incident Commander until relieved or replaced. The IC will organize all resources on-site for a safe and aggressive response. Personnel within the prescribed fire organization will transition into ICS wildfire positions they are qualified to carry out. The IC will order additional suppression resources as needed.

Upon a wildfire conversion, all overhead personnel should document actions taken on a Unit Log. After the incident is contained, the Prescribed Fire Burn Boss will submit a post fire report documenting weather, resources on site, ignition technique and sequence, holding actions, and other pertinent data.

C. Notifications:

The Prescribed Fire Burn Boss/IC will notify Central Idaho Dispatch Center and the North Zone FMO of the escape and identify himself/herself as the IC. The FMO will then notify the District Ranger and the Forest FMO.

Extended Attack Actions and Opportunities to Aid in Fire Suppression:

Unit 4 has poor road access to the top. Containment would be best achieved with handcrews and aircraft (helicopter with bucket). The containment strategy will be to utilize safe anchor points and create direct fire line where feasible and indirect fire line, including burning out, depending upon location of natural barriers and roads. Utilize existing roads and trails, moist drainages, and changes in fuels. Areas of value and special concern include the Charlie Rose homestead, designated old growth stands and the curl leaf mountain mahogany.

The FMO and/or IC, Resource Advisor, and Agency Administrator may develop a WFDSS which will help determine the appropriate management response to the escaped fire.

ELEMENT 19: SMOKE MANAGEMENT AND AIR QUALITY

Smoke Management #:	Burn unit information is submitted to the Montana/Idaho Airshed Group in the form of a preseason burn list (units scheduled for burning that season are on the list). At the time of writing this burn plan, unique unit ID numbers were not available due to scheduling.

Approval required by state or local smoke monitoring unit:	**YES**	**X**	**NO**	

Transport wind and stability conditions needed for burning:

Ignition will not occur if smoke dispersion is predicted to be less than fair during the period of peak emission. Preferred transport winds are of a direction that will not bring smoke directly to the City of Salmon. Forecasted trajectories will be checked prior to burning.

Visibility hazards (roads, airports, etc.) and actions to reduce hazards:

There may be short term visibility impacts to the local roads. The road system will be signed to notify the public of the ongoing burn project. The burn boss may decide to place road guards, if conditions warrant. Public information concerning smoke issues will be posted in flyers, and will be part of the public news release to the radio station and newspaper.

Residual smoke issues and mitigation actions:

No residual smoke issues are expected. Smoke impacts are expected to be few because prevailing winds normally from the southwest push smoke into a remote area of the District. The communities of North Fork, Shoup, and Gibbonsville may experience short-term impacts from smoke. The city of Salmon may be affected, depending on dispersion and wind direction. Prior experience shows "Blue-Sky Rains" (www.blueskyrains.org) is an effective tool for predicting wind trajectory and smoke dispersion.

Special constraints/considerations:

Visible smoke or haze in the local canyons may occur. Smoke accumulations will be reduced by burning under good dispersion conditions and as recommended by the Montana/Idaho Airshed Group.

Documentation:

Approval through the Montana / Idaho Airshed Group usually occurs the afternoon prior to burn day. Approval must be requested through the Group's website by noon the day before the burn.

References:

Montana / Idaho State Airshed Group at www.smokemu.org

ELEMENT 20: MONITORING

A. Fuels Information (forecast and observed) Required and Procedures:
Fuel Moistures are normally derived from Fire Family Plus and RAWS when creating burn prescriptions. A variety of tools may be utilized to determine if a unit is in prescription. Zone weather data may be utilized to help forecast fuel moistures for project implementation start days.
B. Weather Monitoring Required and Procedures:
A Spot Weather Forecast from the National Weather Service is required prior to ignition, for each day active ignition is occurring on the burn. A spot weather forecast can be requested online at http://spot.nws.noaa.gov/cgi-bin/spot/spotmon?site=pih, Central Idaho Dispatch Center at 208-756-5157 or over the radio. Projected weather beyond the ignition operation should be taken into account in order to minimize the risk of a later escape. Local weather observations will be recorded as deemed necessary by the Prescribed Fire Burn Boss. These observations along with daily zone weather and spot forecast will be included in the burn plan folder.
C. Fire Behavior Monitoring Required and Procedures:
The Prescribed Fire Burn Boss, Firing Boss and Holding Boss will all visually monitor fire behavior to ensure prescription is being met. The Prescribed Fire Burn Boss may document or delegate written documentation on a log sheet which should be included in the burn folder.
D. Monitoring Required To Ensure That Prescribed Fire Plan Objectives Are Met:
Photo plots should be established prior to ignitions for post monitoring. These photos along with a written report will be included in the annual district monitoring report.
E. Smoke Dispersal Monitoring Required and Procedures:
The project must be **Preseason Registered** into the Airshed Management System (AMS) between December 1 and February 28th prior to the burn. Prescribed Fire Burn Boss's must **propose** a burn no later than 1200 in the AMS one business day prior to ignition. Finally, accomplishments must be added daily into the AMS. All other smoke documentation the Prescribed Fire Burn Boss keeps on file at least one year.

ELEMENT 21: POST-BURN ACTIVITIES

Post-burn Activities That Must be Completed:
The Prescribed Fire Burn Boss will ensure a post-burn evaluation form is completed within two weeks post-burn. Use the Prescribed Burn Daily Log to record the required fields for post-burn evaluation.

PRESCRIBED FIRE PLAN ELEMENTS	S, U, or N/A	COMMENTS
Signature page		
Goals and Objectives		
GO/NO-GO Checklists		
Complexity Analysis Summary		
Description of the Prescribed Fire Area		
Funding		
Prescription		
Scheduling		
Pre-burn Considerations		
Briefing		
Organization and Equipment		
Communication		
Public and Personnel Safety, Medical		
Test Fire		
Ignition Plan		
Holding Plan		
Contingency Plan		
Wildfire Conversion		
Smoke Management and Air Quality		
Monitoring		
Post-burn Activities		
Appendix A: Maps		
Appendix B: Complexity Analysis		
Appendix C: Risk Assessment/JHA		
Appendix D: Fire Prediction Modeling Runs		
Other		

S = Satisfactory U = Unsatisfactory N/A = Non Applicable

❑ **Recommended for Approval** ❑ **Not Recommended for Approval** ❑ **Approval is recommended subject to the completion of requirements listed in the comments section, or on the Prescribed Fire Plan.**

Technical Reviewer	Qualification and Currency (Y/N)	Date

APPENDIX B. TECHNICAL REVIEWER Signature page		
Goals and Objectives		
GO/NO-GO Checklists		
Complexity Analysis Summary		
Description of the Prescribed Fire Area		
Funding		
Prescription		
Scheduling		
Pre-burn Considerations		
Briefing		
Organization and Equipment		
Communication		
Public and Personnel Safety, Medical		
Test Fire		
Ignition Plan		
Holding Plan		
Contingency Plan		
Wildfire Conversion		
Smoke Management and Air Quality		
Monitoring		
Post-burn Activities		
Appendix A: Maps		
Appendix B: Complexity Analysis		
Appendix C: Risk Assessment/JHA		
Appendix D: Fire Prediction Modeling Runs		
Other		

S = Satisfactory **U = Unsatisfactory** **N/A = Non Applicable**

❑ **Recommended for Approval** ❑ **Not Recommended for Approval** ❑ **Approval is recommended subject to the completion of requirements listed in the comments section, or on the Prescribed Fire Plan.**

Technical Reviewer	Qualification and Currency (Y/N)	Date

APPENDIX H: PRESCRIBED FIRE POST BURN EVALUATION

Burn Unit	Date(s) Burned	Acres Burned	Ignition Start Time

Weather and Fuel Conditions			
	Time of Ignition	Low	High
Temperature			
Relative Humidity			
1-hr Fuel Moisture			
10-hr Fuel Moisture	100-hr Fuel Moisture	1000-hr Fuel Moisture	Days Since Significant Precipitation
Wind Direction (Average)	Wind Speed (Average)	Percent of Fuel Consumed	Ignition Duration (min.)

Accomplishment of Fuels Treatment Objectives				
Overall Objectives Achieved:		Yes		No

Short Term Results (include changes in fuel profile and fire regime condition class)

Cost Evaluation				
Burn Plan Preparation	Site Preparation	Burn Operation	Total Burn Costs	Cost/Acre
$	$	$	$	$

Narrative – Prescribed Fire Burn Boss Comments i.e. operations, safety, fire behavior, personnel & equipment performance, logistics, smoke management

Prescribed Fire Burn Boss		Date	

Appendix B – Weather Observations

ELEMENT 20: MONITORING

B. Weather Monitoring Required and Procedures:

A Spot Weather Forecast from the National Weather Service is required prior to ignition, for each day active ignition is occurring on the burn. A spot weather forecast can be requested online at http://spot.nws.noaa.gov/cgi-bin/spot/spotmon?site=pih, Central Idaho Dispatch Center at 208-756-5157 or over the radio. Projected weather beyond the ignition operation should be taken into account in order to minimize the risk of a later escape. Local weather observations will be recorded as deemed necessary by the Prescribed Fire Burn Boss. These observations along with daily zone weather and spot forecast will be included in the burn plan folder.

Date 9/16/16 | Location [illegible] | Elevation ~6060 Feet | Aspect N E S SE W

Exposure (Ridgetop, slope, etc.) mid-slope | Cover Type (As indicator of wind obstruction) 2nd growth ponderosa pine | Stand Density (As indicator of wind obstruction) moderate

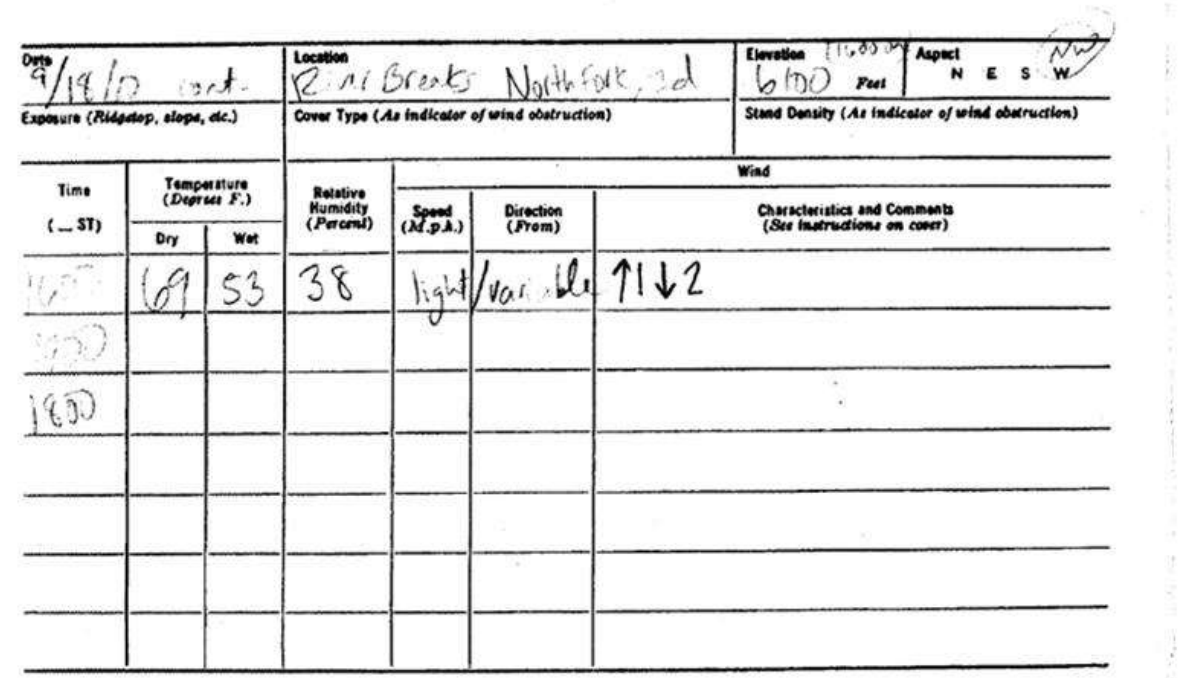
Time (__ ST)	Temperature (Degrees F.) Dry	Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Direction (From)	Characteristics and Comments (See instructions on cover)
1130	55	47	59	0-2	S	
1230	59	51	61			↑4 ↑3
1330	64	52	48	0-8	S/SW	↑5 ↓13
1430	65	51	41	0-8	S/SW	↑1 ↓7
1530	63	50	43	2-4		↓2 ↑2
1630	65	51	41	2-8	SW/W	↑2 ↓2
1730	67	54	46	1-4	SW/W	↑2 ↑5

cont.

Date 9/16/16 | Location | Elevation Feet | Aspect N E S W

Exposure (Ridgetop, slope, etc.) | Cover Type (As indicator of wind obstruction) | Stand Density (As indicator of wind obstruction)

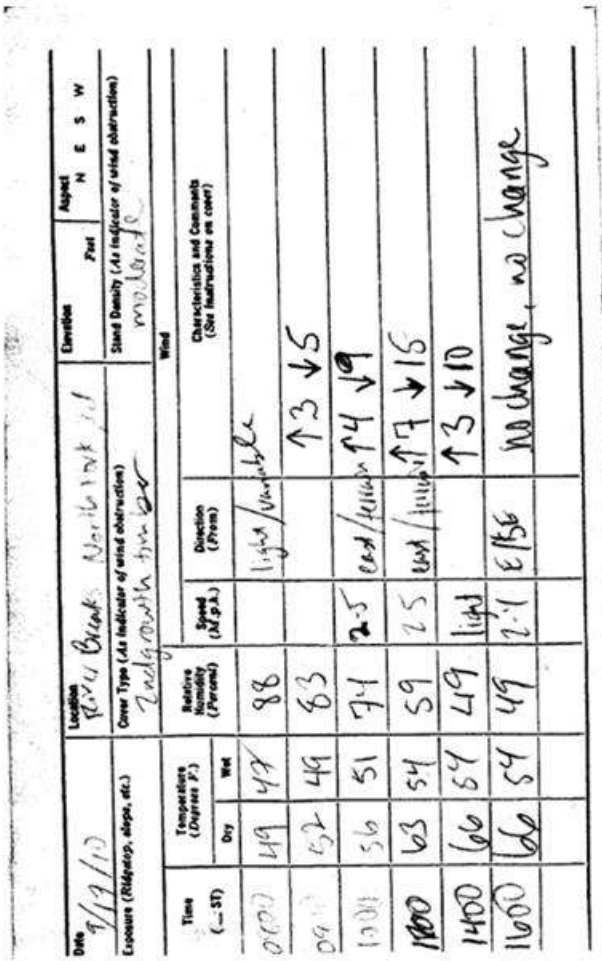
Time (__ ST)	Temperature (Degrees F.) Dry	Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Direction (From)	Characteristics and Comments (See instructions on cover)
1930	64	52	48	1-4	SW/W	↓3 ↑2



Time (— ST)	Temperature (Degrees F.) Dry	Temperature (Degrees F.) Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Wind Direction (From)	Wind Characteristics and Comments (See instructions on cover)
1400	69	53	38	light	variable	↑1↓2
1500						
1600						

Date 9/19/10 cont. Location Rx1 Breaks North Fork, 2d Elevation 6100 Feet Aspect N E S W

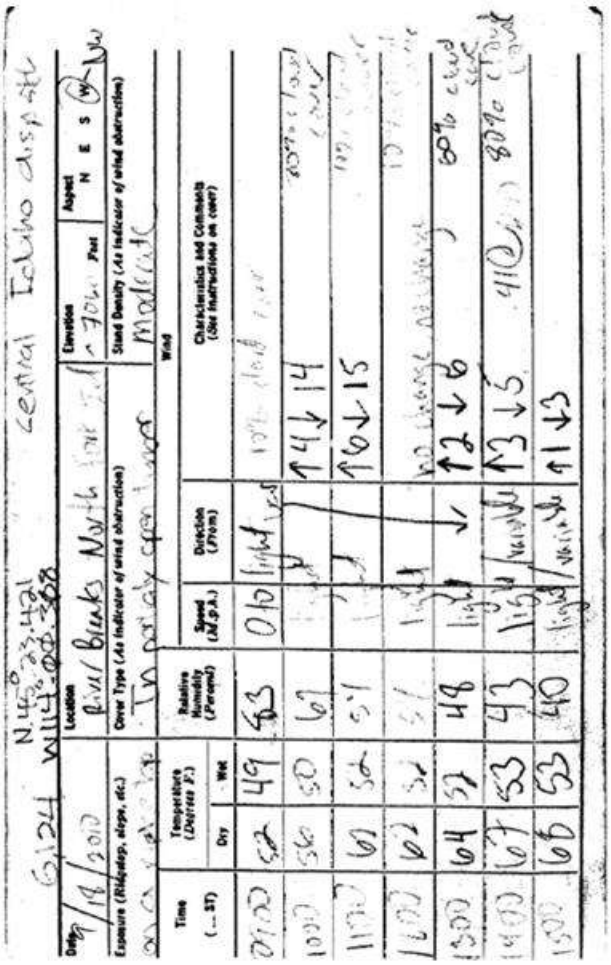
Exposure (Ridgetop, slope, etc.) Cover Type (As indicator of wind obstruction) Stand Density (As indicator of wind obstruction)



Date 9/19/10 Location Rx1 Breaks North Fork, 2d Elevation ~6100 Feet Aspect N E S W

Exposure (Ridgetop, slope, etc.) Cover Type (As indicator of wind obstruction) Stand Density (As indicator of wind obstruction) moderate

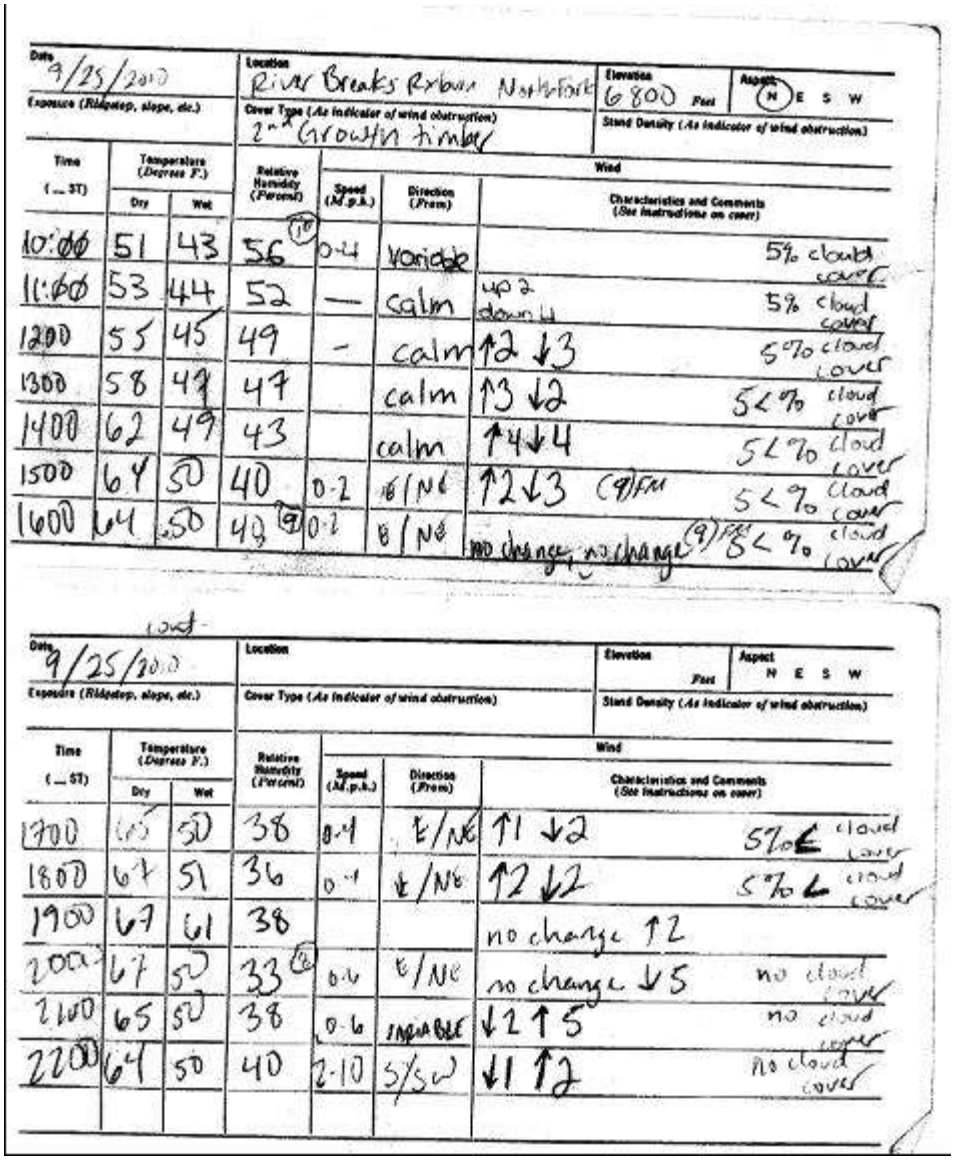
Time (— ST)	Temperature (Degrees F.) Dry	Temperature (Degrees F.) Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Wind Direction (From)	Wind Characteristics and Comments (See instructions on cover)
0900	49	47	88		light/variable	
1000	52	49	83			↑3↓5
1100	56	51	74	2-5	east/	↑4↓9
1200	63	54	59	2-5		↑7↓15
1400	66	54	49	light		↑3↓10
1600	66	54	49	2-4	E/SE	no change, no change



Date 9/19/2010 Location Rx1 Breaks North Fork, 2d Elevation ~6100 Feet Aspect N E S W

Exposure (Ridgetop, slope, etc.) Cover Type (As indicator of wind obstruction) Stand Density (As indicator of wind obstruction) moderate

Time (— ST)	Temperature (Degrees F.) Dry	Temperature (Degrees F.) Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Wind Direction (From)	Wind Characteristics and Comments (See instructions on cover)
0900	52	49	83	0-10	light/variable	
1000	56	50	69			↑4↓14
1100	60	50	59			↑6↓15
1200	62	52	54	light		no change, no change
1300	64	52	48	light		↑2↓6
1400	67	53	43	light	variable	↑3↓5
1500	66	53	40	light	variable	↑1↓3



Date 9/25/2010 | Location River Breaks Rxburn North fork | Elevation 6800 Feet | Aspect N E S W

Exposure (Ridgetop, slope, etc.) | Cover Type (As indicator of wind obstruction) 2nd Growth timber | Stand Density (As indicator of wind obstruction)

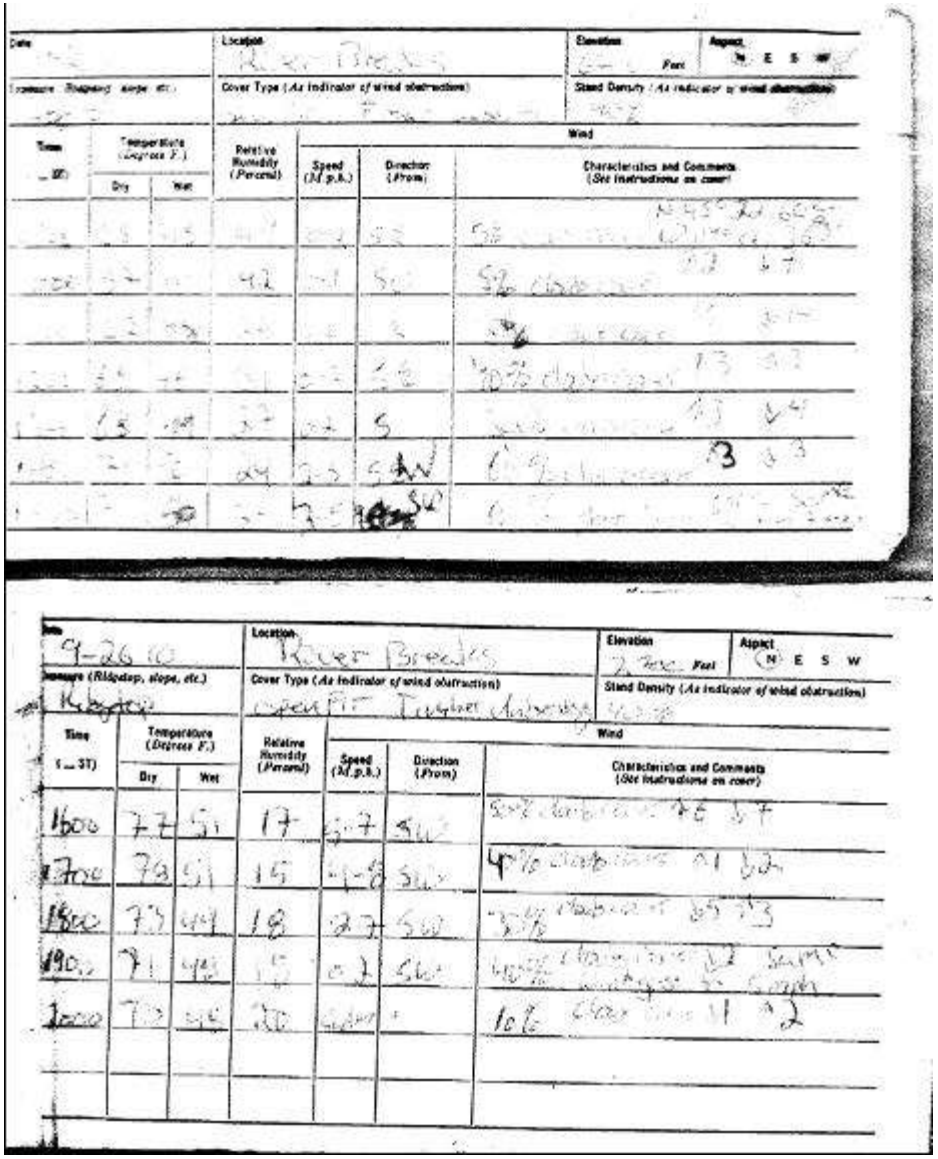
Time (... ST)	Temperature (Degrees F.) Dry	Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Direction (From)	Characteristics and Comments (See instructions on cover)	
10:00	51	43	56 (10)	0-4	Variable		5% cloud cover
11:00	53	44	52	—	calm	up 2 down 4	5% cloud cover
1200	55	45	49	-	calm	↑2 ↓3	5% cloud cover
1300	58	49	47		calm	↑3 ↓2	5<% cloud cover
1400	62	49	43		calm	↑4 ↓4	5<% cloud cover
1500	64	50	40	0-2	E/NE	↑2 ↓3 (9)FM	5<% cloud cover
1600	64	50	43 (9)	0-2	E/NE	no change, no change (9)FM	5<% cloud cover

cont.

Date 9/25/2010 | Location | Elevation Feet | Aspect N E S W

Exposure (Ridgetop, slope, etc.) | Cover Type (As indicator of wind obstruction) | Stand Density (As indicator of wind obstruction)

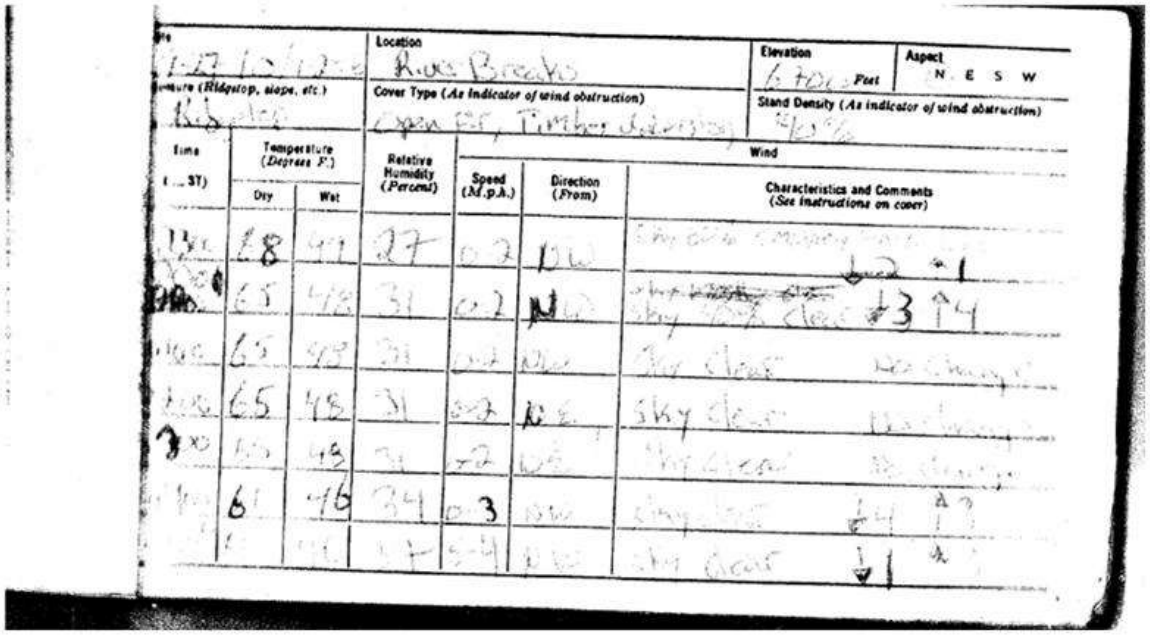
Time (... ST)	Temperature (Degrees F.) Dry	Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Direction (From)	Characteristics and Comments (See instructions on cover)	
1700	65	50	38	0-4	E/NE	↑1 ↓2	5%< cloud cover
1800	67	51	36	0-4	E/NE	↑2 ↓2	5%< cloud cover
1900	67	61	38			no change ↑2	
2000	67	50	33 (9)	0-6	E/NE	no change ↓5	no cloud cover
2100	65	50	38	0-6	INCONSTANT	↓2 ↑5	no cloud cover
2200	64	50	40	2-10	S/SW	↓1 ↑2	no cloud cover



Date 9-26 10 | Location River Breaks | Elevation 2 [illegible] Feet | Aspect (N) E S W

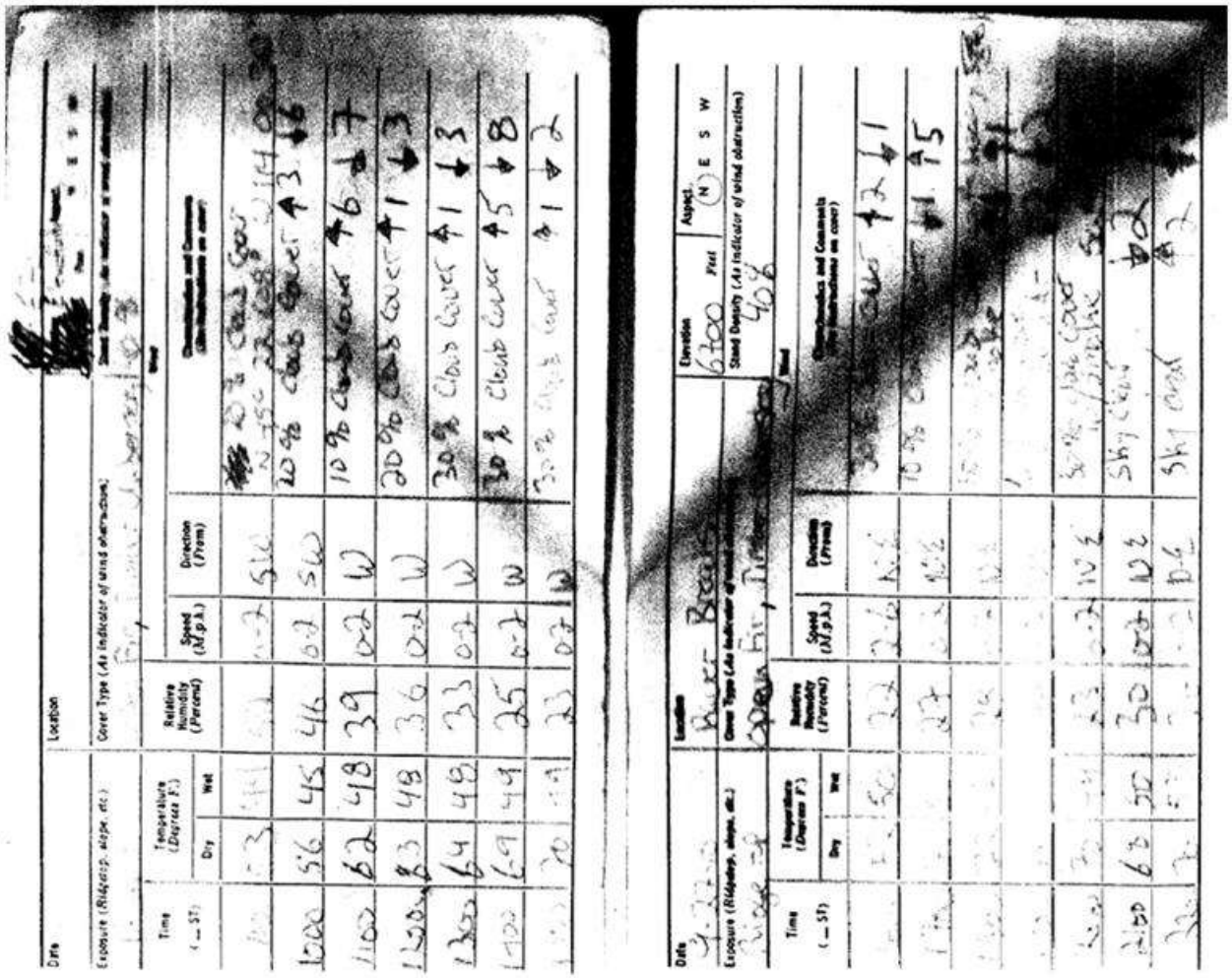
Exposure (Ridgetop, slope, etc.) Ridgetop | Cover Type (As indicator of wind obstruction) open PIT Juniper savanna | Stand Density (As indicator of wind obstruction)

Time (... ST)	Temperature (Degrees F.) Dry	Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Wind Direction (From)	Wind Characteristics and Comments (See instructions on cover)
1600	77	51	17	3-7	SW	
1700	79	51	15	4-8	SW	4%
1800	73	49	19	2-7	SW	
1900	71	48	15	0-2	SW	
2000	72	46	20	calm	-	10%



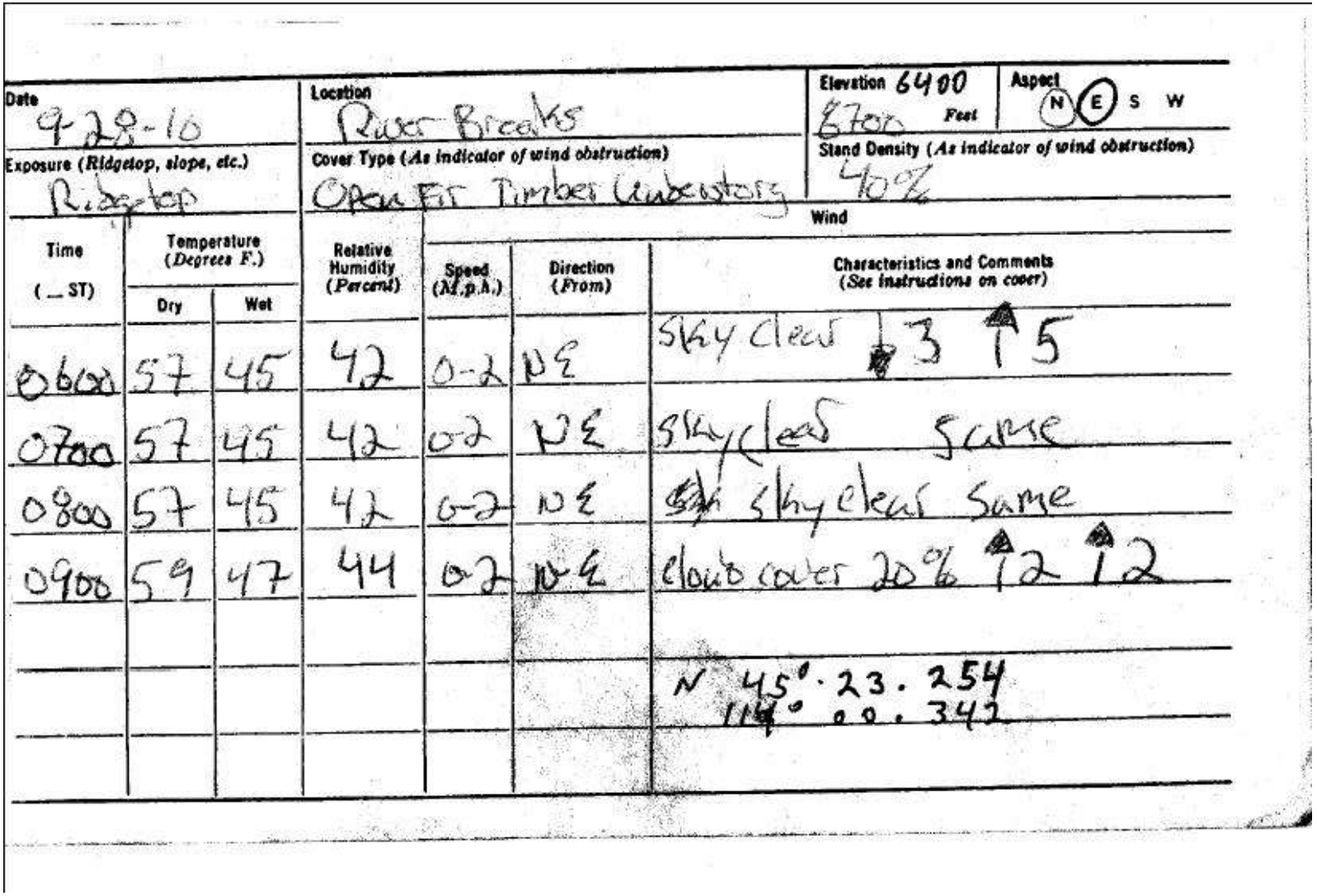
Location: Rock Breaks
Elevation: 6700 Feet
Aspect: N E S W
Cover Type (As indicator of wind obstruction): Open PP, Timber Juniper
Stand Density (As indicator of wind obstruction): 40%

Time (...ST)	Temperature (Degrees F.) Dry	Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Wind Direction (From)	Characteristics and Comments (See instructions on cover)
1100	68	49	27	0-2	NW	Sky clear
1200	65	48	31	0-2	NW	Sky clear
1300	65	48	31	0-2	NW	Sky clear
1400	65	48	31	0-2	NW	Sky clear
1500	63	48	34	2	W	Sky clear
1600	61	46	34	3	NW	Sky clear
1700						



Location: Rock Breaks
Elevation: 6700 Feet
Aspect: N E S W
Cover Type (As indicator of wind obstruction): Open PP, Timber Juniper
Stand Density (As indicator of wind obstruction): 40%

Time (...ST)	Temperature (Degrees F.) Dry	Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Wind Direction (From)	Characteristics and Comments (See instructions on cover)
1100	63	48	36	0-2	W	20% Cloud Cover
1200	64	49	33	0-2	W	30% Cloud Cover
1300	69	44	25	0-2	W	30% Cloud Cover
1400	70	44	23	0-2	W	30% Cloud Cover



Date: 9-28-10
Location: River Breaks
Elevation: 6400 Feet
Aspect: N (E) S W
Exposure (Ridgetop, slope, etc.): Ridge top
Cover Type (As indicator of wind obstruction): Open Fir Timber Understory
Stand Density (As indicator of wind obstruction): 40%

Time (__ ST)	Temperature (Degrees F.) Dry	Temperature (Degrees F.) Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Wind Direction (From)	Characteristics and Comments (See instructions on cover)
0600	57	45	42	0-2	NE	Sky clear 3 5
0700	57	45	42	02	NE	Sky clear Same
0800	57	45	42	02	NE	Sky clear Same
0900	59	47	44	02	NE	cloud cover 20% 12 12
						N 45° 23. 254 114° 00. 342

Date	Location	Elevation	Aspect
09-28-10	Rx River Break Burn	3594 Feet	N E S (W)
Exposure (Ridgetop, slope, etc.)	**Cover Type (As indicator of wind obstruction)**	**Stand Density (As indicator of wind obstruction)**	
Valley	Unsheltered	Grass/Sage	

Time (__ ST)	Temperature (Degrees F.) Dry	Wet	Relative Humidity (Percent)	Wind Speed (M.p.h.)	Direction (From)	Characteristics and Comments (See instructions on cover)
1200	68	56	48	[illegible]	West Southwest	DP-48 RF-7 8% DFMC DFNC-1 40% 2% PIG
1300	72	55	36	Light 3-6	West Southwest	DP-44 RF-5 6% DFMC DFNC-1 60% 2% PIG
1400	76	58	34		Calm	5% clouds high clouds, light grey smoke rising in valley 6%/9% E/S FDFM PIG 60%/5%
1500	80	58	26		Calm	Clear light grey surface drifting NNE Inversion release 5% E/8% S FDFM PIG 70%/40% E/S
1600	85	60	22	1-3	[illegible]	clear light grey smoke drifting NNE 4% E/7% S FDFM PIG 80%/5% isolated torching
1700	85	60	22		Calm	Clear increasing ridgetop winds (SW) isolate torch 4% E/7% FDFM PIG 80%/5%
1800	83	59	23		Calm	Clear isolated torching w/active backing in exposed sage 5% E/8% FDFM PIG 60% E/40% S
1900	70	56	34		Calm	Clear [illegible] 3% E/10% S FDFM PIG 40% [illegible]

Appendix C – Test Fire Documentation

Project Name:	Breaks Number		Unit Name:	Unit 1

ELEMENT 14 TEST FIRE

A. Test Fire Provisions and Planned Location:

A test fire will be completed prior to unit ignition in an area where fuels and fire effects are representative (slope, fuels, and exposure) of the entire treatment area. The purpose of the test fire is for the Prescribed Fire Burn Boss to verify that the observed fire behavior characteristics will meet management objectives stated in the RXBP. In many applications, analysis of the initial ignitions may provide adequate test fire results. On multiple-day projects, evaluation of current active fire behavior, in lieu of a test fire, may provide a comparative basis for continuing. If the evaluation of current fire behavior is used as a test fire, the Prescribed Fire Burn Boss will document the decision in the Test Fire Documentation table below. Prior to ignition of both the test fire and ignition operations, the Burn Boss will compare the RXBP prescription parameters to weather forecasts, and the actual weather conditions onsite. Observations from the test fire will be documented by the Burn Boss.

B. Test Fire Documentation:

Location: Top of Burn Unit 4

Date and Time: 9/25/2010 1400

Weather/Fuels Conditions	
Cloud Cover %	5%
Temperature:	64
Relative Humidity:	4%
Fine Dead Fuel Moisture:	4
Wind Speed:	0-2
Fuels:	Dry Fir grass, timber litter

Test Fire Results	
Comments	good

The test fire meets the prescription parameters	Yes	✓	No	

SIGNED [Signed by Burn Boss and Burn Boss Trainee.] **DATE** 9/25/2010

9/25/2010

Project Name:	Breaks Number		Unit Name:	Unit 1	

ELEMENT 14 TEST FIRE

A. Test Fire Provisions and Planned Location:

A test fire will be completed prior to unit ignition in an area where fuels and fire effects are representative (slope, fuels, and exposure) of the entire treatment area. The purpose of the test fire is for the Prescribed Fire Burn Boss to verify that the observed fire behavior characteristics will meet management objectives stated in the RXBP. In many applications, analysis of the initial ignitions may provide adequate test fire results. On multiple-day projects, evaluation of current active fire behavior, in lieu of a test fire, may provide a comparative basis for continuing. If the evaluation of current fire behavior is used as a test fire, the Prescribed Fire Burn Boss will document the decision in the Test Fire Documentation table below. Prior to ignition of both the test fire and ignition operations, the Burn Boss will compare the RXBP prescription parameters to weather forecasts, and the actual weather conditions onsite. Observations from the test fire will be documented by the Burn Boss.

B. Test Fire Documentation:

Location: Upper 1/3 of burn unit

Date and Time: 9/27/2010 1740

Weather/Fuels Conditions	
Cloud Cover %	50%
Temperature:	71
Relative Humidity:	27
Fine Dead Fuel Moisture:	
Wind Speed:	0-2 NE
Fuels:	open fir, timber litter understory

Test Fire Results	
Comments	Started firing operations through the night and into the next day

The test fire meets the prescription parameters	Yes	✓	No	

SIGNED [Signed by Burn Boss and Burn Boss Trainee.] DATE 9/27/2010 9/27/10

Project Name:	Breaks Number		Unit Name:	Unit 1	

ELEMENT 14 TEST FIRE

A. Test Fire Provisions and Planned Location:

A test fire will be completed prior to unit ignition in an area where fuels and fire effects are representative (slope, fuels, and exposure) of the entire treatment area. The purpose of the test fire is for the Prescribed Fire Burn Boss to verify that the observed fire behavior characteristics will meet management objectives stated in the RXBP. In many applications, analysis of the initial ignitions may provide adequate test fire results. On multiple-day projects, evaluation of current active fire behavior, in lieu of a test fire, may provide a comparative basis for continuing. If the evaluation of current fire behavior is used as a test fire, the Prescribed Fire Burn Boss will document the decision in the Test Fire Documentation table below. Prior to ignition of both the test fire and ignition operations, the Burn Boss will compare the RXBP prescription parameters to weather forecasts, and the actual weather conditions onsite. Observations from the test fire will be documented by the Burn Boss.

B. Test Fire Documentation:

Location: Ridge top

Date and Time: 9/27/2010 2000

Weather/Fuels Conditions	
Cloud Cover %	50% cloudy Cover
Temperature:	70
Relative Humidity:	23
Fine Dead Fuel Moisture:	
Wind Speed:	3
Fuels:	Open Fir, Timber understory

Test Fire Results	
Comments	

The test fire meets the prescription parameters	Yes	✓	No	

SIGNED [Signed by Burn Boss and Burn Boss Trainee.] **DATE** 9/27/2010

9/27/10