The Little Valley Escaped Prescribed Fire Review

The Little Valley Review Team

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1. Executive Summary

"The Nevada Division of Forestry fuel treatments and prescribed fire policy is established to treat fuels and mitigate threats to the public, and to protect, enhance, restore and/or maintain critical plant communities."

Nevada Division of Forestry Administrative Manual,
Fire Treatments and Prescribed Fire, 06040.0

The Little Valley Prescribed Fire was conducted by the Nevada Division of Forestry (NDF) between Oct. 4-7, 2016. Mop-up began immediately upon completion of each unit and continued through Oct. 13. In the early hours of Oct. 14, at approximately 0138 hours, a wildland fire—subsequently named the "Little Valley Fire"—was detected along the ridge between Little Valley and Washoe Valley.

Influenced by exceptionally high winds, the wildland fire pushed down canyon into a subdivision along Franktown Road. While rapid response and evacuation of residents saved human lives, tragically, the fire destroyed 23 homes and 17 outbuildings before it was contained.

A team of professional wildland fire investigators determined that the Little Valley Fire was caused by and originated from the Little Valley Prescribed Fire.

Request Made for an Escaped Prescribed Fire Review

On Oct. 26, the Nevada Department of Conservation and Natural Resources submitted a formal request to the National Association of State Foresters for an interagency team of fire specialists to conduct an Escaped Prescribed Fire Review, as required by Nevada Division of Forestry Fire Protection Manual, Chapter #5, Fuel Treatments and Prescribed Fire.

The Little Valley Escaped Prescribed Fire Review Team arrived in Carson City, Nevada on Nov. 9, receiving an official in-brief by the Department of Conservation and Natural Resources at 1000 hours the next day.

The Review Team was delegated the authorization to conduct a review of factual information related to the escaped Little Valley Prescribed Fire including, but not be limited to:

1. An evaluation of the prescribed fire plan.
2. An evaluation of involved personnel's actions taken pursuant to the prescribed fire plan.
3. A determination of the factors that led to the prescribed fire's escape.
4. Specific recommendations for the conduct of future prescribed fires.

The Review Team added two focus areas to be included in the review process:

1. Personnel training and qualification.
2. Review of relevant State of Nevada laws and policy governing the planning and implementation of prescribed fire.

A total of 53 interviews were conducted including 40 first time interviews and 13 follow-up interviews.

Methodical Review Process

The Review Team followed a methodical process of review, including:

- Onsite visits to each of the five burn units.
- Review of causal factors and origin of the Little Valley Escaped Prescribed Fire.
- Personal interviews with individuals, directly or indirectly, associated with the Little Valley Prescribed Fire planning, preparation and/or implementation. (A total of 53 interviews were conducted including 40 first time interviews and 13 follow-up interviews.)
- Review of applicable laws, statutes, and policies governing agency prescribed burning and available records, documents, and pertinent data directly related to the Little Valley Prescribed Fire (such as training records, prescribed fire plan, maps, dispatch and unit logs, weather data, National Fire Danger Rating indices, photographs and video recordings).

Daily discussion, inquiry, assessment, and fact-checking between Review Team members was conducted to ensure that the focus of the review remained within identified parameters to achieve agency objectives as defined within the Delegation of Authority.

State Laws, Regulation, and Policy

A review of applicable state laws, regulations, and agency policy governing or guiding prescribed burning was also conducted to assess compliance in the planning, preparation, and implementation of the Little Valley Prescribed Fire.

The Review Team found the Little Valley Prescribed Fire to be thoughtfully planned, carefully prepared and effectively executed following most Nevada Division of Forestry (NDF) prescribed fire standards. However, the prescribed fire plan lacked consistency with some sections of the Nevada Revised Statutes, NDF Administrative Manual, and the NDF Fire Protection Manual as relates to prescribed fire planning.

Relevant law, statute, and policy includes:

- NDF Division Administrative Manual/Fuel Treatments and Prescribed Fire (06040.0).
- NDF Fire Protection Manual/Chapter #5, “Fuel Treatments and Prescribed Fire.”
- SB444 Chapter 381, Statutes 1993, the source of Nevada Revised Statutes (N.R.S.) 527.122 to 527.128.
- NRS 527.122 through N.R.S. 527.128, inclusive regarding Controlled Fires. Authorizes the State Forester Fire Warden to utilize the controlled application of fire to natural vegetation as a resource and wildland fire management tool.

Specific reference to the above laws and/or policy guidelines will be provided in the body of the report where they are applicable under each area of review. (In addition, more specific information on these laws and policy is available in Appendix A.)

2. Background

The Sierra Front is commonly known for fast-moving wildfires that have burned a number of homes over the years. On average, this geographic area can have as many as 400 wildfires a year.

As urban development continues along the eastern slope of the Sierra, future wildfires will continue to threaten firefighter lives and safety and may compromise public safety and damage homes. These fast-moving wildfires will continue to occur almost every year.

Vital Tool to Reduce Threat

Aggressive fuel treatments and the use of prescribed fire is an important and vital tool to reduce the threat to life and property and to increase the safety environment for firefighters.

The general geographic area of the Sierra Front covers private, local, state and federal lands from the Doyle/Pyramid lake area to the north; south to Bridgeport, Calif.; and extends into the west central portion of Nevada.

High wind events in the western part of the Sierra Front are not uncommon. National Weather Service can predict these very strong downslope wind events which are often referred to as “Downslope Wind Storms” and/or “Zephyr Winds.”

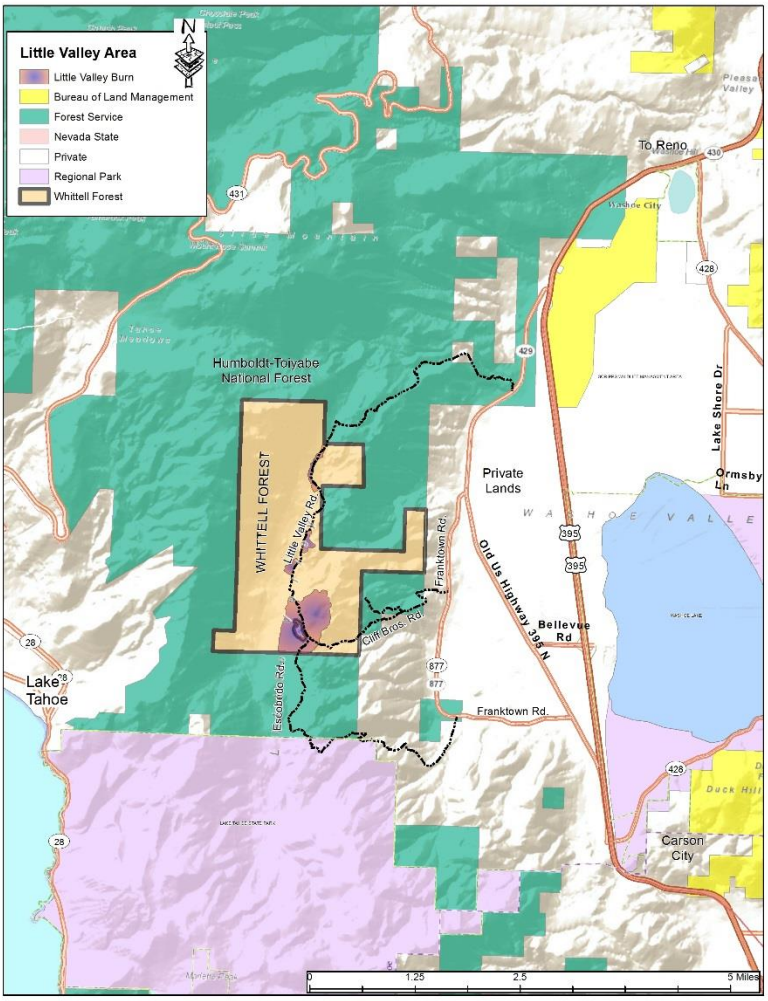


Figure 1 – Map depicting the land ownership in the geographic area of the Sierra Front.

These very strong downslope wind events are associated with frontal passages as storms/wind stack up against the Sierra Crest and “spill over” to the eastern side—sometimes creating winds in excess of 100 mph. On the other hand, Zephyr Winds (also downslope winds) are most often due to the pressure gradient changes in the summertime, but can be just as damaging when wildfires ignite and move in a downhill direction.

What makes these fires particularly dangerous to firefighters is the fact firefighters often move in to protect property, downslope ahead of the main fire, essentially putting them at the head of a downslope wind-driven fire. As more and more homes are built along this Wildland-Urban Interface (WUI), the threat and exposure will only increase with time as vegetation continues to accumulate, drought conditions persist, and summers become hotter and drier.

Prior large wildfires in this area include:

- Martis Fire, 2001—14,357 acres
- Waterfall Fire, July 2004—8,800 acres
- Caughlin Fire, Nov. 2011—1,935 acres
- Washoe Valley Fire, Jan. 2012—3,776 acres

Whittell Plan Provides Direction for Vegetation Treatments

The Whittell Plan guides and directs the vegetation treatments (mechanical and prescribed fire treatments) on state lands of the Little Valley area in West Washoe Valley. The state lands in this area encompass roughly 2,650 acres.

The prescribed fire treatment area in Little Valley is contiguous with areas that have been thinned in the early 1990s, or are targeted for treatment by the U.S. Forest Service as part of the North Washoe Valley Wildfire Risk Reduction and Ecosystem Enhancement Project (U.S. Forest Service 2004).

The Whittell Plan provides the direction for prescribed fire plans and states that these plans will be written by Nevada Division of Forestry personnel in consultation with a representative of the Whittell Board.

What is the Whittell Forest?

The Whittell Forest and Wildlife Area is a research and teaching facility of the University and Community College System of Nevada.

The 2,650-acre property was donated to the University System in 1959 by George Whittell.

The Whittell Forest is located in the Carson Range on the east slope of the Sierra Nevada south of Reno, Nevada.

The majority of the property is located in Little Valley. Vegetation is dominated by Jeffrey pine forests with an understory of bitterbrush and manzanita, lodgepole pine forests, and subalpine meadows.

Identifying the Most at Risk Landscapes and Reducing Fuels

In an effort to recognize the importance of treating vegetation that has missed a number of natural fire events, it has become necessary to identify the most at risk landscapes and to begin the long process of reducing fuels to an acceptable level with the intent of protecting the lives of emergency responders, protecting the lives and property of the public, and to lessen the severe impacts of a wildfire on watershed health.

The “zone of defense” created in the Whittell Forest could be linked to other land area treatments on adjacent lands. For example, north of the Whittell Forest, the U.S. Forest Service is implementing fuel reduction treatments that are contiguous with those conducted in the Whittell Forest. To the south, the U.S. Forest Service and the Nevada Division of State Parks are planning other treatments. Together, these linked areas form a north-south front that could provide an important role in combating future wildfires in the Carson Range.

Prescribed fire and mechanical fuel treatments are needed to reduce fuels for creating conditions that might lessen the damaging effects of a wildfire under severe conditions—affecting the Whittell Forest and neighboring lands, threatening the safety of people, and diminishing the value of property. Furthermore, this type of management action is needed to prevent a conflagration such as the following incidents: 2001 Martis Fire, 2004 Waterfall Fire, 2011 Caughlin Fire, or the 2012 Washoe Valley Fire.

Based on these considerations, the most effective methods for reducing fuel loads and increasing forest health in and throughout Little and Washoe valleys is to maintain the forest as a primitive area through:

1. Mechanical hand thinning of small-diameter trees and saplings where the forest is too dense.
2. Prescribed fire, including pile and/or broadcast burning, depending on the situation.
3. Ensuring that treatment areas form a continuous zone that can provide a meaningful role in future suppression of a regional fire.

Importance of an Integrated Regional Strategy for Wildland Fire Management
It is important to understand there is a collection of disjunctive sites in the Little Valley area that have a limited strategic relationship to one another. Treatment of each unit should be designed to improve the health of that unit, but more importantly, any treatment should add to a larger regional strategy for reducing hazardous fuels and providing a higher degree of safety and success in suppressing future wildfires.

Similar fuel treatments planned for the Whittell Forest are also planned for the Humboldt-Toiyabe National Forest to the north and east, identified in the North Washoe Valley Wildfire Risk Reduction and Ecosystem Enhancement Project. This larger initiative includes strategically placed area treatments (such as shaded fuel breaks) on forest, brushland, and riparian areas.

Many of the treatment units planned by the Forest Service are contiguous with those in the Whittell Forest. Communication with and between key land management agencies and fire protection districts will go a long way to leverage critical human capital and enhance training, experience, and collaborative decision making for future prescribed fires.

Relationship Between the University of Nevada-Reno and the Nevada Division of Forestry
Nevada Division of Forestry personnel have been identified in the Whittell Plan to conduct all prescribed burns. All broadcast burns and all pile burns conducted by NDF will be conducted under a prescribed fire prescription. Prescriptions will be written by NDF personnel in consultation with a Whittell Board representative.

Jurisdictional Agencies
There are several agencies that immediately adjoin the Whittell Forest prescribed fire area, as well as many assisting and cooperating agencies, most notably, the U.S. Forest Service's Humboldt-Toiyabe National Forest (HTF), and Carson Ranger District. Another agency with a vested interest in this project includes the Truckee Meadows Fire Protection District which has the statutory responsibility to provide structure fire suppression and protection for the homes and private property located in West Washoe Valley.

The Eastern Sierra Front consists of many different emergency response organizations which require close coordination and collaboration to ensure open and transparent exchange of information. Decisions made by one agency, which may not be readily apparent, will likely have an impact on others. The Sierra Front Wildfire Cooperators is comprised of emergency fire response agencies that work together on large, fast-moving fires along the Sierra Front.

History of the Multi-County Sierra Forest Fire Protection District
The Multi-County Sierra Forest Fire Protection District (SFFPD) was established in 1949 with the passage of Nevada Revised Statute (NRS) 473. The legal name of the NRS 473 Statute is "Fire Districts Receiving Federal Aid." The original District was formed to enable federal funds authorized through the Clark/McNary Act to be utilized for watershed protection and wildfire suppression along the eastern slope of the Carson and Sierra Nevada Mountains.

The District's 1949 boundaries included Carson, Douglas, and Washoe counties. The District was designed to provide rural fire protection for counties unable to provide protection and to serve as a fuel barrier between the U.S. Forest Service lands and the privately owned lands of each county.

At the time the District was originally formed, only states were eligible for Clark/McNary federal funds, not counties. As a result, the SFFPD was operated by the Nevada State Forester/Fire Warden. The State Forester

submitted budget requests for county tax dollars through each County Board of Commissioners to supplement the federal Clark/McNary funds.

Similar to the other western states, since its creation in 1949, significant changes occurred throughout the SFFPD. The U.S. Forest Service acquired much of the once-private timber lands. The federal aid authorized through the Clark/McNary Act expired in 2000. Urban development pushed out of the Truckee Meadows Valley into the foothills, coining a new term known as the "Wildland-Urban Interface." These changes caused the SFFPD to become fractured and more difficult to manage.

"Community Wildfire Protection Plan – Washoe Valley West" is More Than 10 Years Old

The comprehensive Community Wildfire Protection Plan – Washoe Valley West, completed in 2005, is a solid document that addresses the concerns and issues surrounding the need for hazard fuel reduction and fire protection, specifically, the threats and need for fuel treatment in West Washoe Valley.

This plan states that "approximately ninety percent of the homes surveyed in the West Washoe Valley have landscaping that meets defensible space guidelines to protect the home from damage or loss during a wildfire." Under all but the most extreme conditions, this statement is likely true.

This particular plan is more than 10-years old. Since the plan's initial inception, protection districts have changed (the Sierra Forest Fire Protection District has been dissolved and combined with Truckee Meadows Fire Protection District).

Knowing that this type of wind event that occurred during the Little Valley Prescribed Fire is not unique nor rare, future planning efforts should consider the worst case scenario.

"Carson Range Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy" Provides 16 Different Agencies with a Collaborative Framework

The Carson Range Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy with Amendment (2007) Plan (http://www.fs.usda.gov/detail/htnf/home/?cid=fsm9_026841) is a coordinated effort representing 16 federal, state, and local agencies located within several counties, including Washoe County. This plan comprehensively combines all existing plans that have been developed within the planning area and provides a framework for participating agencies to identify priority areas, as well as a collaborative strategy for accomplishing these priorities.

This plan identified many homes within the Carson Range that are outside of the core Wildland-Urban Interface areas that are at high risk from wildfires. The West Washoe Valley was identified as one of the areas that are at high risk to severe wildfires.

Where projects cross or adjoin jurisdictional boundaries, this plan emphasizes the need to collaborate on implementing the projects rather than work independently. This is a key component that is required for a high degree of success.

One of this plan's primary outcomes is to identify projects that will help create community defensible space and to help facilitate communication and cooperation among those responsible for implementing fuel reduction projects.

The Nevada Division of Forestry and the University of Nevada-Reno have a long-standing relationship of conducting fuel treatment on state lands in the Whittell Forest located in Little Valley. The Little Valley Prescribed Fire was a treatment that was built upon previous treatments in the area.

Prescribed Fire Permitting in Washoe County

Washoe County Air Quality is the Regulatory Agency for issuing permits and variances for prescribed burning in Washoe County

Washoe County Air Program is a direct delegation from the US EPA Region IX. A Memorandum of Understandings (MOU) with Nevada land management agencies requires the agencies to follow Washoe County Air Quality guidelines and regulations in smoke management.

The Washoe County District Health Department's Smoke Management Program can be found at the following website: (https://www.washoecounty.us/health/programs-and-services/air-quality/planning-rogram/smoke-management-program.php).

Stakeholder Engagement Associated with the Little Valley Prescribed Fire

As with all significant prescribed fire projects that occur along the eastern Sierra Front, a measure of success depends upon the engagement and opportunities for individuals and community leaders to be able to voice concerns and support for a wide variety of land management projects, not the least of which is prescribed fire.

Use of prescribed fire in Little Valley has the potential to impact local homeowners and smoke sensitive areas. It is vital to provide a collaborative effort with all local land management, regulatory, and jurisdictional agencies.

In planning the Little Valley Prescribed Fire there were a number of public meetings scheduled (for instance, Sept. 8, at the Washoe Valley Volunteer Department) which allowed for the local community to better understand the objectives of the prescribed fire. (See Appendix C for a synopsis of the outreach that was undertaken for the Little Valley Prescribed Fire.)

3. What was Planned?

Broadcast Prescribed Fire

As the summer of 2016 was coming to an end, the Nevada Division of Forestry planned to implement the Little Valley Prescribed Fire in cooperation with the University of Nevada-Reno. This was one of the largest broadcast prescribed fires (~200 acres) to be implemented along the Eastern Sierra Front. The units planned for burning occurred entirely within the Whittell Forest. All prescribed fire units were next to roads, occurring on flat to gently rolling slopes.

Communication and Outreach Efforts

The Little Valley Prescribed Fire "Community Communication Plan" was developed on Aug. 24. This plan included holding community meetings, disseminating a fact sheet to stakeholders and interested citizens, media updates and social media updates, highway information signage, and the development of an extensive feature documentary. In addition, outreach to local news outlets generated several stories.

On Aug. 26, a fact sheet of the prescribed burn and the community meeting was sent out to 400 citizens in the Washoe Valley area. In addition, a media advisory was sent out to the media with this same information. Approximately two weeks later, on Sept. 8, a community meeting was held at the Washoe Valley Volunteer Fire Department Station. Approximately 15-20 community members attended the meeting. Several cooperators made presentations at this meeting, including the Nevada Division of Forestry, University of Nevada, U.S. Forest Service, and the Desert Research Institute.

From October 3-7, six information updates and one "smoke impact" release were sent to the media outlets and to people on the community list. Nevada Division of Forestry Twitter and Facebook accounts were also updated at least daily. In addition, the information "trap line" was updated daily at 13 different locations. Nevada Department of Transportation highway information signs were placed and operational at the south and north end of Washoe Valley, displayed a message informing travelers of the prescribed fire.

Recommendations and Amendments Made to Little Valley Prescribed Fire Plan

The Prescribed Fire Plan was written and implemented as per the Interagency Prescribed Fire Planning Guide. The Technical Review was completed on May 26 by an equally qualified Prescribed Fire Burn Boss (RXB2) with similar prescribed fire qualifications and experience.

Two recommendations by the technical reviewer regarding adjustments to the prescribed fire plan were made to the Prescribed Fire Burn Boss:

- **Element #7 Prescription**: May want to add mixing height and direction.
- **Element #18 Wildfire Declaration**: Add Regional Fire Management Officer (FMO) to the list of contacts.

Two amendments were made to the final Little Valley Prescribed Fire Plan:

Amendment #1:

Element #11

Defined the required positions to be filled for implementing the prescribed fire. Incident Commander Type 3 (ICT3) and Incident Commander Type 4 (ICT4) were removed while Prescribed Fire Burn Boss Type 2 (RXB2) was retained to clearly demonstrate the overall authority for the prescribed fire would be held by the RXB2. Engine Boss (ENGB) was retained to demonstrate the need for supervision of engines deployed to the prescribed fire. Crew Boss (CRWB) was retained to demonstrate the need for

supervision of handcrews deployed to the prescribed fire. Safety Officer (SOFR) was added to the organization. Helicopter Manager (HMBG) was removed.

Element #15 – Minimum Staffing

DIVS: An additional Division Supervisor (DIVS) was added to provide additional staffing (Firing and Holding).

Element #16 – Mop-up Standards

Increased the level of supervision from an Incident Commander Type 4 (ICT4) to a DIVS for the mop-up and patrol as the burn progresses.

Element #17 – Contingency Resources

Added Truckee Meadows as a contingency resource, the type and kind of resource was left blank.

Limited Window of Opportunity

The first precipitation of the season occurred on October 2-3 in the form of light rain/snow for a total of 0.25 inches. While this provided fire managers a brief sense of relief, it wasn't enough to make a significant impact in the overall dryness of the fuels.

A fall prescribed fire was planned in this area due to the fact that most of the fuels targeted for reduction in this prescribed fire area are drier and available to burn. To the contrary, these same fuels are often too wet to burn in the spring.

Arson Fire Response and Brief Rain Postpones Little Valley Prescribed Fire Ignition by One Day

The Little Valley Prescribed Fire was planned to begin on the morning of Monday Oct. 3. The night before, the East Fork Fire Protection District (located approximately 10 miles south of the Little Valley Prescribed Fire area) had a human-caused fire start within their protection jurisdiction and requested cooperating agencies to assist the department in suppression efforts. Several agencies responded, including: Nevada Division of Forestry, U.S. Forest Service, and Bureau of Land Management.

This wildfire was successfully contained on the next day and the cooperating agency's resources were released back to their home units. Due to the commitment of these resources on Sunday and Monday and a small amount of precipitation received on the night of Oct. 2, the start of the Little Valley Prescribed Fire was delayed until Tuesday Oct. 4.

Nevada Division of Forestry completed a pre-burn morning briefing at their East Lake Office on Monday. All the required resources and overhead were available and filled.

The Little Valley Remote Automated Weather Station (RAWS) was used for onsite weather observations and was also used by the National Weather Service to produce the local spot weather forecasts.

4. Chronology of the Prescribed Fire – Day-to-Day

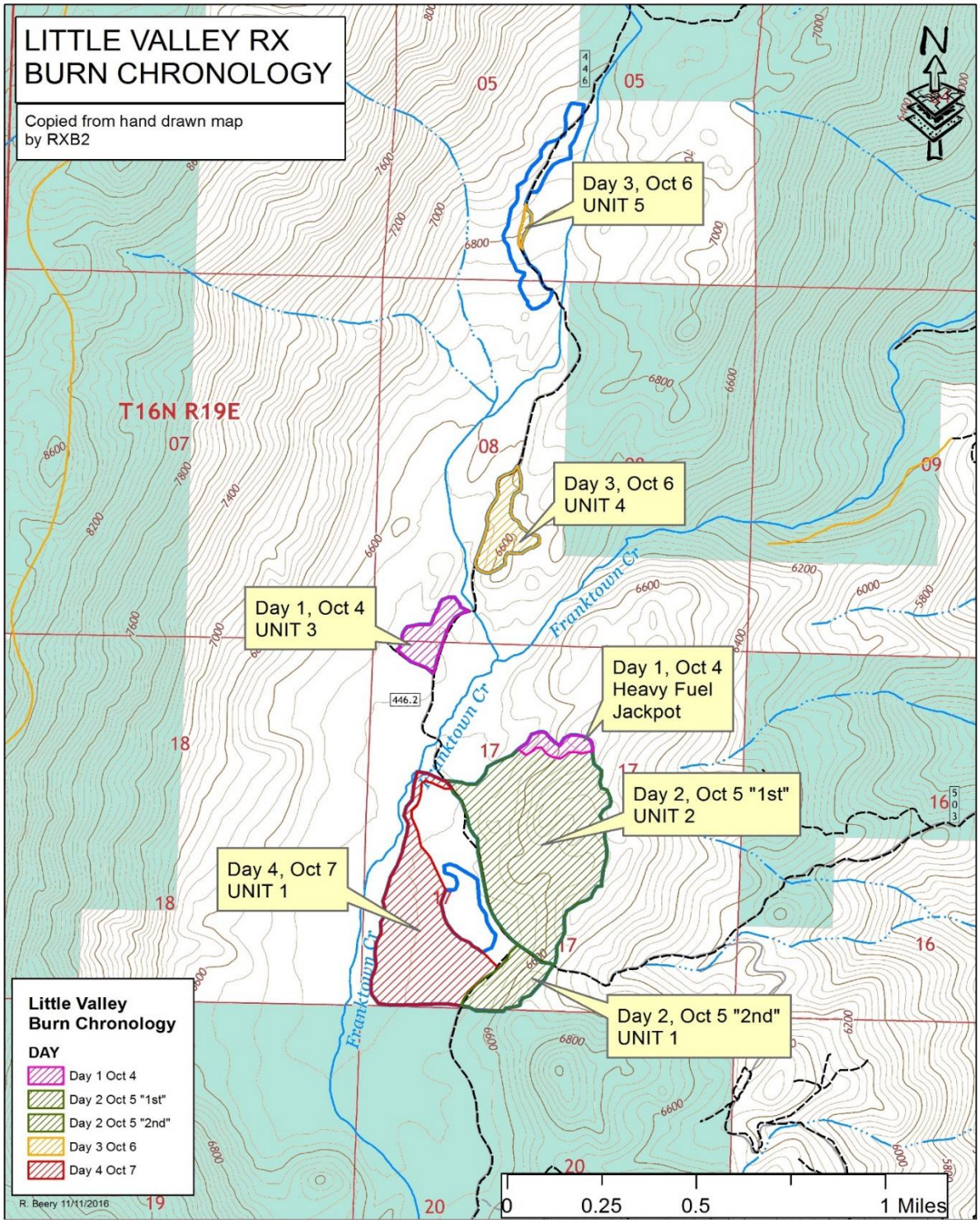


Figure 2 – Chronological map showing how the prescribed fire progressed on a day-to-day basis. For a more detailed chronology of the Little Valley Prescribed Fire, see Appendix E.

5. An Evaluation of the Prescribed Fire Plan

The Little Valley Prescribed Fire Plan was prepared on May 3 by a Nevada Division of Forestry (NDF) Type 2 Burn Boss. The plan used the most current version of the National Wildfire Coordinating Group (NWCG) Prescribed Fire Plan Template. It was technically reviewed on May 26 by a qualified Type 2 Burn Boss from the North Lake Tahoe Fire Department. All elements were found to be satisfactory. The Prescribed Fire Plan received an additional review from the NDF Regional Fire Management Officer (FMO) on June 1 and was approved by the NDF State Forester on June 17.

The Agency Administrator Ignition Authorization form was recommended by the Regional FMO on June 1 and approved by the State Forester on June 17. This form authorized the ignitions of the Little Valley Prescribed Fire to occur between Sept. 1 and Nov. 30.

General Review Team Observations

- The prescribed fire plan included all 21 elements of the NWCG Prescribed Fire Plan Template.
- A complexity analysis was completed for the burn using the NWCG Prescribed Fire Complexity Rating Guide Template.
- The prescribed fire plan included the required appendices which contained a project map, technical review checklist, complexity analysis, hazard analysis, fire behavior modeling documentation, and a smoke trajectory map.

A. Review Team Analyzed Plan's Consistency with State Statutes and NFD Manuals

The Little Valley Prescribed Fire Plan was reviewed by the Review Team for consistency with Nevada Revised Statutes (527.122 – 527.128), the NDF Administrative Manual, and the NDF Fire Protection Manual. (For more detailed information on these three references, see Appendix A.)

Review Team Observations

- NRS 527.128(c) requires a description of meteorological factors in the written plan. Specifically, transport wind speed, mixing height and maximum temperature are listed in the statute but were not included in the prescribed fire plan's prescription or smoke management and air quality section.
- NRS 527.128(d) requires a description of considerations related to common behavioral patterns of fires in the areas to be burned, including various burning techniques, anticipated length of the flame and the anticipated speed of the fire. The prescribed fire plan's prescription did not include a fire behavior description.
- NDF Division Administrative Manual (06040.0) states that "Prescribed Fire and Fuel Treatment Plans need to identify sensitive areas and provide operational guidance to minimize the impacts from smoke or other particulates. If potential negative impacts from smoke or other particulates could occur, an assessment of potential downwind impacts using an appropriate smoke management model will be completed." The prescribed fire plan did not adequately identify smoke sensitive receptors for all transport wind directions identified in the prescribed fire plan and smoke modeling was not completed for this project.
- The NDF Fire Protection Manual defines specific conditions for declaring a wildfire as well as specific actions that should be taken. The prescribed fire plan utilized language that was inconsistent with the NDF Manual for declaring the prescribed fire a wildfire.

- The prescribed fire plan was consistent with all other relevant sections of the Nevada Revised Statutes (527.122 – 527.128), the NDF Administrative Manual, and the NDF Fire Protection Manual.

B. Prescribed Fire Plan's Consistency with NWCG Guidance

The prescribed fire plan was further reviewed for consistency with direction provided in the NWCG Interagency Prescribed Fire Planning and Implementation Procedures Guide (PMS-484, April 2014), effectiveness of fire behavior modeling, and adequacy for safe and effective implementation.

Review Team Observations

- The prescribed fire plan (Element 4) did not provide a description of fuels adjacent to the project area (PMS-484, Page 27, B).
- There are measurable resource objectives (Element 5) for the units, however, they are too specific. Objectives should be attainable by making them a range of acceptable results. Example: "Reduce the duff layer by 50-80%." The prescribed fire objectives were phrased more as a goal or strategy. These should describe the fire behavior/fire effects necessary to meet the resource objectives. Objectives need to be measurable and quantifiable so prescription elements can be developed to meet them (PMS-484, Page 28).
- The prescribed fire plan's prescription (Element 7) was very narrow for relative humidity (10-30%) and wind direction (W, SW). It did not include parameters for effectively managing smoke such as mixing height, transport wind speed and direction or dispersion index. The prescription did not include a description of fire behavior needed to meet objectives (PMS-484, Page 28-29).
- The fire behavior modeling was insufficient to have prepared a fire behavior prescription and did not consider adjacent fuels (PMS-484, Page 27, B). The cool and hot ends of the prescription were not analyzed.
- The prescribed fire organization (Element 11) is not clearly defined. There are eight supervisory positions listed, however their roles on the prescribed fire are not clearly stated. An organizational chart would have helped clarify the organization. The equipment section lists required equipment, but should also include personnel staffing numbers for each piece of equipment. Thus, it is not possible to identify the total number of people that are required on the burn. In addition, there is no distinction for the number of lighters needed. These numbers only need to be minimums, but it is acceptable to discuss optimal as well. The organization should be clearly defined for all phases of burning (Ignition, Mop-up, Patrol) (PMS-484, Pages 31-32).
- Holding plans (Element 16) should consider fire behavior outside the unit boundary based on adjacent fuels (PMS-484, Page 34). There was no analysis of potential fire spread outside the units.
- The patrol section within the holding plan (Element 16) states that the burn will be patrolled daily until completely extinguished. In another paragraph, it states that the frequency and need to patrol will be determined by the Burn Boss in consultation with the FMO/Duty Officer. This could cause some confusion. If not patrolled daily, the conditions that determine the frequency of patrols should be better defined.
- The Contingency Plan (Element 17) describes three Management Action Points (MAPs): spot fire, spot fire that exceeds onsite resource capability, and fire intensity that exceeds or does not meet resource objectives. PMS-484 (Pages 34-35) recommends other MAPs be considered such as an Incident-

Within-an Incident, negative smoke impacts, multiple spots, loss of resource (mechanical), and other wildfires in the area.

- It is recommended that contingency planning utilize an analysis (using a spread model such as Behave) of fire outside the unit at the hot end of the prescription for all significant fuel models adjacent or within spotting distance of the burn. In addition, onsite holding force production capability as well as contingency resource production capability should be calculated and an analysis such as Behave's "contain module" be run to determine that sufficient contingency resources are planned. It is also beneficial to discuss potential strategies and control points adjacent to the burn units in order to pre-plan an effective response to fire outside the unit.
- The Smoke Management and Air Quality Plan (Element 19) was insufficient to effectively minimize negative impacts. Smoke modeling was not completed for the prescribed fire plan. There are no set guidelines for mixing height, transport wind speed or dispersion index. Sensitive receptors were not identified. Mitigation strategies consisted of monitoring, rapid mop-up, and reduction in unit size. Consider including other mitigation strategies for reducing or redistributing emissions such as burning under good dispersion and identifying and avoiding sensitive areas (airports, highways, schools, sensitive populations, etc.). Spot weather forecasts did not include the dispersion index or "HYSPLIT" modeling. (The HYSPLIT model is a complete system for computing simple air parcel trajectories, as well as complex transport, dispersion, chemical transformation, and deposition simulations.) (PMS-484, Page 36).
- The Complexity Rating did not include a signature page. The Complexity Rating should be signed by the plan preparer and the Agency Administrator. A review of the Complexity Rating for this burn revealed that a few elements might have been underrated. Complexity Ratings are somewhat subjective, however specific elements (off-site values, management organization, public and political interest, and smoke management) may have been underrated.
- There were two amendments to the prescribed fire plan. The first was requested on Sept. 28 and approved by the State Forester on Sept. 30. It was the result of a meeting between the Burn Boss, Burn Boss Trainee (RXB2(T)), State FMO, and Regional FMO with concerns over the plan. The amendment increased the burn staffing and clarified the organization. The second prescribed fire plan amendment allowed for burning under any wind direction with 20 ft. wind speeds up to 8 miles per hour. This amendment was documented through an email from the Agency Administrator on Oct. 6 at 1630 during the implementation of Unit 5. Amendments take place before ignition and require Agency Administrator signature (PMS-484, Page 20). A change to wind direction has a direct correlation to other sections of the prescribed fire plan such as smoke management and air quality. Affected sections of the plan should be analyzed and updated (including modeling) as part of the amendment before its approval. This was not done for the second amendment. The amendment states that this will "potentially prolong smoke impacts to N. Lake Tahoe for 36 hours"—an area that was not analyzed in the prescribed fire plan's Smoke Management Section (Element 19) (PMS-484, Page 36).

6. An Evaluation of the Involved Personnel's Actions Taken Pursuant to the Prescribed Fire Plan

Overall, operations from October 4-7 went well, according to Review Team interviews conducted with those people directly involved with the implementation of the Little Valley Prescribed Fire. Burning was done slowly and cautiously. Units selected each day were chosen to minimize risk of escape or to reduce smoke impacts. The prescribed fire was well staffed (more than 100 personnel) and contingency resources were available. Prescribed fire personnel camped onsite which provided a quick reaction to overnight problems if they had occurred.

The prescribed fire was staffed everyday throughout the mop-up phase. Mop-up began immediately upon completion of each unit and continued through Oct. 13.

Review Team Observations

Tuesday Oct. 4

- The morning briefing on Tuesday Oct. 4 followed a wildfire format and did not include some elements from the prescribed fire plan's briefing checklist (Element 10, PMS-484, Page 10). Items not covered: burn prescription, holding plan, contingency plan and assignments, and procedures for a wildfire declaration. Breakout sessions were done for the three divisions and may have covered some of these missing elements, but the information was not shared with the entire burn organization. Additional items (not listed in Element 10) were included in the briefing such as air operations, logistics, and public information.
- On Tuesday Oct. 4 the prescribed fire was out of prescription on the cool end. (See Table 1 below.)
  - The Go/No-Go form was signed for Units 2 and 3 by the Burn Boss. "Yes" was circled for "Are all prescription parameters met."
  - Test fire-weather was recorded on the form. But the test fire location and results were not recorded on the form (as is stated on the form to do).

Table 1 – Depiction of onsite conditions on Oct. 4 compared with prescribed fire plan prescription parameters using the Little Valley RAWS (LV RAWS) and onsite observations recorded in the Little Valley Unit Log.

Prescription Parameters		Observations – October 4th													
		LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite
Time		**1038**	**1025**	**1138**	**1112**	**1238**	**1200**	**1338**	**1300**	**1438**	**1400**	**1538**	**1500**	**1638**	**1600**
Relative Humidity	10 - 30%	57 %	63%	48%	48%	40%	49%	39%	41%	36%	32%	38%	33%	42%	32%
20' Wind Speed	5-20 mph	5.99	N/A	5.99	N/A	4	N/A	5.99	N/A	7	N/A	5.99	N/A	7	N/A
Mid-flame Wind Sp.	2-12 mph	N/A	1.5	N/A	1-2	N/A	2-4	N/A	3-5	N/A	5-8	N/A	NR	N/A	NR
Wind Direction	W SW	W	NR	WSW	E	SSE	SW	WSW	SW	SW	W	SW	NR	SSW	NR
Temp.	N/A	47	47	49	52	52	53	53	55	53	59	54	55	52	56

NR=Not Recorded; N/A=Not Applicable

Outside of Prescription Parameters

Marginal Prescription Parameter

- On Oct. 4, ignitions commenced at 1120 in Unit 2. At 1457, ignitions began in Unit 3. Ignitions were complete in Unit 3 at 1645 and at 1817 in Unit 2. One small slopover occurred and was quickly extinguished. Ten acres were completed in Unit 3 and 20 acres were completed in Unit 2.

Wednesday Oct. 5

- The morning briefing on Oct. 5 was presented in a wildfire format and did not follow the briefing checklist (Element 10). The briefing specifically covered 5 of the 12 checklist items. Based on observations of the video taken during the morning briefing, there seemed to be some confusion on the plan presented at that briefing.
- On Oct. 5 the prescribed fire was out of prescription on the cool end for Relative Humidity, Wind Speed and Wind Direction based on Little Valley RAWS (LV RAWS) and onsite observations. (See Table 2 below.)
  - The Go/No-Go form was signed for Units 1 and 2 by the Burn Boss Trainee. Only qualified Burn Bosses should sign the form. "Yes" was circled for "Are all prescription parameters met."
  - Test fire-weather was recorded on the form, but test fire location and results were not recorded on the form (as is stated on the form to do).

Table 2 – Depiction of onsite conditions on Oct. 5 compared with prescribed fire plan prescription parameters using the Little Valley RAWS (LV RAWS) and onsite observations recorded in the Little Valley Unit Log.

Prescription Parameters		Observations – October 5th													
		LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite
Time		**1038**	**1044**	**1138**	**1100**	**1238**	**1200**	**1338**	**1300**	**1438**	**1400**	**1538**	**1500**	**1638**	**1600**
Relative Humidity	10 - 30%	56%	54%	50%	42%	48%	38%	44%	36%	43%	32%	40%	49%	57%	34%
20' Wind Speed	5-20 mph	4.99	N/A	4.99	N/A	4.99	N/A	4	N/A	7	N/A	2.01	N/A	2.01	N/A
Mid-flame Wind Sp.	2-12 mph	N/A	Calm	N/A	NR	N/A	3-5	N/A	3-5	N/A	3-5	N/A	NR	N/A	1-2
Wind Direction	W SW	ENE	NR	E	NR	E	NR	NE	NE	NNE	NE	WNW	NR	SW	NE
Temp.	N/A	44	34	47	58	48	58	50	59	48	58	47	51	44	56

NR=Not Recorded; N/A=Not Applicable

Outside of Prescription Parameters
Marginal Prescription Parameter

- Oct. 5 ignitions began at 1049 on the remainder of Unit 2. Ignitions were started on a portion of Unit 1 at 1619. Ignitions were completed on both units at 1802. The Burn Boss reported 90 acres completed in Unit 2 and 10 acres completed in Unit 1.
- Negative smoke impacts began to occur on Oct. 5 in Incline Village. Based on an interview and supplied notes, Washoe County Air Quality Management District (AQMD) called the Burn Boss in the afternoon at 1645 and expressed concerns with air quality and asked the Burn Boss not to burn on the

next day (Thursday, Oct. 6). In an interview with the Burn Boss, he stated that he did not recall a phone conversation with AQMD on Oct. 5.

Thursday Oct. 6

- The next day, Thursday Oct. 6, the prescribed fire was out of prescription on the cool end for Relative Humidity, Wind Speed and Wind Direction for most of the burn day, based on LV RAWS and onsite observations. (See Table 3 below.)
  - The Go/No-Go form was signed for Units 4 and 5 by the Burn Boss Trainee. Only qualified Burn Bosses should sign the form. "Yes" was circled for "Are all prescription parameters met."
  - Test fire-weather was recorded on the form. But test fire location and results were not recorded on the form (as is stated on the form to do).

Table 3 – Depiction of onsite conditions on Oct. 6 compared with prescribed fire plan prescription parameters using the Little Valley RAWS (LV RAWS) and onsite observations recorded in the Little Valley Unit Log.

Prescription Parameters		Observations – October 6th													
		LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite
Time		**1038**	**1100**	**1138**	**1200**	**1238**	**1300**	**1338**	**1400**	**1438**	**1500**	**1538**	**1600**	**1638**	**1700**
Relative Humidity	10 - 30%	50%	34%	43%	41%	37%	38%	34%	18%	33%	NR	31%	24%	57%	28%
20' Wind Speed	5-20 mph	4.99	N/A	3	N/A	4	N/A	4	N/A	4	N/A	4	N/A	2.01	N/A
Mid-flame Wind Sp.	2-12 mph	N/A	NR	N/A	2-3	N/A	2-4	N/A	NR	N/A	NR	N/A	Light	N/A	Light
Wind Direction	W SW	NE	NR	E	E	SE	E	E	NR	ENE	NR	ENE	NR	ESE	NR
Temp.	N/A	46	50	50	54	53	52	55	66	56	NR	56	62	56	62

NR=Not Recorded; N/A=Not Applicable

Outside of Prescription Parameters
Marginal Prescription Parameter

- Oct. 6 ignitions began at 1131 in Unit 4 and were completed at 1430. Ignitions began in Unit 5 at 1500 and were completed at 1700. A total of 15 acres were completed in Unit 4 and three acres were completed in Unit 5.
- On the morning of Oct. 6, Washoe County AQMD again made contact with the Burn Boss due to significant smoke impacts overnight in Washoe Valley. AQMD stated that conditions were not favorable for continuing burning. This was not clearly understood by the Burn Boss. He stated that he was informed of complaints only. Several additional calls occurred throughout the afternoon of Oct. 6 in which the Burn Boss stated he understood the significance of the smoke impacts, but lighting had already commenced on Units 4 and 5 and would be completed for firefighter safety.
- A verbal amendment to the prescribed fire plan was completed at 1630 to allow for all wind directions with a 20 ft. wind speed up to 8 mph. This amendment, done between the State Forester and the Burn Boss, was documented through an email.

Friday Oct. 7

- On Friday Oct. 7 the prescribed fire was in prescription based on LV RAWS observations, however onsite observations show two separate 1-hour periods in which the prescribed fire was out of prescription for relative humidity (33%). While wind direction and speed were below the prescribed fire plan prescription thresholds, they were allowed under the Oct. 6 amendment to the prescribed fire plan. (See Table 4 below.)
    - The Go/No-Go form used for burning this day was the same form used for Unit 1 on Oct. 5 signed by the Burn Boss Trainee. There was no signature or date for burning on Oct. 7. A new form should have been completed by the Burn Boss validating the decision to proceed with a signature/date.
    - Test fire-weather was recorded on the form, but test fire location and results were not recorded on the form (as is stated on the form to do).

Table 4 – Depiction of onsite conditions on Oct. 7 compared with prescribed fire plan prescription parameters (modified after the second prescribed fire plan amendment on 10/6 at 1630) using the Little Valley RAWS (LV RAWS) and onsite observations recorded in the Little Valley Unit Log.

Prescription Parameters		Observations – October 7th (With Amendment)													
		LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite	LV RAWS	Onsite
Time		**1038**	**1100**	**1138**	**1200**	**1238**	**1300**	**1338**	**1400**	**1438**	**1500**	**1538**	**NR**	**1638**	**NR**
Relative Humidity	10 - 30%	30%	46%	26%	33%	22%	30%	19%	33%	19%	27%	19%	NR	21%	NR
20' Wind Speed	0-8 mph	4.99	N/A	4.99	N/A	3	N/A	4.99	N/A	4.99	N/A	3	N/A	1.01	N/A
Mid-flame Wind Sp.	N/A	N/A	1-2	N/A	1-2	N/A	2-3	N/A	1-2	N/A	1-2	N/A	NR	N/A	NR
Wind Direction	Any	ENE	E	ENE	NW	E	SE	E	E	ENE	NE	ESE	NR	SE	NR
Temp.	N/A	56	61	58	67	61	68	62	65	64	71	65	NR	63	NR

NR=Not Recorded; N/A=Not Applicable

Outside of Prescription Parameters
Marginal Prescription Parameter

- On Oct. 7, two key leadership positions on the prescribed fire, the Holding Division Supervisor (DIVS) and the Extended Holding DIVS, were vacated due to other commitments. On that day, the Regional FMO stepped in to cover both of these positions. This staffing level fell below the required number of DIVS as stated in the Sept. 30 amendment to the prescribed fire plan.
- On Oct. 7, Washoe County AQMD again made an attempt to have the prescribed fire reduced or halted due to unfavorable conditions through an email to Sierra Front Dispatch Center (at 0828 hours). This message was not relayed to the Burn Boss. At 1058 hours, Washoe AQMD contacted the Public Information Officer (PIO) and asked that burning be stopped. The PIO referred them to the State Forester. At 1100 hours, AQMD spoke with the State Forester to express their concerns for public health and to compel NDF to cease burning.

Overall Review Team Observations

- Many of the communications from Washoe AQMD to the NDF regarding the negative smoke impacts went directly to Sierra Front Dispatch or to the PIO. It appears that many of these communications were not passed on to the Burn Boss.
- The Go/No-Go Checklist has an element that asks: "Are ALL smoke management specifications met?". This element was circled "Yes" for all days of burning.
- The prescribed fire plan (Element 19c) states that smoke impacts to potential sensitive receptors will be mitigated by ensuring that burning will take place when mixing heights and transport winds are favorable. On Oct. 6-7, NDF was informed from AQMD that conditions were not favorable.
- Ignitions began at 1155 in Unit 1, on Oct. 7. Conditions from the test fire were not acceptable, the fire was extinguished and a second test fire was initiated at 1220 in a different location. The second test fire yielded favorable conditions and ignitions proceeded. Ignitions were completed at 1545; 80 acres were completed.
- The prescribed fire plan (Element 20) requires monitoring for favorable smoke transport through ocular estimation. NDF Policy (NDF Fire Protection Manual) requires monitoring of smoke dispersal. There was no evidence of monitoring conducted by NDF burn personnel.
- Mop-up began immediately after each unit was completed. Mop-up continued from Oct. 8 through Oct. 13. Normal mop-up procedures were used, including the utilization of large amounts of water. Mop-up followed the prescribed fire plan and in many cases exceeded the requirements for mop-up distance.
- Mop-up was supervised Oct. 9-12 by the Burn Boss Trainee. The Burn Boss was not on site but received regular updates 2-3 times per day from the Burn Boss Trainee. The Burn Boss was on site on Oct. 13.
- Oct. 11 was the last day any of the Eastern Sierra Camp crews were assigned to the prescribed fire. They were available beyond Oct. 11. There was still active mop-up occurring on the burn units and the wind event was in the forecast. The Burn Boss and Burn Boss Trainee believed that they could handle mop-up with their local resources. The Burn Boss Trainee stated that they kept one of the Eastern Sierra Camp crews one day longer than initially planned because of the mop-up work that still remained.
- The Burn Boss and the Burn Boss Trainee discussed the high winds forecast for the night of Oct. 13. Based on the limited amount of heat near the control lines, success of the current mop-up effort, and the risk to firefighters working in timber during high winds, the decision was made to not staff the prescribed fire the night of the Oct. 13.
- Spot weather forecasts were requested every day during the prescribed fire as well on Oct. 8, 11, 12, and 13 during the mop-up phase. The forecast included statements for high winds beginning on the Oct. 11 thru the night of Oct. 13. The spot weather forecast for Thursday Oct. 13 did not include a Fire Weather Watch or Red Flag Warning.

Review Team Observations
Safety/Risk
Incident Action Plan (IAP)

- The Little Valley Prescribed Fire did have a dedicated Safety Officer (SOFR) and a Safety Officer Trainee (SOFR-T). A safety briefing was given during morning briefings.
- The Little Valley Incident Action Plan (IAP) did include a complete Medical Plan (ICS 206 WF) for the prescribed fire. The Medical Incident Report, which is a part of the Medical Plan, was not used. This report (also known as the 9-Line) would have provided personnel step-by-step instructions on who was responsible for certain actions during medical situations on the prescribed fire.
- There were no discussions for an "Incident-Within an-Incident" during operational briefings. This discussion would have given burn personnel the opportunity to have questions answered or concerns addressed up front about emergency protocol on the prescribed fire. Everyone would have heard the same information at the same time. It would have given folks an opportunity to view the Medical Incident Report before it was needed.

Review Team Observations
Risk Analysis

- Values at Risk were not identified or discussed during operational briefings. This information would have provided valuable information to all personnel on the incident as to what those values were, where they were located, and why they were valuable.
- A daily risk analysis that identified hazards and mitigations was not done for the prescribed fire.

7. A Determination of the Factors that Led to the Prescribed Fire Escape

A. Validation of Cause and Origin Investigation

Site Visits

November 10

The Review Team made a site visit to gain an overview of the execution of the prescribed fire in Little Valley. This overview tour was conducted by the Prescribed Fire Burn Boss and the Prescribed Fire Burn Boss Trainee.

November 11

A site visit was conducted by the Review Team to examine the factors surrounding the escape. Burn patterns and fire spread indicators lead the investigators back to the general area of origin. Due to the time that had passed (29 days) since the escape, only macro indicators were available and reliable. Micro spread indicators had been disturbed by fire suppression activity and several inches of precipitation, rendering some of these indicators unreliable. Using the information available, the General Area of Origin for the escape of the Little Valley Prescribed Fire was identified.

November 14

After reviewing the Fire Cause and Origin Investigation Team report released by the fire investigation team assigned to investigate the Little Valley Wildfire, a site visit was conducted with the investigators from the Bureau of Land Management (BLM), Carson City District. The investigators walked though their observations and methodology that they used while conducting their investigation.

During this visit an opportunity arose to interview these BLM investigators regarding what they observed within the prescribed fire area Unit 1. Both stated that they observed multiple areas of heat and smoke in Unit 1 within close proximity to the “Area of Origin” that they had identified. These statements are supported by photo documentation taken by one of the investigative team members from the Nevada State Fire Marshal’s office.

More details were requested regarding the most probable heat source(s) that the fire investigation team had identified within their report. The Fire Cause and Origin Investigation report references a “still hot stump hole” which the investigators pointed out. During the site visit, the fire investigation team measured the distance of the stump hole to be 34 feet 9 inches west of the “Area of Origin” of the Little Valley Wildfire. There were also two areas where they pointed out that burning roots from that stump hole surfaced. They measured at 40 feet 1 inch and 41 feet 5 inches west of the area of origin.

Conclusion Regarding Cause and Origin Investigation

The Review Team reviewed the following: the Fire Cause and Origin Investigation Team report, the supplemental report, viewing and analyzing all of the photos taken of the origin area, interviewing the investigators, as well as personal observations. The findings of the Fire Cause and Origin Investigation Team and the methodology in which the investigation was conducted was confirmed by the Review Team to meet wildland fire investigation standard practices.

Figure 3 – Photo shows smoke from areas in Unit 1 smoldering adjacent to the area of escape on Oct. 14, midday, post-escape. Notice the disturbance on the forest floor created by mop-up operations that had occurred prior to the escape.

B. Causal Factors Contributing to the Escape

Presence of Heat in Unit 1

The Fire Cause and Origin Investigation states, and the associated photographs taken around the origin area of the Little Valley Wildfire clearly show, that residual heat was present in the south end of Unit 1 on Oct. 14 upon arrival of the fire investigators, approximately 12 hours after discovery.

General Mop-Up Operations

Mop-up of the prescribed fire commenced on Saturday, Oct. 8 and continued through Oct. 11, in reverse sequence to the firing that had occurred.

- Standard wildland fire mop-up practices appear to have been used by the assigned resources. This was evident in the interviews of personnel and images viewed.
- Water supply was not an issue with multiple draft sites available within the project area and a water tender assigned through Oct. 11.
- Hand crews were reportedly supported by engines and the water tender.
- All personnel understood the mop-up standard end state to be 100% for 100 feet from the perimeter.
- Units 3, 4, and 5 were mopped-up 100% due to their relatively small size.

Table 5 – Staffing onsite each day of mop-up.

Resources	Oct 8	Oct 9	Oct 10	Oct 11	Oct 12	Oct 13
Burn Boss	1	0	0	0	0	1
Burn Boss Trainee	1	1	1	1	1	1
Misc. Overhead Personnel	3	3	0	0	0	0
Inmate Crew Personnel	96	72	72	0	0	0
Helitack Personnel	7	0	7	7	7	7
Type 3 Engines Personnel	1 2	1 2	1 2	0	0	0
Type 6 Engines Personnel	2 4	1 2	1 2	1 2	1 2	1 2
Type 2 Water Tender Personnel	1 2	1 2	1 2	1 2	0	0
Type 2 Helicopter Personnel	1 1	0	0	0	0	0
Est. Total Equip. Personnel	**5 116**	**3 82**	**3 87**	**2 12**	**1 10**	**1 11**

Mop-Up Operations on Oct. 12-13

Interviews with NDF personnel that were assigned to mop-up operations on Oct. 12-13 were conducted on Nov. 15 with follow-up interviews on Nov. 16.

The following is a general summary of events that occurred on Oct. 12. A more specific timeline of events that occurred during the mop-up hours on Oct. 13 is presented on the next page.

October 12

- Personnel briefed by Burn Boss Trainee and then he patrols line on foot.
- At 0950, Burn Boss Trainee reports to Minden Dispatch: Little to no heat in Units 3, 4, and 5; will continue to mop-up 100 feet in on Units 1 and 2.
- Primary focus for the morning of Oct. 12 was the east side ridge of Units 1 and 2 for the NDF Helitack personnel, consisting of 7 crew members. They found very few smokes within 100 feet of the line and pushed farther into the units, 300-feet plus.

- ❖ The Helitack personnel were told and were aware that the east ridge is the most vulnerable area of escape—with predicted high winds from the west.
- ❖ In the afternoon, the Helitack personnel made a sweep of Units 3, 4, and 5. They found a few scattered smokes and extinguished them, then made another sweep of the ridgeline of Units 1 and 2—not much found there.
- ❖ Primary assignment for the Type 6 Engine Crew was road patrol, keeping an eye on all units with focus on Units 1 and 2, and worked smokes in Units 1 and 2.

October 13

0700

On duty at Eastlake Station
Briefing

- Engine 5160
- Helitack Crew (8 personnel)
- Burn Boss and Burn Boss Trainee

0800
Helitack personnel and Engine depart Eastlake Station.

0830
Onsite. Discovered big log/stump burning by road in Unit 2 across from "No Burn" area. Engine and all Helitack worked the area.

0900
Helitack Crew splits into three groups:

- Group 1 (2 personnel) went south from Little Valley Road along the ridge in SE Unit 1. No heat found.
- Group 2 (3 personnel) started up the ridge north in Unit 2 from Little Valley Road. Group 1 finished and joined Group 2, for a total of 5 personnel at this time. Found heat on the line near the south end of the ridgeline in Unit 2. Worked this area. Groups 1&2 continued north along the ridgeline in Unit 2. Noted some heat well interior down the hill in Unit 2.
- Group 3 (3 personnel) drove north to check units 3, 4, 5. No heat found.

1000
Engine 5160 calls Group 3 on the radio, asks for help in Unit 1 where they have multiple smokes.

1000-1100
Group 3, Engine 5160, Burn Boss and Burn Boss Trainee all work smokes in Unit 1 "Triangle" which is the SW area of Unit 1 that is timbered, bounded by the Cliff Brothers Road on the northeast, west of Escobedo Road, north of the south boundary of Section 17, and east of the large meadow in Unit 1.

1100-1200
Group 3 drives to north end of project and pulls hose and tanks.

1200
All Helitack personnel meet at SNOTEL site in Unit 2 for lunch. (SNOTEL site is the weather site for recording snowfall.)

1300
Helitack notices heavy smoke interior in Unit 2 in snag patch just south of the SNOTEL site. All went to check. Snag patch deemed too hazardous to work in the area.

1330
- Burn Boss and Burn Boss Trainee call Helitack Crew on radio to "Come off of the hill by 1530".
- Burn Boss and Burn Boss Trainee leave the site for Eastlake Station.

1400-1500
All Helitack and Engine personnel pull gear in Unit 3 area and load most of it onto the engine.

1500
- Engine 5160 and 3 Helitack Crewmembers in pickup vehicle depart the area back to Eastlake Station.
- The remaining 5 Helitack Crewmembers recheck Units 3, 4, 5. Think they see smoke in Unit 5—but determine that it's just ash picked up by the wind. No heat found in Units 3, 4, 5.

1600
- As the crew is driving out they notice blown-down trees that fell since they drove in.
- At the "Y Junction" they notice drift smoke from the area of the "Triangle" in Unit 1.
- The Helitack Squad Leader recons the area where the smoke is coming from.

1615-1630
- The crew tools up and starts dry-mopping the "Triangle" where the smokes are coming from. These smokes are described as approximately one-quarter acre in size, burning in the duff surrounded by black.
- One crew member states he can see more smokes to the south of their location.
- The Helitack Squad Leader makes a phone call to Engine 5160.
- The Helitack Squad Leader states weather conditions are deteriorating with increases in wind speed.
- Engine 5160 calls Burn Boss Trainee to relay information from Helitack regarding the Triangle in Unit 1.

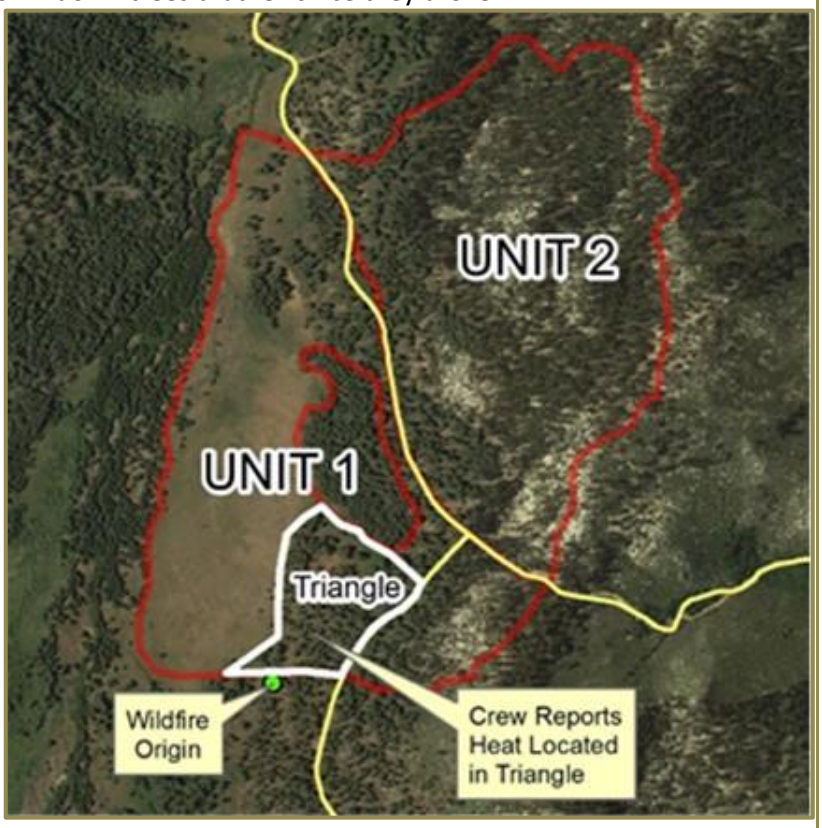


Figure 4 – View of the area referred to as the "Triangle" where the Helitack Crew reported heat late in the day on Oct. 13.

1645-1700
Engine 5160 calls back. The crew is told to return to Eastlake Station if the area they are working is not a threat to the line.

1730
The Helitack personnel is back at Eastlake Station.

C. Weather Conditions

The weather conditions were a key contributing factor to the escape of the Little Valley Prescribed Fire. The most prevalent weather factor to affect this escape was the wind. As the area came under the influence of the approaching low pressure system, weather conditions at the prescribed fire site deteriorated.

The Helitack personnel estimated that the wind was out of the west at 10-15 mph with gusts to 20 mph. The crew also stated that they had noticed trees had fallen in Unit 2 at approximately 1600 and branches were falling in the "Triangle" area of Unit 1 that they were dry-mopping due to the increase in wind speed. In fact, the Little Valley Remote Automated Weather Station (RAWS) located in the southwest portion of Unit 1 approximately 400 feet from the point of escape, was recording wind speeds of 11-13 mph with gusts of 31-45 mph from the west during the last two hours the Helitack personnel was onsite. The conditions at the prescribed fire site after the Helitack personnel left, up until the time the Little Valley Wildfire was discovered, is illustrated in Table 6 (below). This table clearly shows the increasing strength in the wind speed and especially the wind gusts. (For more information, see Appendix B.)

Table 6 – The Little Valley Remote Automated Weather Station (RAWS) Data

Date	Time	Temp.	RH	Wind Speed	Wind Direct.	Max. Gust
10/13/16	17:38	57	31%	15 mph	West	39
10/13/16	18:38	55	37%	15 mph	West	36
10/13/16	19:38	53	39%	17 mph	West	35
10/13/16	20:38	51F	38%	14 mph	West	33
10/13/16	21:38	52F	32%	15 mph	W-N-W	45
10/13/16	22:38	52F	32%	13 mph	West	44
10/13/16	23:38	52F	29%	20 mph	West	54
10/14/16*	00:38	52F	32%	16 mph	West	87
10/14/16**	01:38	52F	35%	19 mph	West	56

*Most Probable Time of Escape. **Approximate Time of Discovery of the Little Valley Wildfire.

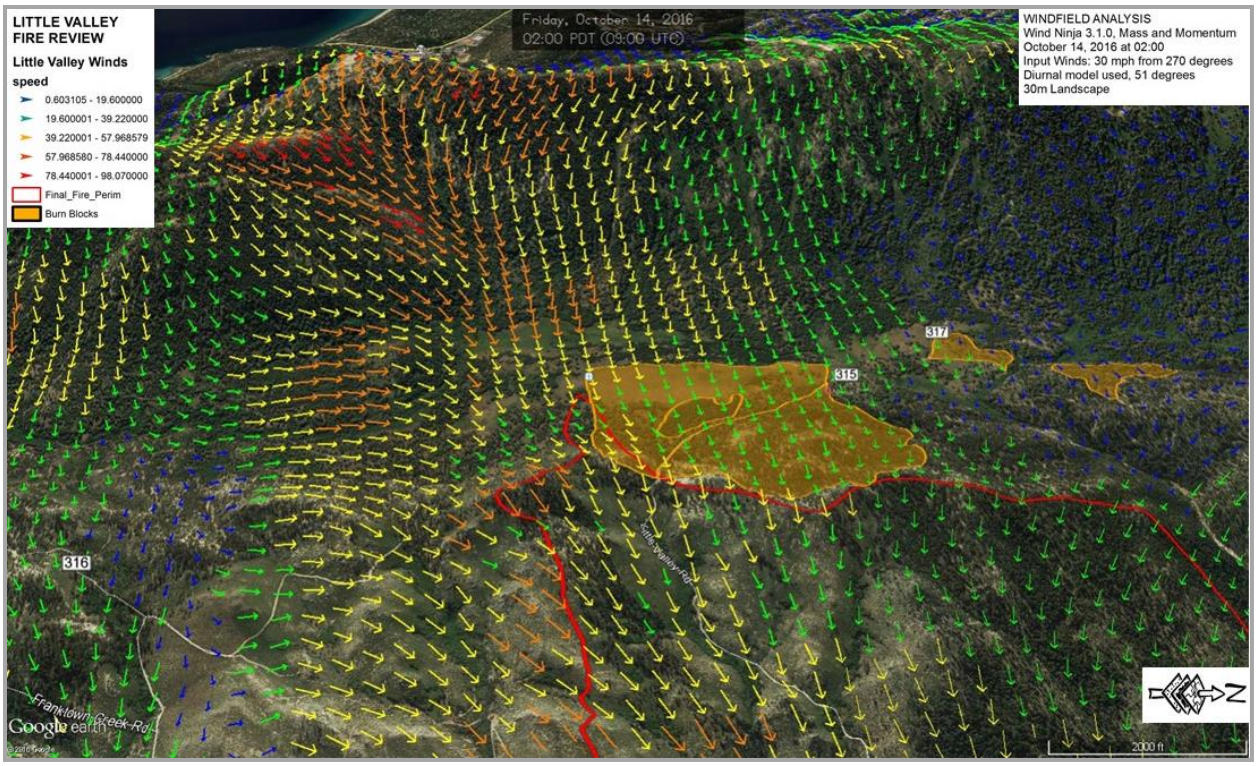


Figure 5 – This photo illustrates a computer program called "WindNinja" which uses weather models to create or recreate wind that flows across the terrain.

An interview with a National Weather Service (NWS) Meteorologist revealed that the Little Valley area is noted for being one of the most wind-prone areas for strong downslope wind storms in the Reno Forecast Zone. NWS described the weather event that occurred the evening of Oct. 13 and into Oct. 14 as an "Exceptional Storm."

Topography appears to be part of the answer as to why the area is noted for exceptional wind speeds. Illustration of the wind and topography relationship is depicted in a "WindNinja" modeling program run (see Figure 5 above). This run shows that a "Venturi" effect is caused by a saddle in the ridge to the southwest of the Little Valley Prescribed Fire site. The prevailing wind in this model is set at 30 mph and shows the rate of acceleration of the wind as it passes through the saddle southwest of the prescribed fire site.

D. Fuel Conditions

The fuels targeted in the prescribed fire treatment were Fire Behavior Fuel Model (FBFM) GRASS 4 (GR4 Moderate Load, Dry Climate Grasses) with a fuel bed depth of approximately two feet. FBFM TL8 (Long-Needle Litter) is found predominantly on the east side (western aspect) of the valley.

There are also scattered pockets of FBFM 2 (Low Load Grasses with a Shrub Component) found in some areas where the timber transitions to the grass fuel type. In these areas, the deep duff layer's 1-, 10-, and 100-hour fuels and a scattered light brush component in the under story of the mixed conifer stand were targeted. (For more information, see Appendix B.)

The Eastern Sierra Front, including the Little Valley area, was under the influence of long-term drought. (See Appendix B) Seasonal drying had occurred over the prescribed fire area during the previous summer months.

The area was unusually dry for the time of year, before receiving a quarter of an inch of rain/snow just prior to implementing the prescribed fire. While this impeded burn operations early in the project, the area quickly recovered to the previously very dry condition.

Due to the precipitation received on Oct. 3, the burn depth into the duff, stumps, and roots in Units 3, 4, and 5 did not burn as deep as occurred in Units 1 and 2. Units 3, 4, and 5 were also relatively small in comparison to Units 1 and 2 and were therefore quickly mopped-up.

By the time Units 1 and 2 were completed and mop-up began, the effects of the precipitation that had been previously received was nonexistent. This allowed fire to penetrate the duff layer and burn deep into the late 1800s logging operations' stumps and their roots left by timber harvest.

Subsurface Heat Difficult to Locate

Subsurface heat under the forest floor can be somewhat difficult to locate. The duff layer and decomposing stumps can smolder under the forest floor without showing smoke until these components are disturbed and sufficient oxygen is introduced to the smoldering fuel. The smoldering fuel will then show itself and begin producing smoke and accelerate its burning—depending on the available oxygen and fuel. Such subsurface smoldering areas can be difficult to locate without extra measures being used such as "cold trailing," the method of locating heat by using the back of a bare hand to feel for hidden heat that then must be dug-up and extinguished.

Infrared (IR) handheld devices are also useful tools to help in locating residual heat that may be hiding under the forest floor's surface. The firefighters interviewed stated that they did cold trail while mopping-up but did not have access to infrared detection devices.

There is evidence of digging associated with mop-up from photos (see Figure 3) taken by the fire investigators. But it is also evident that residual heat was still present close to the Area of Origin of the wildfire.

Dog Leg in the Control Line

At the general area of origin of the wildfire, a portion of a two-track road was used as the prescribed fire's control line. This two-track road runs in a general east to west direction along the southern edge of Unit 1 and the northern portion of the U.S. Forest Service property. This road and constructed hand line comprise the south boundary of Unit 1.

At the area of origin of the wildfire the two-track road makes a bend from a general east-west direction and runs for approximately 30 feet in a north-south direction, then bends back in a general east-west direction once again. Using this combination of existing road and hand line kept a small buffer of state land between the Unit 1 boundary and Forest Service land to the south.

The bend in the control line or "dog leg" is a contributing factor to the escape of the prescribed fire. The portion of the two-track road that bends and runs north-south for 30 feet placed the hot stump cited by the fire investigators, as well as any other burning material in proximity of this hot stump, upwind of the area of origin of the wildfire. From the edge of the prescribed fire to the natural fuel bed outside of the control line is approximately ten feet.

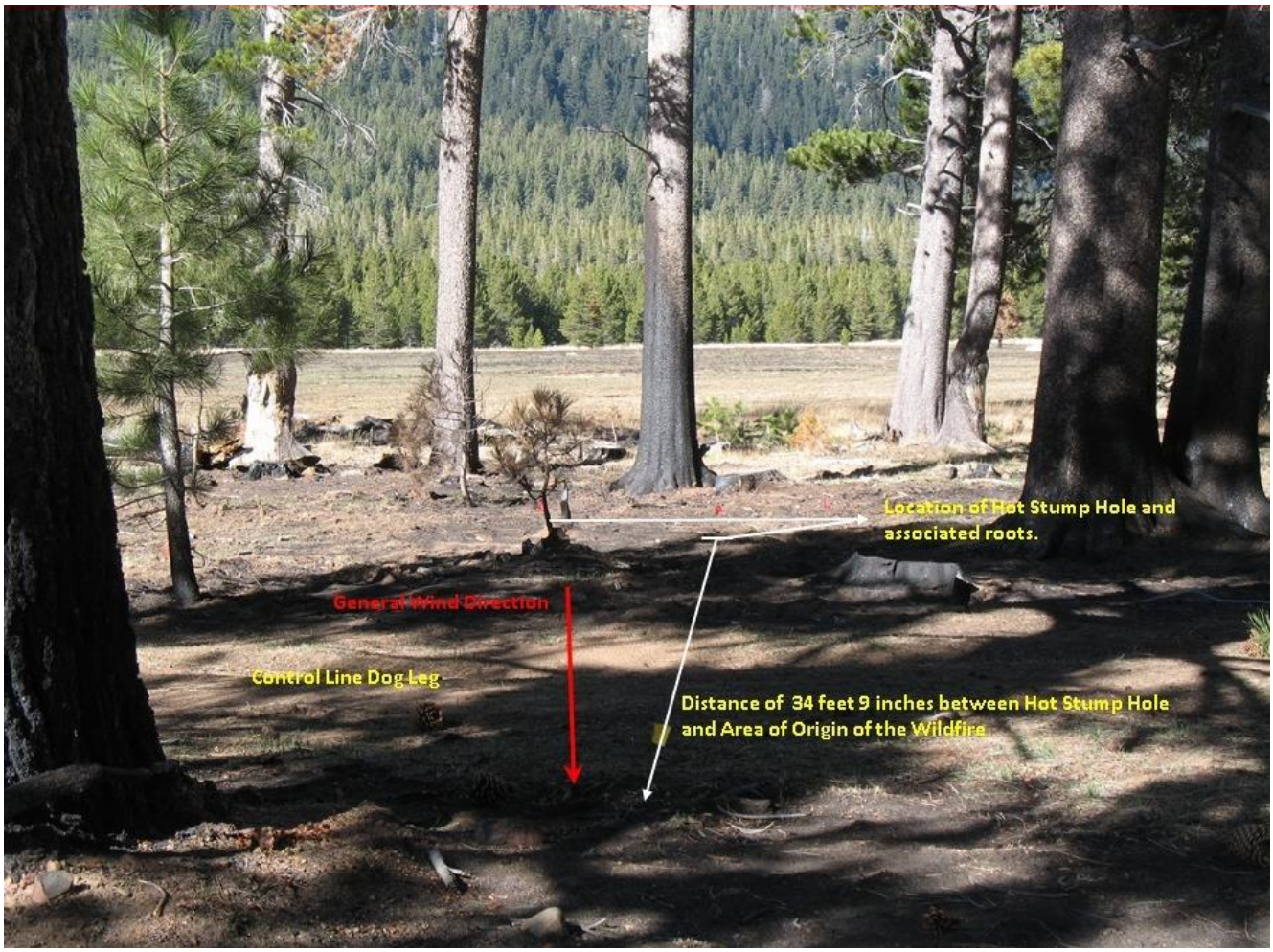


Figure 6 – Photo indicates the general location of the hot stump relative to the general wind direction.

The fire investigators located the hot stump hole and measured it to be 34 feet 9 inches from the natural fuel bed of the area of origin. Again, this portion of the line was perpendicular to the strong prevailing wind. (See Figure 6 above.)

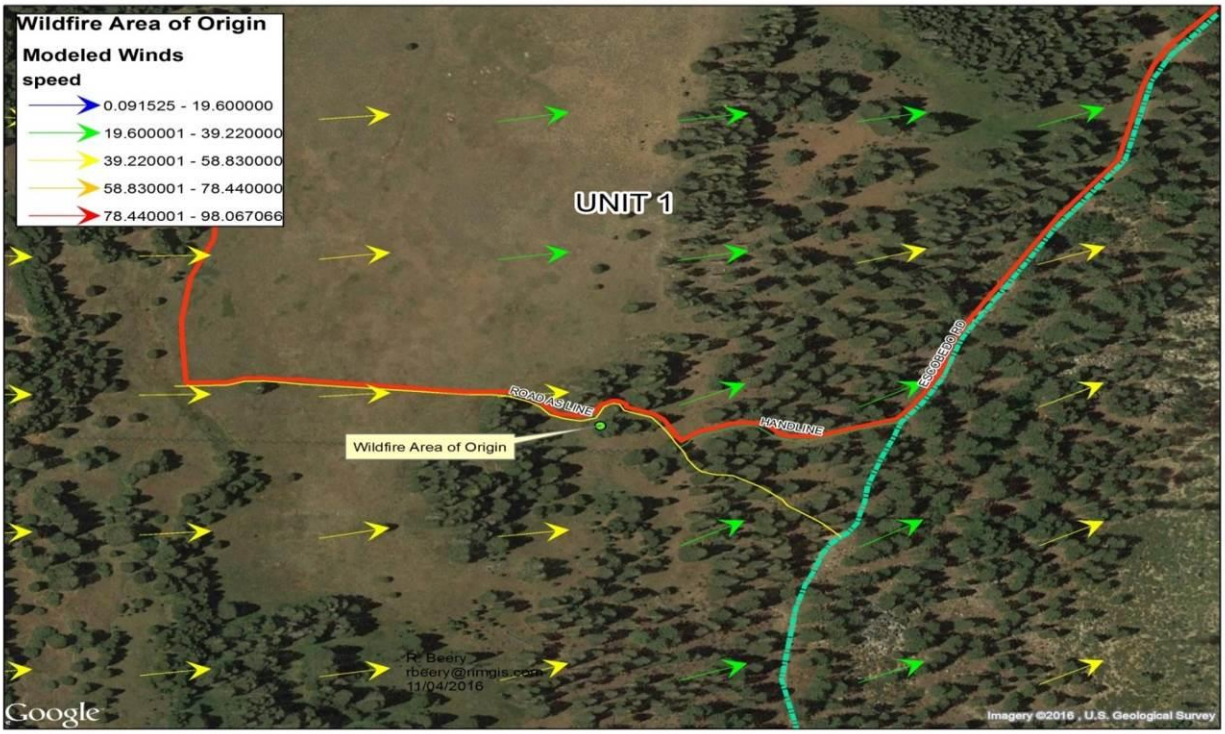
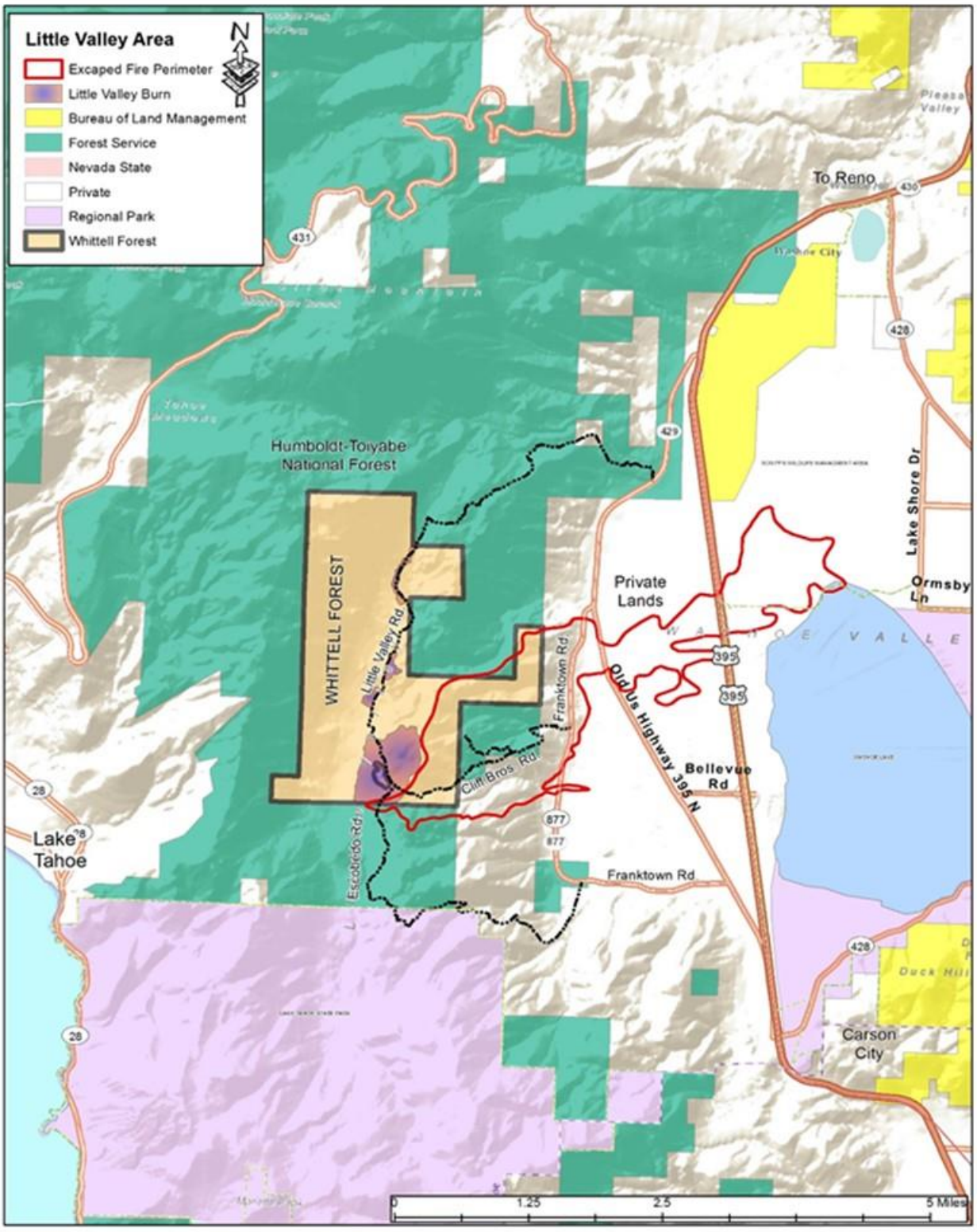


Figure 7 – Blowup of the "Wind Ninja" photo showing the general wind and speed, as well as the containment line with the "dog leg" that indicates the wildfire's area of origin. Figure 8 (below) – provides a close-up view of the wildfire's origin and the "dog leg."

Figure 9 – Little Valley Burn Unit and Escaped Fire Perimeter Map.



E. Summary

Multiple causal factors contributed to the escape of the Little Valley Prescribed Fire:

- The presence of heat in close proximity to the control line in Unit 1, stated in the Unit Log entry on Oct. 13, in addition to photo evidence from Oct. 14.
- Residual heat remained within the 100 foot mop-up specification.
- Focus was placed on the east side of Units 1 and 2.
- With knowledge of the impending wind event, staffing continued to decrease on the two days prior to the escape.
- Wind. Specifically, the westerly wind that was present Oct. 13 that was strong enough to disturb the forest floor and introduce oxygen to the smoldering materials on and under the duff layer—in some instances, bringing them to a free-burning state.
- The wind was strong (13-20 mph sustained winds with gusts of 33-87 mph) enough to transport fire brands from the hot stump as well as other burning materials present in the prescribed fire area such as small conifer cones, needles, etc.
- Precipitation moderated burn depths in Units 3, 4, and 5, making mop-up quick and easy.
- In Units 1 and 2 the effects of this precipitation were short-lived. The area quickly returned to a very dry condition due to prolonged drought coupled with a drier than normal period prior to the prescribed fire's implementation.
- The dry duff fuel bed in the area of origin of the Little Valley Wildfire was extremely receptive to ignition sources under the extreme wind conditions present the evening of Oct. 13.
- The "dog leg" in the control line shortened the distance that burning material would have to travel to receptive fuels outside of the unit in the strong prevailing winds.

8. Prescribed Fire Qualifications Summary

A comprehensive assessment of individual training records was performed on all personnel that assisted with the Little Valley Prescribed Fire. This assessment consisted of verifying individual qualification and fitness levels for Incident Command System (ICS) positions utilized on the Little Valley Prescribed Fire. (See Appendix D.)

The assessment utilized documentation from individual training records and Incident Qualification System Records (IQS) as the basis for comparison against the NWCG Wildland Fire Qualification System Guide (PMS 310-1) requirements for each position.

The Nevada Division of Forestry Policies and Procedures for Prescribed Burns/Fire Protection Manual/Chapter 5 states within the Qualifications section, that the PMS 310-1 is the Nevada Division of Forestry (NDF) standard for prescribed fire qualifications. The NDF has additional training requirements for certain prescribed fire positions and those additional training requirements were also assessed. The policy further states that all NDF personnel will meet the minimum requirement for those positions identified in Table 7.

Table 7 – Nevada Division of Forestry Prescribed Fire Qualifications

[**Bold Print** represents NDF's additional requirements and positions.]

Position	Qualified As	Required Training	Suggested Training	Physical Fitness	Position Task Book
Prescribed Fire Manager 1 (RXM1)	RXB1	None		None	Required
Prescribed Fire Manager 2 (RXM2)	RXB2	None		None	Required
Prescribed Fire Burn Boss 1 (RXB1)	RXB2 + ICT3	S-490 **RX-410**	RX-510 M-580 M-581	**Arduous**	Required
Prescribed Fire Burn Boss 2 (RXB2)	FIRB + ICT4	S-390 **RX-301** **RX-310** **BEHAVE**	RX-410 I-300	**Arduous**	Required
Prescribed Fire Burn Boss 3 (RXB3)	**ICT5**	**S-290**		**Arduous**	**Required**
Firing Boss (FIRB)	FIRB	**RX-310**	**STLD or TFLD (Required on Type 1 Burns)**	**Arduous**	Required
Fire Effects Monitor (FEMO)	FFT2	S-290 **RX-310**	S-244	**Arduous**	Required
Prescribed Fire Plan Preparer	**RXB1/RXB2/ RXB3 ****	**RX-341**	**M-580**	**None**	**None**
Prescribed Fire Technical Reviewer	**RXB1/RXB2***			**None**	**None**

**Currency not required.*

***RXB3 is not required to have RX-341. The level of Burn Plan prepared must be commensurate with preparer's qualifications.*

After a complete assessment of records that were provided, there were additional points of clarification asked of and provided by one of the two NDF training officers regarding the qualification and training certification procedures that are currently in place for NDF personnel.

Observations

- The qualification section as outlined in NDF Policies and Procedures for Prescribed Burns/Fire Protection Manual/Chapter 5 does not clearly define the training requirements for other positions in addition to the nine that are mentioned which may be utilized on prescribed fires.
- The assessment of individual training and IQS qualification records indicates that at the time of hire to the agency, the RXB2 was fully qualified under the PMS 310-1 standards but lacked documentation of the additional training requirements as required by NDF policy for this position. It was discovered that during the year 2016, the RXB2 was a unit instructor at the Truckee Meadows Community College on three separate occasions for the NDF additionally required training courses for the RXB2 position, which would allow certification to be granted for these additional training requirements.
- The assessment of individual training and IQS qualification records indicates that one of the Division Supervisor (DIVS) positions is lacking documentation of two required training courses as required for this position in the PMS 310-1.
- The assessment of individual training and IQS qualification records indicates that one of the DIVS Trainees is lacking documentation of two required training courses as required for this position in the PMS 310-1.
- The assessment of individual training and IQS qualification records indicates that the Firing Boss (FIRB) is fully qualified under the PMS 310-1 standards but lacks documentation of an additional training requirement as required by NDF policy for this position.
- The assessment of individual training and IQS qualification records indicates that one of the Safety Officer (SOFR) positions is lacking documentation of two required training courses as required for this position in the PMS 310-1.
- The assessment of individual training and IQS qualification records indicates that one of the Firefighter Type 2 (FFT2) positions is lacking documentation of one required training course as required for this position in the PMS 310-1.
- The assessment of individual training and IQS qualification records indicates that the remainder of the NDF personnel identified to this Review Team as being utilized on the Little Valley Prescribed Fire met the requirements for their respective positions as required in the PMS 310-1 and/or additional NDF training requirements.
- The assessment indicated that prior to 2004 there was no formal database, such as IQS, which was utilized for the documentation of individual training and qualification requirements for NDF personnel which may provide a direct link back to some missing documentation components.
- The assessment findings indicate a lack of documentation for certain required training components for some fire department personnel as documented in individual IQS records provided to the Review Team. The Review Team analyzed NDF Policies and Procedures for Prescribed Burns; Nevada Revised Statute, Inter-local Contract Between Local Agencies and Master Cooperative Wildland Fire Management; and Stafford Act Response Agreement in an effort to locate wording that clearly defines the training requirements for utilizing fire department personnel on NDF prescribed fire

projects. The assessment could not verify in writing the individual training requirements policy for utilizing fire department personnel on NDF prescribed fires. (For more information, See Appendix D.)

Considerations

- Clearly define the language as stated in the NDF Policies and Procedures for Prescribed Burns/NDF Fire Protection Manual/Chapter 5 which would provide that clear directives on which ICS positions utilized on prescribed fires are required to adhere to the PMS 310-1 standards and additional NDF required trainings for prescribed fires.
- Evaluate all NDF personnel IQS and individual training records to ensure compliance with the PMS 310-1 as required in the NDF Policies and Procedures for Prescribed Burns/NDF Fire Protection Manual/Chapter 5.
- Clearly define in policy the minimum training requirements for fire department personnel utilized on prescribed fire projects.
- Provide clear direction in the NDF Policies and Procedures for Prescribed Burns/Fire Protection Manual/Chapter 5 which outlines the process for training documentation and certification of NDF personnel.
- Provide clear direction in the NDF Policies and Procedures for Prescribed Burns/Fire Protection Manual/Chapter 5 which outlines the roles and responsibilities of the NDF Red Card Qualification and Certification Committee with regards to qualification, certification, and verification of individual IQS and training records.

9. Recommendations for the Conduct of Future Prescribed Fires

It is notable that while the Review Team determined the planning, preparation, and implementation of the Little Valley Prescribed Fire was carried out within the framework of current state laws and policies, the team was not able to confirm full compliance in all areas due to missing information, records, and vague verbiage linking state policy to national standards.

A. Specific Recommendations

The following specific recommendations have been synthesized from key observations and analyses conducted by the Little Valley Escaped Prescribed Fire Review Team. These recommendations are not confined to site-specific scale planning and implementation but extend to include up through the programmatic scale.

1. NDF Policies and Procedures for Prescribed Burns

Clearly define and communicate the intent of the language stated in the "NDF Policies and Procedures for Prescribed Burns/NDF Fire Protection Manual" (see Appendix A) contained in the following sections:

a. Project Planning

The last sentence in Project Planning states: "If potential negative impacts from smoke or other particulates could occur, an assessment of potential downwind impacts using an appropriate smoke management model will be completed."

Recommendation

Clearly define what an "appropriate smoke management model" is.

b. Prescribed Fire Projects

Bullet number 4 states: "All Prescribed Fire Plans will contain the required elements as laid out in the Prescribed Fire Plan template."

Recommendation

Clearly define if the intent of this statement indicates that the template referred to is the NWCG Prescribed Fire Template. If so, clearly define if the NDF agency expectations are to utilize the NWCG Prescribed Fire Planning and Implementation Guide (PMS 484) as a required planning tool for completing the template.

c. Qualifications Recommendations

Clearly define the language as stated in this section of policy which would provide clear intent on the qualifications standard that would apply to any ICS positions utilized on prescribed fires, as well as any required additional NDF training elements if applicable.

Clearly define the policy or directive which defines the individual training requirements for utilizing fire department personnel or other cooperating agencies on NDF prescribed fire projects.

d. Prescribed Fire Monitoring Recommendation

Require the use of the Fire Effects Monitor (FEMO) position on prescribed fires to ensure that onsite weather observations, burn behavioral patterns, and smoke dispersal data can be collected during the project which can be helpful to the burn boss, prescribed fire resources, local air quality agencies, and the National Weather Service regarding fire effects, weather, and smoke management.

2. Nevada Laws on Forestry and Fire Nevada Revised Statutes NRS 527.122 through 527.128 (For the complete text of these statutes, See Appendix A.)

Evaluate the following NRS statutes in order to define and communicate the intent as stated.

a. NRS 527.126 – Requirements to conduct fire; governmental immunity

1. **Section 2(b)** states: Under the direct supervision of at least one person who is qualified to oversee such fires and who remains onsite for the duration of the fire.
   Recommendation
   Clearly define the intent of the term "duration of the fire."

2. **Section 3** states: A controlled fire which is commenced pursuant to this section and which complies with laws relating to air pollution shall be deemed in the best interest of the public and not to constitute a public or private nuisance.
   Recommendation
   Clearly define the intent of the term "nuisance."

b. NRS 527.128 – Written Plan

1. **Section 1(c)** states: A description of the meteorological factors that must be present before commencing a controlled fire, including surface wind speed and direction, transport wind speed and direction, minimum mixing height, minimum relative humidity, maximum temperature and fine fuel moisture.
   Recommendation
   Ensure that all burn practitioners understand and comply with the minimum required components when developing Prescribed Fire Plans as stated in this state statute.

2. **Section 1(d)** states: A description of considerations related to common behavioral patterns of fires in the area to be burned, including various burning techniques, the anticipated length of the flame and the anticipated speed of the fire.
   Recommendation
   Ensure that all burn practitioners understand and comply with the minimum required components when developing Prescribed Fire Plans as stated in this state statute.

B. General Recommendations

1. NWCG Prescribed Fire Planning and Guidance as Policy Within NDF

For the preparation of the prescribed fire plans, incorporate the NWCG Interagency Prescribed Fire Planning and Implementation Guide (PMS-484) as policy within the Nevada Division of Forestry (NDF). Ensure that prescribed fire plans meet the direction and intent of this guide.

2. Smoke Management

For the management of smoke, clearly define the environmental variables that can cause negative smoke impacts and develop prescribed fire plans to mitigate these impacts. Specifically:

a. Conduct appropriate smoke modeling as part of the prescribed fire planning process. Model both plume and emissions.

b. Define prescription elements that will minimize smoke impacts and include these in prescribed fire plans.

c. Identify sensitive receptors and build prescriptions to avoid impacting them.

d. Utilize smoke modeling during burn days to validate current conditions and potential smoke impacts.

e. Monitor and document smoke throughout each prescribed fire for potential impacts.

f. Utilize smoke management mitigation techniques “best management practices” (Smoke Management Guide for Prescribed and Wildland Fire, PMS 420-2).

g. Closely coordinate with air quality regulators.

3. Post-Burn Evaluations

Ensure that burning is conducted in accordance with the elements of the prescribed fire plan. To better refine future plans, consider conducting post-burn evaluations of prescribed fire execution compared to the plan.

4. Techniques/Standards

a. Use “wet water” (water containing a wetting agent-surfactant [foam] to reduce the surface tension which allows the water to penetrate deeper into burning material) as a mop-up standard, especially in heavy duff and litter fuels.

b. Utilize handheld Infrared (IR) equipment to assist in locating heat signatures during mop-up procedures.

c. Plan smaller burn units. Burn, hold, and mop-up prior to moving to other units. This method will help with implementation and smoke management as related to the prescribed fire.

5. Smoke Modeling Products

a. Utilize an appropriate smoke modeling product for this fuel type and terrain which considers weather parameters that would compute air parcel trajectories and dispersion or deposition of atmospheric pollutants and provide a visual indicator of potential downwind smoke impacts and concentration levels.

b. Request smoke modeling products from the local National Weather Service office as a planning tool to help mitigate potential impacts to health and human safety, both before and during prescribed fire projects.

c. If smoke impacts to health and human safety are made known, ensure that a smoke management model is utilized which will model both plume and emissions.

6. Individual Personnel Training and Qualifications

a. Evaluate all NDF personnel’s individual IQS and training records to ensure compliance with the PMS 310-1 as required by NDF policy.

b. Clearly define in NDF policy the minimum training requirements for utilizing fire department personnel on prescribed fire projects.

c. Clearly define in NDF policy the roles and responsibilities of the NDF Red Card Qualification and Certification Committee regarding qualification, certification, and verification of individual IQS and training records.

7. **Prescribed Fire Plan Technical Reviewer**
    a. Consider that outside technical reviewers of prescribed fire plans meet the same requirements for NDF personnel as stated in NDF policy.
    b. Utilize local land management agency personnel as qualified technical reviewers in accordance to NDF policy, especially on projects that may impact their area of responsibility**.**
8. **Prescribed Fire Plan**
    a. For the preparation of prescribed fire plans, incorporate the NWCG Interagency Prescribed Fire Planning and Implementation Guide (PMS-484) as policy within NDF. Ensure that prescribed fire plans meet the direction and intent of this guide.
    b. Ensure that burn operations are conducted in accordance with all elements, including prescription parameters of the prescribed fire plan.
    c. When amendments are made to the prescribed fire plan, develop a process to ensure that the plan is reviewed and verify that all elements, including prescription parameters, are still valid.
    d. Ensure that amendments are executed timely in order to meet NDF policy requirements (i.e. timing/review/approval prior to burn execution).
    e. Ensure that the Go/No-Go checklist is signed each day by the Burn Boss.
    f. Ensure that the Go/No-Go checklist aligns with all required elements as described in the prescribed fire plan.
    g. Consider conducting post-burn evaluations of prescribed fire execution in comparison to the plan in order to better refine future plans.
9. **Weather Observations**
    a. If onsite weather observations do not align with National Weather Service provided spot weather forecasts, communicate observations to the National Weather Service and ask for validation of the spot weather forecast provided.
10. **Partnerships/Relationships**
    a. Work collectively with local land management agencies, cooperators, and the general public on all aspects of prescribed fire projects, through inception, planning and completion. Involve them early in the process.
    b. Communicate frequently with local land management agencies, cooperators, and the general public to provide periodic updates on prescribed fire projects.
    c. Work in a collaborative effort to build a cohesive land management partnership with all land management agencies and cooperators along the Sierra Front.
    d. Strengthen partnerships with air quality agencies to educate each other on agency regulations, missions, goals, and visions to better serve the general public and to protect human health and safety.

e. Utilize the experience and expertise of qualified personnel from local land management agencies and cooperators on prescribed fire projects to strengthen personnel skillsets within the NDF and further broaden and reinforce partnerships along the Sierra Front.

f. Collaborate with local land management agencies, cooperators, and the general public to work in a unified effort to promote the benefits of prescribed fires into the future.

11. Safety

a. Along with the ICS-206 Medical Plan, use the Medical Incident Report, which is a part of the Medical Plan. This report (also known as the 9-Line) provides personnel step-by-step instructions on who is responsible for certain actions during an accident.

b. Discuss an Incident-Within an-Incident during operational briefings. This allows the opportunity to have any questions answered or concerns addressed up front. Everyone hears the same information at the same time. This also provides folks an opportunity to view the Medical Incident Report before it's needed.

c. For prescribed fire briefings, utilize the prescribed fire briefing checklist as described in Element 10 of the Interagency Prescribed Fire Planning and Implementation Guide (PMS 484).

d. When Incident Action Plans (IAP) are developed for prescribed fire projects, include a briefing checklist in the document as described in the Interagency Prescribed Fire Planning and Implementation Guide (PMS 484, Page 31).

12. Risk

a. Identify and discuss Values at Risk during each briefing. This provides information to all personnel on the prescribed fire as to what those values are, where they're located, and why they're valuable.

b. Prepare a daily risk analysis that identifies hazards and mitigations on the incident. Discuss during each operational briefing.

c. Have a future vision of Risk Management for the Nevada Division of Forestry. Consider exploring training opportunities that ensure consistency in application of Risk Management concepts and principles as applied to managing wildland and prescribed fire.

10. Appendices

Appendix A – Pertinent Laws, Policies, and Procedures

State of Nevada
Department of Conservation and Natural Resources
DIVISION OF FORESTRY

NEVADA LAWS ON FORESTRY AND FIRE

2016

NRS CHAPTER 527 - PROTECTION AND PRESERVATION OF TIMBERED LANDS, TREES AND FLORA

PROTECTION OF TIMBERED LANDS

PROTECTION OF TREES AND FLORA

PROTECTION OF CHRISTMAS TREES, CACTI AND YUCCA

CONTROLLED FIRES

CONTROL OF FOREST INSECTS AND DISEASES

USE OF MECHANICAL DEVICES FOR HARVESTING PINE NUTS OR CONES FROM PINON TREES

landowner's authorized agent, showing the origin by legal land description and the number of plants in the lot being transported.
(Added to NRS by 1957, 318; A 1977, 779)

NRS 527.090 Tag required; fee.
1. All Christmas trees, cacti or yucca removed or possessed for commercial purposes must have attached thereto a tag issued by the State Forester Firewarden, by the Bureau of Land Management or by the United States Forest Service.
2. The State Forester Firewarden may charge a reasonable fee for each tag to help defray costs to the State for enforcement of the laws regulating removal or possession of Christmas trees, cacti or yucca. Money collected by the State Forester Firewarden shall be deposited in the appropriate fund of the State Forester Firewarden.
(Added to NRS by 1957, 319; A 1963, 55; 1977, 779)

NRS 527.100 Unlawful acts; regulations of State Forester Firewarden.
1. Except as otherwise provided by law, it is unlawful for any person, firm, company or corporation, his, her, its or their agent or agents, willfully or negligently to cut, destroy, mutilate, remove or possess any Christmas tree, cactus, yucca or branches thereof, or knowingly transport or sell any Christmas tree, cactus, yucca or its branches from any of the lands owned by or under the jurisdiction of the State of Nevada or its counties, or on any reserved or unreserved lands owned by the United States, or from any privately owned lands, without written permission from the legal owner, or the legal owner's duly authorized agent, specifying locality by legal land description and number of plants to be removed or possessed.
2. For the purpose of sustaining productivity and preservation of the water-supplying functions of Nevada forest lands, the State Forester Firewarden shall adopt such reasonable regulations governing removal or possession of Christmas trees, cacti or yucca as are deemed necessary.
3. This section does not apply to necessary cutting or trimming of such plants if done for maintenance of electric power lines, telephone lines or other property of a public utility, or to a logging operation.
(Added to NRS by 1957, 319; A 1961, 108; 1977, 780, 1167)

NRS 527.110 Confiscation of plants unlawfully removed or possessed; sale; disposition of proceeds.
1. Except as provided in subsection 3, the State Forester Firewarden, or the State Forester Firewarden's duly authorized agent, officials of the United States Forest Service or of the Bureau of Land Management, and peace officers are hereby authorized to confiscate Christmas trees, cacti or yucca which are removed or possessed in a manner not authorized by law. Plants which are confiscated shall be sold to the highest bidder therefor, by the sheriff of the county wherein the plants were confiscated. The sale shall be held by the sheriff in a like manner as on an execution.
2. If it is determined that the plants originated on privately owned lands, the owner thereof shall be notified of the sale, and the proceeds of the sale, after deducting the costs thereof, shall be paid over to the owner.
3. If the owner of the lands cannot be determined, or if the plants originated on state lands, the State Forester Firewarden may dispose of the plants without selling them to the highest bidder. If the plants are sold, the net proceeds of sale shall be deposited in the State General Fund.
4. If the plants originated on land owned by the Government of the United States, the net proceeds shall be paid over to the federal agency administering the lands.
(Added to NRS by 1957, 319; A 1961, 107; 1977, 780)

NRS 527.120 Penalty. Every person who violates any provision of NRS 527.060 to 527.110, inclusive, not otherwise punishable, is guilty of a misdemeanor.
(Added to NRS by 1957, 319; A 1967, 609; 1971, 1463; 1977, 780; 1979, 1486)

CONTROLLED FIRES

NRS 527.122 Definitions. As used in NRS 527.122 to 527.128, inclusive, unless the context otherwise requires:
1. "Authority" means the State Forester Firewarden, or a local government, whichever is charged with responsibility for fire protection in the area where a controlled fire is to take place.
2. "Controlled fire" means the controlled application of fire to natural vegetation under specified conditions and after precautionary actions have been taken to ensure that the fire is confined to a predetermined area.
(Added to NRS by 1993, 1202)

NRS 527.124 Regulations. The State Forester Firewarden shall adopt such regulations as the State Forester Firewarden deems necessary to carry out and enforce the provisions of NRS 527.126 and 527.128.

(Added to NRS by 1993, 1202)

NRS 527.126 Requirements to conduct fire; governmental immunity.
1. The authority may authorize an agency of this state or any political subdivision of this state to commence a controlled fire.
2. A controlled fire must be conducted:
(a) Pursuant to a written plan which has been submitted to and authorized by the authority; and
(b) Under the direct supervision of at least one person who is qualified to oversee such fires and who remains on-site for the duration of the fire.
3. A controlled fire which is commenced pursuant to this section and which complies with laws relating to air pollution shall be deemed in the best interest of the public and not to constitute a public or private nuisance.
4. The State of Nevada, an agency of this state or any political subdivision or local government of this state, or any officer or employee thereof, is not liable for any damage or injury to property or persons, including death, which is caused by a controlled fire that is authorized pursuant to this section, unless the fire was conducted in a grossly negligent manner.
(Added to NRS by 1993, 1202)

NRS 527.128 Written plan.
1. The written plan required by NRS 527.126 must remain on-site for the duration of the fire. The plan must be prepared by a person qualified to oversee a controlled fire and contain at least:
(a) A description and map of the area to be burned;
(b) A list of the personnel and equipment necessary to commence and control the fire;
(c) A description of the meteorological factors that must be present before commencing a controlled fire, including surface wind speed and direction, transport wind speed and direction, minimum mixing height, minimum relative humidity, maximum temperature and fine fuel moisture;
(d) A description of considerations related to common behavioral patterns of fires in the area to be burned, including various burning techniques, the anticipated length of the flame and the anticipated speed of the fire; and
(e) The signature of the person who prepared the plan.
2. Before signing the written plan, the person qualified to oversee the fire must evaluate and approve the anticipated impact of the fire on surrounding areas which are sensitive to smoke.
3. The State Forester Firewarden shall establish the qualifications for a person to oversee a controlled fire.
(Added to NRS by 1993, 1203)

CONTROL OF FOREST INSECTS AND DISEASES

NRS 527.130 Definitions. As used in NRS 527.130 to 527.230, inclusive, unless the context otherwise requires:
1. "Control" means preventing, retarding, suppressing, eradicating or destroying forest pests.
2. "Forest" or "forest land" means land on which occurs a stand or potential stand of trees valuable for timber products, watershed or wildlife protection, recreational uses or for other purposes.
3. "Forest pest" means any insect or disease which is determined by the State Forester to be harmful, injurious or destructive to forests or timber.
4. "Infestation" means actual, potential, incipient or emergency infestation or infection by forest pests.
5. "Owner" means any person owning any forest or forest lands.
6. "State Forester" means the State Forester Firewarden.
7. "Timber" includes forest trees, standing or down, dead or alive.
(Added to NRS by 1957, 634; A 1985, 304, 522)

NRS 527.140 Purposes of provisions for control of forest insects and diseases; forest pests declared public nuisance.
1. The purposes of NRS 527.130 to 527.230, inclusive, are to protect and preserve the forests of this state, promote the stability of forest-using industries, protect recreational wildlife, and to aid in pest and fire control.
2. Forest pests are hereby declared to be a public nuisance.
(Added to NRS by 1957, 635)

NRS 527.150 Powers of State Forester Firewarden. The State Forester may, subject to the administrative supervision of the Director of the State Department of Conservation and Natural Resources:
1. Employ personnel.

NDF Policies and Procedures for prescribed burns:

NDF DIVISION ADMINISTRATIVE MANUAL

FUEL TREATMENTS AND PRESCRIBED FIRE….06040.0

N.R.S. 527.122 through N.R.S. 527.128, inclusive regarding Controlled Fires authorizes the State Forester Firewarden to utilize the controlled application of fire to natural vegetation as a resource and wildland fire management tool.

SB444 Chapter 381, Statutes 1993, the source of Nevada Revised Statutes (N.R.S.) 527.122 to 527.128, inclusive, contains the following provisions not included in NRS.

> "The legislature hereby finds and declares that:
> 1. Controlled fires reduce the risk of naturally occurring wildfires which are caused by highly flammable vegetation and which often result in catastrophic damage to life and property.
> 2. Fires are essential for the perpetuation, restoration and management of many plants and animals.
> 3. Controlled fires provide benefits to the public by ensuring the continuity of the wildlife and biological diversity in this state."

The NDF Fuel Treatments and Prescribed Fire policy is established to treat fuels and mitigate threats to the public, and to protect, enhance, restore and/or maintain critical plant communities. Fuel treatment projects and prescribed fire activities shall follow guidelines and procedures as outlined in the NDF Fire Protection Manual.

PROJECT PLANNING

NDF's hazardous fuel treatment activities are a coordinated interdisciplinary effort supported by the Resource and Fire Management Programs. All participating disciplines will coordinate their respective roles for the planning, implementation, monitoring, and evaluation of fuel treatment projects.

Natural resource objectives are the driving force behind the fuels management policy. It is required that fuel treatments and prescribed fire projects be planned and analyzed using an interdisciplinary process. Compliance with state and local regulation is required for all fuel treatment projects.

All use of fuel treatments and prescribed fire will be conducted according to a land use or treatment plan.

It is the public policy of the State of Nevada and the purpose of N.R.S. 445B to achieve and maintain levels of air quality which will protect human health and safety, prevent injury to plant and animal life, prevent damage to property, and preserve visibility and scenic, esthetic and historic values of the state.

Compliance with Federal, state, and local air quality regulations is mandatory and will require coordination with the Department of Conservation and Natural Resources Division of Environmental Protection and local air quality regulators. Personnel developing fuel treatment and Prescribed Fire Plans must be aware of state and local regulations and the impacts that a specific project may have on critical areas. Potential smoke or dust impacts on critical areas such as Class I air sheds, restricted areas, and non-attainment areas (often called designated areas) must be considered. Equally important are local features that could be impacted such as highways, airports, recreation sites, and smaller population centers. Prescribed Fire and Fuel Treatment Plans need to identify sensitive areas and provide operational

guidance to minimize the impacts from smoke or other particulates. If potential negative impacts from smoke or other particulates could occur, an assessment of potential downwind impacts using an appropriate smoke management model will be completed.

PRESCRIBED FIRE PROJECTS

- The safety of firefighters and the public is the number one priority when planning and implementing fuel treatment projects.
- All prescribed fire projects will have an approved Prescribed Fire Plan prior to ignition.
- All Prescribed Fire Plans will contain measurable objectives, a predetermined prescription, and an escaped fire plan to be implemented in the event of an escape.
- All Prescribed Fire Plans will contain the required elements as laid out in the Prescribed Fire Plan template.
- All prescribed fire projects will be in compliance with state and local regulations.

NDF FIRE PROTECTION MANUAL

Chapter #05 - Fuel Treatments and Prescribed Fire

Priorities

The NDF will strategically focus fuels treatments by placing priority on:

- Areas where actions will mitigate threats to the safety of the public.
- Areas where actions will reduce risks and damage from a wildfire. This includes the reintroduction of fire into fire dependant ecosystems to maintain and enhance those ecosystems and the modification of vegetation to achieve specific land management objectives.
- Areas where actions will protect, enhance, restore and/or maintain plant communities and habitats that are critical for endangered, threatened, or sensitive plant and animal species.

Prescribed Fire Plans

A Prescribed Fire Plan must be reviewed and approved by the State Forester/Firewarden, or a local government, whichever is charged with responsibility for fire protection in the area where a controlled fire is to take place.

A variance issued by the Nevada Division of Environmental Protection, Bureau of Air Quality (NDEP-Air Quality) or the local air quality regulator having jurisdiction is required prior to the ignition of a prescribed fire.

Implementation

Prescribed fire projects must be implemented in compliance with the approved written plan. The prescribed fire burn boss will submit the completed "Go/No-Go Checklist" and the acres/number of piles burned daily to the State Headquarters front desk for tracking.

Obtaining a spot weather forecast on the first day of the burn, prior to ignition, is mandatory. The prescribed fire burn boss will monitor the general forecasts and decide on the need for additional spot

weather forecasts.

Note: An exception can be made for piled slash and other burns where no rate of spread outside of the burn area is expected. The Prescribed Fire Burn Boss or other person in charge of mop up and patrol needs to review the general weather forecast and determine if a spot weather forecast is needed.

Restrictions

Implementation of Prescribed Fires at Great Basin Preparedness Levels IV and V is restricted.

At Great Basin Preparedness Level IV and V, concurrence by the State Forester and the Fire Management Program Manager must be obtained before implementing a prescribed fire.

Spot Weather Observation and Forecast

Spot Weather Observation and Forecast Request

(See reverse for instructions)

Requesting Agency will Furnish Information for Blocks 1-12

1. Name of Incident or Project	2. Control Agency	3. Request Made	
		Time:	Date:
4. Location (Designate Township, Range, and Section (include ¼ section):		5. Drainage Name	6. Exposure/Aspect:
7. Size of Incident or Project (acres):	8. Elevation: Top / Bottom	9. Fuel Type:	10. Project On: ** Ground ** Crowning

11. Weather Conditions at Incident or Project or from RAWS:

Place	Elevation	Observation Time	Wind Direction/Velocity		Temperature		No entry necessary. To be completed by the Fire Weather Forecaster.		Remarks (Indicate precipitation, cloud type and % cover, wind and frontal conditions, etc.)
			20-Foot:	Eye Level:	Dry Bulb:	Wet Bulb:	Rh	Dp	

12. Send Forecast To (Person):	Send Forecast To (Location):	Send Forecast Via:	Send Copy To:

The Fire Weather Forecaster will Furnish the Information for Block 13:

13. Discussion and Outlook: Date and Time:

Burn Period	Sky Cover	Temperature	Humidity	Wind: Eye Level	Wind: 20-Foot	Indices
** Today (sunrise to dusk) ** This Afternoon (noon until dusk) ** This Evening (1600 until dusk) ** Tonight (sunset until sunset)	** Mostly Sunny/Clear ** Fair ** Partly Cloudy ** Mostly Cloudy ** Cloudy ** Variable	°F _____ ** High ** Low ** Range	_____% ** Maximum ** Minimum ** Range	** Upslope ** Downslope Direction_____ Velocity____ mph Gusts_____ mph	** Upslope ** Downslope Direction_____ Velocity____ mph Gusts_____ mph	Haines: LAL: BI: CI:
** Today (sunrise to dusk) ** This Afternoon (noon until dusk) ** This Evening (1600 until dusk)	** Mostly Sunny/Clear ** Fair ** Partly Cloudy ** Mostly Cloudy ** Cloudy	°F _____ ** High ** Low ** Range	_____% ** Maximum ** Minimum ** Range	** Upslope ** Downslope Direction_____ Velocity____ mph	** Upslope ** Downslope Direction_____ Velocity____ mph	Haines: LAL: BI:

** Tonight (sunset until sunset)	** Variable			Gusts_____ mph	Gusts_____ mph	CI:
Outlook for (Date): _____	** Mostly Sunny/Clear ** Fair ** Partly Cloudy ** Mostly Cloudy ** Cloudy ** Variable	°F _____ ** High ** Low ** Range	_____% ** Maximum ** Minimum ** Range	** Upslope ** Downslope Direction_____ Velocity____ mph Gusts_____ mph	** Upslope ** Downslope Direction_____ Velocity____ mph Gusts_____ mph	Haines: LAL: BI: CI:
Name of Fire Weather Forecaster:				Fire Weather Office Issuing Forecast:		
14. Forecast Received by (Name):		Date:		Time:	Forecast Received at (Location) Via:	

Spot Weather Observation and Forecast Request

Instruction & Notes

Spot Weather Forecasts should be requested for fires that will exceed initial attack, have potential for extreme fire behavior, or are located in areas where Red Flag Warnings or Fire Weather Watches have been issued. This form is primarily for field use documentation of weather observations and/or forecasts. Whenever possible, a copy of the actual fire Weather Forecast should be used for operational briefings and/or included in the fire documentation.

Instructions

1. **Name of Fire/Incident:** Use incident or project name.
2. **Control Agency:** Agency with primary responsibility for managing the incident.
3. **Request Made:** Put date and time (use 24-hour clock).
4. **Location:** Use an on-site legal description specific to the nearest ¼ section.
5. **Drainage Name:** Use the closest drainage name or landmark from a topographical map.
6. **Exposure:** Use one of the 8 major cardinal points (N, SE, NW, etc.) to designate general aspect.
7. **Size of Project:** In acres.
8. **Elevation:** Designate elevation in feet; Top and Bottom refer to elevation of fire. (For a group of lightning fires specify "Concentration" then give number of fires and size of largest; request forecast for each drainage.)
9. **Fuel Type:** Use a fuel model number or a name description.
10. **Project On:** Projects may be on the ground or crowning.
11. **Weather Conditions at Project or from Nearby RAWS Stations:** In the Place column, put On-site (which refers to the legal description used in Number 4); if the observations are taken off-site, specify the Township, Range, and Section to the nearest ¼ or the location of the RAWS used. In the Elevation column, put the actual elevation for the observations (may or may not be the same as in Number 8).
12. **Send Forecast To:** Specify how the forecast will be broadcast or sent, especially if it differs from normal radio relay or faxing procedures (i.e., having copies faxed to mobile units, office, or stations), and also the name of the contact who will be receiving the request (may differ from the person making the forecast request).
13. **Forecast and Outlook:** Document name of forecaster and office forecast originated from.
14. **Forecast Received:** Document name of person receiving forecast, date, time and location and received (to verify or update information in Number 12).

Notes

Under the Remarks column in Number 11, put the estimated ignition time for Rx projects. For Rx projects, fire weather forecasters can work with you ahead of time and either do some "practice" forecasts or provide you with weather information for planning.

For better service, do not send a request in just prior to Rx ignition (turn-around time is typically 1 to 2 hours). Most fire weather forecasters work early shifts, and usually leave around 1600 to 1700.

If the fire weather forecaster does not hear from you, they assume the forecast was accurate. If the forecast does not match what is actually occurring, let the fire weather forecaster know.

Feedback is crucial for improving forecast accuracy. Forecasts can be updated. If at any time you do not understand what the forecast is telling you, or you have questions about its content for whatever reason, do not hesitate to call the fire weather forecaster and discuss the matter.

Determination of Complexity

The NWCG Prescribed Fire Complexity Rating System Guide is the NDF standard for rating prescribed fire complexity. A complexity rating will be completed for each prescribed fire project.

Qualifications

All prescribed fire projects rated as "High Complexity" require a Prescribed Fire Burn Boss rated as RXB1 and a Firing Boss rated as FIRB1. All other prescribed fires will require a RXB2, except for slash pile burns. All slash pile burns require a RXB3 at a minimum.

Safety & Qualifications

Safety Awareness

The safety of fire fighters and the public is the number one priority when planning and implementing a prescribed fire project. Every person involved in a prescribed fire project is responsible for identifying safety issues and concerns. It is the responsibility of each individual participating in prescribed fire activities to let management know if they do not understand their assignment or have safety concerns related to the assignment.

All personnel will be briefed prior to any prescribed fire assignment. The briefing will ensure that all people involved understand how the project will be implemented and what their assignments are. Briefings must cover safety considerations for both known site specific hazards and potential hazards. A briefing checklist must be developed and attached to the Prescribed Fire Plan. A briefing will be given for each operational period of multi-period projects.

A Job Hazard Analysis (JHA) will be completed for each prescribed fire project and attached to each Prescribed Fire Plan.

Safety Equipment

All personnel on a prescribed fire project will be equipped with required PPE appropriate to their position or as identified in a JHA. For holding and ignition personnel the minimum PPE (unless otherwise identified in the JHA) is the same as that required for wildland fire assignments.

Smoke Exposure

Exposure to smoke during prescribed fire operations can be a significant safety concern. All effort shall be made to minimize smoke exposure during the planning and implementation phases of a prescribed fire. At a minimum consideration will be given to fire line location and crew rotation to minimize exposure to

smoke.

Qualifications

The NWCG Wildland and Prescribed Fire Qualification System Guide (PMS 310-1) is the NDF standard for prescribed fire qualifications. The guide provides a complete review of the qualification system and explains the task book process for documenting performance and certifying personnel. The NDF has additional requirements for some positions. The qualifications for each position are shown in the chart below. All NDF personnel assigned to prescribed fire operations will meet the minimum qualifications outlined in this section. This will include personnel assigned to assist other agencies even though the other agency may have established its own (lower) qualifications. Trainees may fill these positions under supervision of qualified personnel.

Prescribed Fire Qualifications Summary
Bold print represents NDF's additional requirements and positions.

Position	Qualified As	Required Training	Suggested Training	Physical Fitness	Position Task Book
Prescribed Fire Manager 1 (RXM1)	RXB1	None		None	Required
Prescribed Fire Manager 2 (RXM2)	RXB2	None		None	Required
Prescribed Fire Burn Boss 1 (RXB1)	RXB2 + ICT3	S-490 **RX-410**	RX-510 M-580 M-581	**Arduous**	Required
Prescribed Fire Burn Boss 2 (RXB2)	FIRB + ICT4	S-390 **RX-301** **RX-310** **BEHAVE**	RX-410 I-300	**Arduous**	Required
Prescribed Fire Burn Boss 3 (RXB3)	**ICT5**	**S-290**		**Arduous**	**Required**
Firing Boss (FIRB)	FIRB	**RX-310**	**STLD or TFLD (Required on Type 1 Burns)**	**Arduous**	Required
Fire Effects Monitor (FEMO)	FFT2	S-290 **RX-310**	S-244	**Arduous**	Required
Prescribed Fire Plan Preparer	**RXB1/RXB2/RXB3 ******	**RX-341**	**M-580**	**None**	**None**
Prescribed Fire Technical Reviewer	**RXB1/RXB2***			**None**	**None**

* Currency not required. **RXB3 is not required to have RX-341. The level of Burn Plan prepared must be commensurate with preparer's qualifications.

Prescribed Fire Burn Boss 3 (RXB3):

As a supplement to the qualifications system, the NDF has identified this position. This position supervises prescribed fire operations that are of "low complexity." These types of operations typically would have few personnel assigned, have a very low threat of escape, and present a minimal risk to the people involved in the operation. Examples include burning piled slash, burning landings, ditch burning, and debris burning, and broadcast burns of less than one acre with a minimal chance for escape.

Note: These types of operations still require a signed prescribed fire plan; however, the detail of the plan should be commensurate with the scope of the project.

Prescribed Fire Holding Boss:

The Holding Boss will be qualified at the Single Resource Boss, Strike Team Leader, Task Force Leader, Division Supervisor, Operations Section Chief 2, or Operations Section Chief 1 as required by the number and mix of the resources assigned to the holding operation. For some projects there may be no holding requirements, or the holding duties are assumed by the Prescribed Fire Burn Boss.

Prescribed Fire Plan Preparer:

This is the person responsible for preparing the prescribed fire plan. The preparer may have other people assist in the preparation of the plan, but is responsible for the final plan content.

Prescribed Fire Plan Technical Reviewer:

For prescribed fire projects rated as "High Complexity," (those projects requiring an RXB1) the technical reviewer must be qualified as, or have been previously qualified, at the RXB1 level. For those Prescribed Fire Plans rated as "Moderate" or "Low," the technical reviewer must be qualified as, or have been previously qualified, at the RXB2 level. If a field office cannot complete their own technical review, the state office will ensure that a technical review is completed by a qualified person. A primary reviewer will be designated; however, it is acceptable for other specialists to review specific portions of the Prescribed Fire Plan. For example, a Fire Behavior Analyst may review the fire behavior calculations or the Aviation Officer may review the Air Operations Plan.

Currency Requirements:

The prescribed fire qualifications system does not establish currency requirements to maintain prescribed fire qualifications. The currency requirement is set at five years, the same as for suppression qualifications. As with the suppression qualifications, an assignment at one level may maintain prescribed fire qualifications at the next lower level.

Prescribed Fire Monitoring

A monitoring plan is required as part of each Prescribed Fire Plan. It describes what data will be collected, when it will be collected, where on the prescribed fire site it will be collected, which methods will be used for each data element, and list the responsible person(s).

The requirements established for prescribed fire monitoring include weather conditions before ignition, during the ignition phase, the observed fire behavior, smoke dispersal, and whether fire treatment objectives have been met. The monitoring of smoke dispersion and impacts must be included.

The use of the Fire Effects Monitor (FEMO) position to accomplish the monitoring tasks is encouraged.

Prescribed Fire declared as a Wildland Fire

Prescribed Fire becomes a wildland fire when the Prescribed Fire Burn Boss determines that an escape has, or is likely to occur. Fire outside of the planned perimeter, or outside any planned "Buffer or Allowable Areas," that cannot be contained with the holding forces identified in the Prescribed Fire Plan, is an escaped fire and will be **declared a wildland fire**. This is not fire that crosses the fire line which can

be contained by resources on-site (no suppression charges will be used). If fire suppression funds (4196) are used to contain a prescribed fire, it must be declared an escaped fire and an incident number assigned.

Some Prescribed Fire Plans identify "Buffer or Allowable Areas," where a fire outside the planned perimeter will not be declared a wildland fire until it exceeds specified criteria, exceeds a stated target size, or threatens the boundary of the "Buffer or Allowable Area." In such cases, an escaped fire does not need to be declared until the criteria as stated in the Prescribed Fire Plan have been exceeded.

Additionally, prescribed fire becomes a wildland fire when it causes unexpected property damage by burning within the planned perimeter, but outside of the allowable area (generally applicable, but not limited, to pile burning situations) where additional resources may be needed to control and suppress the fire.

Once a prescribed fire becomes a wildland fire it cannot be returned to prescribed fire status.

Action

When a prescribed fire is declared a wildland fire, managers still have the full range of suppression options available under the concept of the "Appropriate Management Response." If a prescribed fire is declared a wildfire, an "Incident Number" will be assigned and all suppression costs will be charged to B/A 4196.

The following actions will be taken on all NDF prescribed fires that escape and are declared wildland fires:

- Take prompt and reasonable action to control and suppress the fire.
- Notify the regional Fire Management Officer and land owners that may be affected, of the escaped fire. Coordinate suppression actions with the other affected parties.
- Document the time and environmental conditions that existed when the escape occurred.
- Document the incident, including all actions prior to and after the escape. Set up a file that includes all pertinent information, i.e., the prescribed fire plan, a chronology of events including the prescribed fire report and unit logs or individual statements, the fire investigation report, weather forecasts including any spot forecasts, Remote Automated Weather Station (RAWS) data and National Fire Danger Rating System (NFDRS) data for the day of the escape for the nearest weather stations, photos, and any appraisal of damages.

Reviews - Escaped Prescribed Fire

All escaped prescribed fires will be investigated and receive an administrative review. The level and scope of the review will be determined by the injuries, damage, and cost associated with the escape.

The objectives of the prescribed fire review are:

- To prevent future escapes from occurring.
- To establish accountability.
- To determine if the Prescribed Fire Plan was adequate for the project.
- To determine if the prescription, actions, and procedures set forth on the Prescribed Fire Plan were followed.
- To determine if overall policy, guidance, and procedures relating to prescribed fire operations are adequate.
- To determine the level of awareness and the understanding of the personnel involved, in regard to procedures and guidance.
- To determine the extent of prescribed fire training and experience levels of personnel involved.

Responsibilities for the review are as follows:

Regional Fire Management Officer. The FMO is required to make an investigation of all escaped prescribed fires either personally or through an appropriate designated investigator.

The Regional FMO will notify the State Forester of any escaped prescribed fires immediately. Copies of the completed review report will be sent to the State Forester, and to the Fire Program Manager.

Reports

Burn dates and number of piles/acres burned will be tracked by the State Office for all prescribed fires conducted by NDF. On the day of burning the Burn Boss will send a copy of the signed Prescribed Fire Go/No-Go Checklist, including the number of piles/acres burned, to the State Office.

The Burn Boss for prescribed fires conducted by NDF that emit more than one ton of PM10 emissions will complete and submit data to the Nevada Division of Environmental Protection (NDEP) in accordance with the current Memorandum of Understanding between NDEP and NDF. The data will include project name, date, location, size, fuel type, pre-burn fuel loading, type of burn, final burn areas and estimated emissions. NDEP will provide NDF with a spreadsheet for the submittal of the information required.

If a prescribed fire escapes and is declared a wildfire, the acreage burned while the fire was considered a prescribed fire is reported as prescribed fire acreage and acreage burned after the fire was declared a wildfire must be reported as wildfire acreage.

Statutes of the State of Nevada - Sixty-Seventh Session, 1993

381 AN ACT relating to fires; allowing controlled fires under certain circumstances; requiring a written plan to be approved before commencing a controlled fire; requiring the state fire marshal to include a discussion of issues relating to controlled fires in educational materials; requiring certain reports to be submitted for presentation to the 68th session of the legislature; and providing other matters properly relating thereto. Senate Bill No. 444—Senator Jacobsen. Approved July 1, 1993

NRS 527.122 Definitions. As used in NRS 527.122 to 527.128, inclusive, unless the context otherwise requires:

1. "Authority" means the State Forester Firewarden, or a local government, whichever is charged with responsibility for fire protection in the area where a controlled fire is to take place.
2. "Controlled fire" means the controlled application of fire to natural vegetation under specified conditions and after precautionary actions have been taken to ensure that the fire is confined to a predetermined area.
(Added to NRS by 1993, 1202)

NRS 527.124 Regulations. The State Forester Firewarden shall adopt such regulations as the State Forester Firewarden deems necessary to carry out and enforce the provisions of NRS 527.126 and 527.128.
(Added to NRS by 1993, 1202)

NRS 527.126 Requirements to conduct fire; governmental immunity.

1. The authority may authorize an agency of this state or any political subdivision of this state to commence a controlled fire.
2. A controlled fire must be conducted:

(a) Pursuant to a written plan which has been submitted to and authorized by the authority; and

(b) Under the direct supervision of at least one person who is qualified to oversee such fires and who remains on-site for the duration of the fire.

3. A controlled fire which is commenced pursuant to this section and which complies with laws relating to air pollution shall be deemed in the best interest of the public and not to constitute a public or private nuisance.
4. The State of Nevada, an agency of this state or any political subdivision or local government of this state, or any officer or employee thereof, is not liable for any damage or injury to property or persons, including death, which is caused by a controlled fire that is authorized pursuant to this section, unless the fire was conducted in a grossly negligent manner.
(Added to NRS by 1993, 1202)

NRS 527.128 Contents of written plan; maintenance of plan on-site for duration of fire; establishment of qualifications for person to oversee fire.

1. The written plan required by NRS 527.126 must remain on-site for the duration of the fire. The plan must be prepared by a person qualified to oversee a controlled fire and contain at least:

(a) A description and map of the area to be burned;

(b) A list of the personnel and equipment necessary to commence and control the fire;

(c) A description of the meteorological factors that must be present before commencing a controlled fire, including surface wind speed and direction, transport wind speed and direction, minimum mixing height, minimum relative humidity, maximum temperature and fine fuel moisture;

(d) A description of considerations related to common behavioral patterns of fires in the area to be burned, including various burning techniques, the anticipated length of the flame and the anticipated speed of the fire; and

(e) The signature of the person who prepared the plan.

2. Before signing the written plan, the person qualified to oversee the fire must evaluate and approve the anticipated impact of the fire on surrounding areas which are sensitive to smoke.
3. The State Forester Firewarden shall establish the qualifications for a person to oversee a controlled fire.
(Added to NRS by 1993, 1203)

Appendix B – Topography, Fuels, Weather, Wind

Area Description

The project area was approximately 5 miles northwest of Carson City, Nevada in a valley known locally as "Little Valley." This valley is the Franktown Creek drainage. The area is owned by the University of Nevada-Reno and is used as a research forest. It is known as the Whittell Forest and encompasses approximately 2,700 acres. It is managed for forest health and fire protection by the Nevada Division of Forestry.

Topography

This valley is located on the western aspect of the Sierra Nevada mountain range. The valley elevation averages 6,300 feet with a ridgeline one mile to the west at 8,300 feet and the Washoe Valley two miles to the east at 5,000 feet. The valley itself is aligned east/west and is fairly flat with slight ridges on all sides.

Fuels

The valley bottom is primarily FBFM GR4 (Moderate Load, Dry Climate Grasses) with a fuel bed depth of about two feet. FBFM TL8 (Long-Needle Litter) is found predominantly on the east side (western aspect) of the valley. There are also scattered pockets of FBFM 2 (Low Load Grasses with a Shrub Component) found in some areas where the timber changes to the grass fuel type. This entire area has had numerous fuel treatments over the last decade, both mechanical and prescribed fire, and has minimal heavy fuel on the ground. The three photos (below) were taken onsite on Nov. 10.

FBFM Fuel Model GR4

FBFM Fuel Model TL8

FBFM Fuel Model 2

Calculated Fine Dead Fuel Moistures, Little Valley RAWS (September 27-October 13)

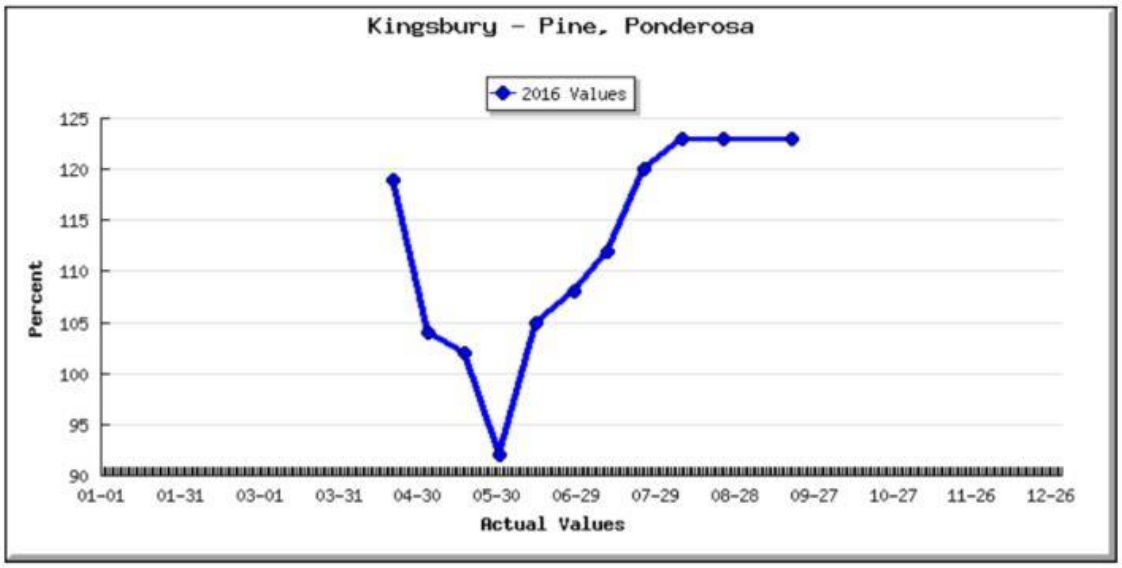
1-Hour: 2.89 – 8.03 with a spike (17.74) on October 3 from precipitation
10-Hour: 4.68 – 9.39 with a spike (16.80) on October 3 from precipitation
100-Hour: 8.57 – 15.25 October 3 did not show a spike

Historical Fuel Treatment

There have been multiple fuel treatments in the Little Valley Prescribed Fire area over the last decade. These include both mechanical treatment and pile burns. Per NDF, there has never been a broadcast burn in the area. It's unknown the exact timing and extent of the treatments, but the majority show up in the aerial photo (07/13/2016) as fuel modification. We have GIS data but no supporting underlying treatment data.

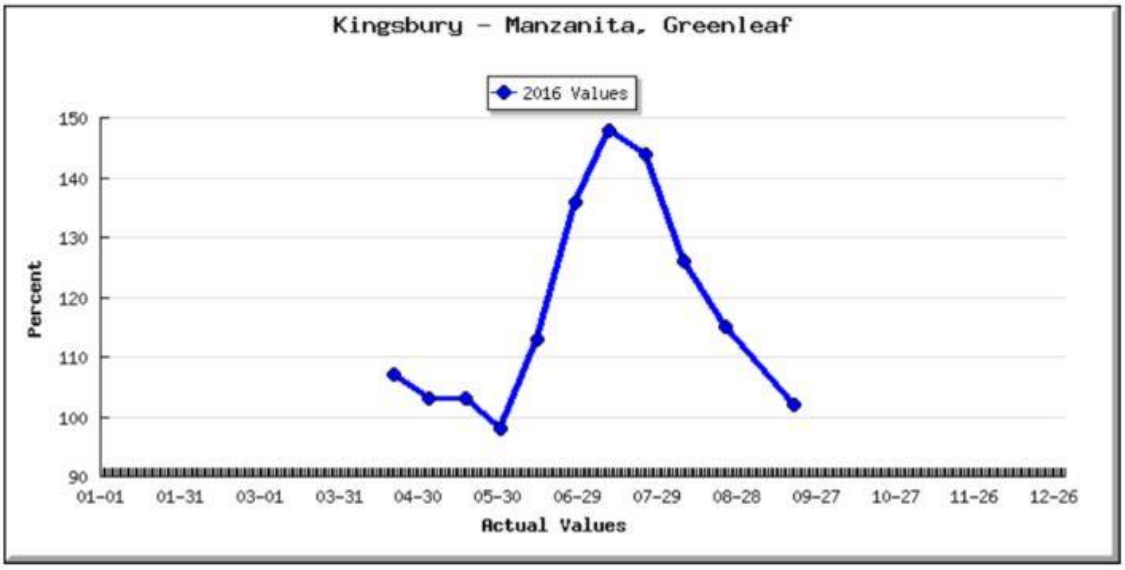
Live fuel Moisture

The Kingsbury sampling site is the closest live fuel site to the burn area. It is approximately 18 miles south at the same elevation. 2016 is the only year available. The fuels sampled are Ponderosa Pine and Greenleaf Manzanita. The Ponderosa Pine has maintained 120% fuel moisture since July which should be "normal" and is probably the maximum for this time of year. This does not indicate drought stress. The Manzanita was 102% which shows that it is going into dormancy for the season.



Kingsbury - Pine, Ponderosa

	04-21	05-04	05-18	05-31	06-14	06-28	07-11	07-25	08-08	08-24	09-19	09-28	10-14	10-26
2016	119	104	102	92	105	108	112	120	123	123	123			
2015												121	118	110



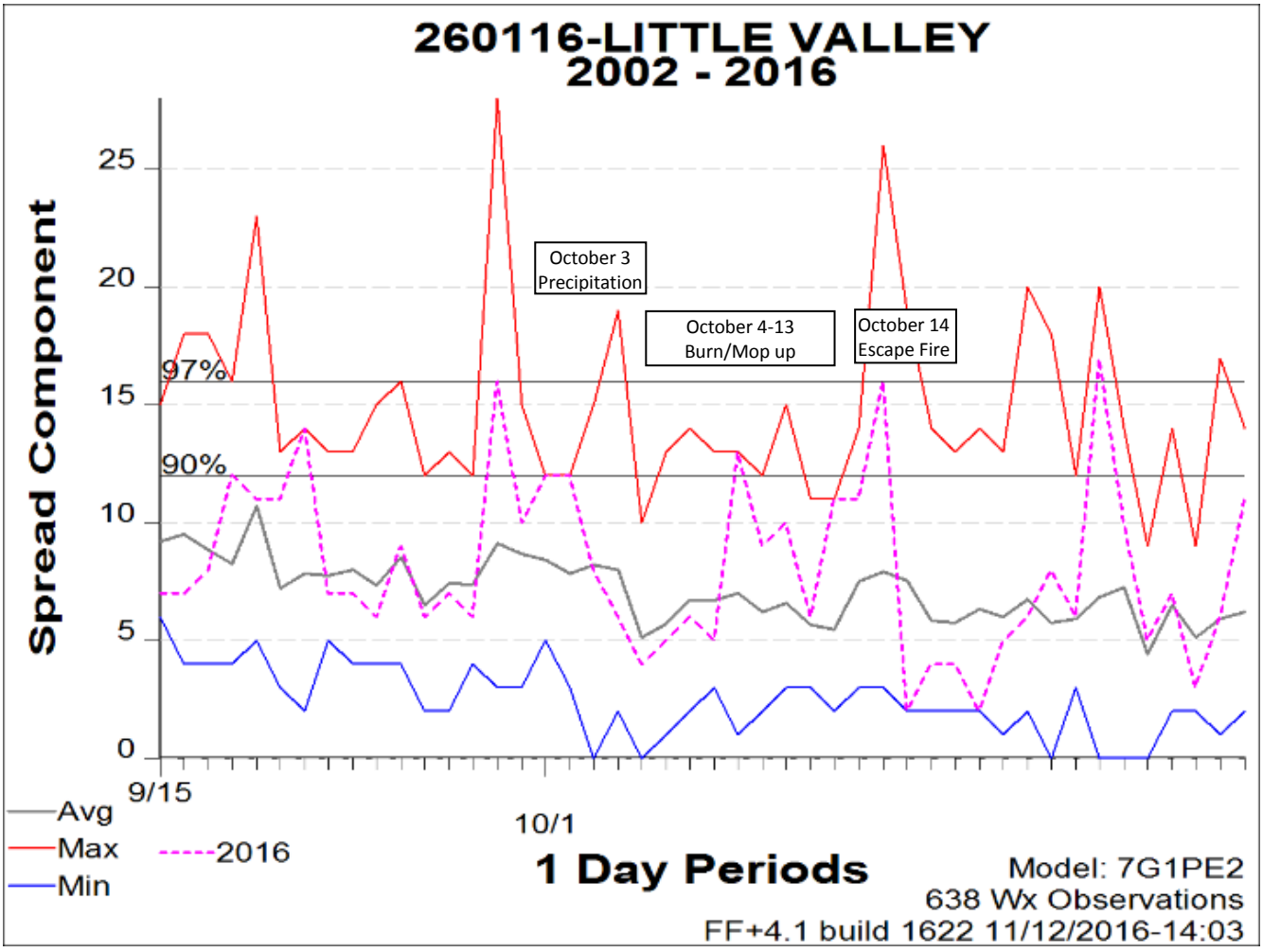
Kingsbury - Manzanita, Greenleaf

	04-21	05-04	05-18	05-31	06-14	06-28	07-11	07-25	08-08	08-24	09-19	09-28	10-14	10-26
2016	107	103	103	98	113	136	148	144	126	115	102			
2015												84	92	100

Spread Component

The best overall measure of potential fire behavior in these fuel types is the Spread Component (SC). This takes into effect the 1-, 10-, and 100-hour fuel moisture content, wind, and slope. This number correlates into the rate of spread in feet per minute.

The Energy Release Component (ERC) is not as applicable in this case because it measures the larger fuels and drought.

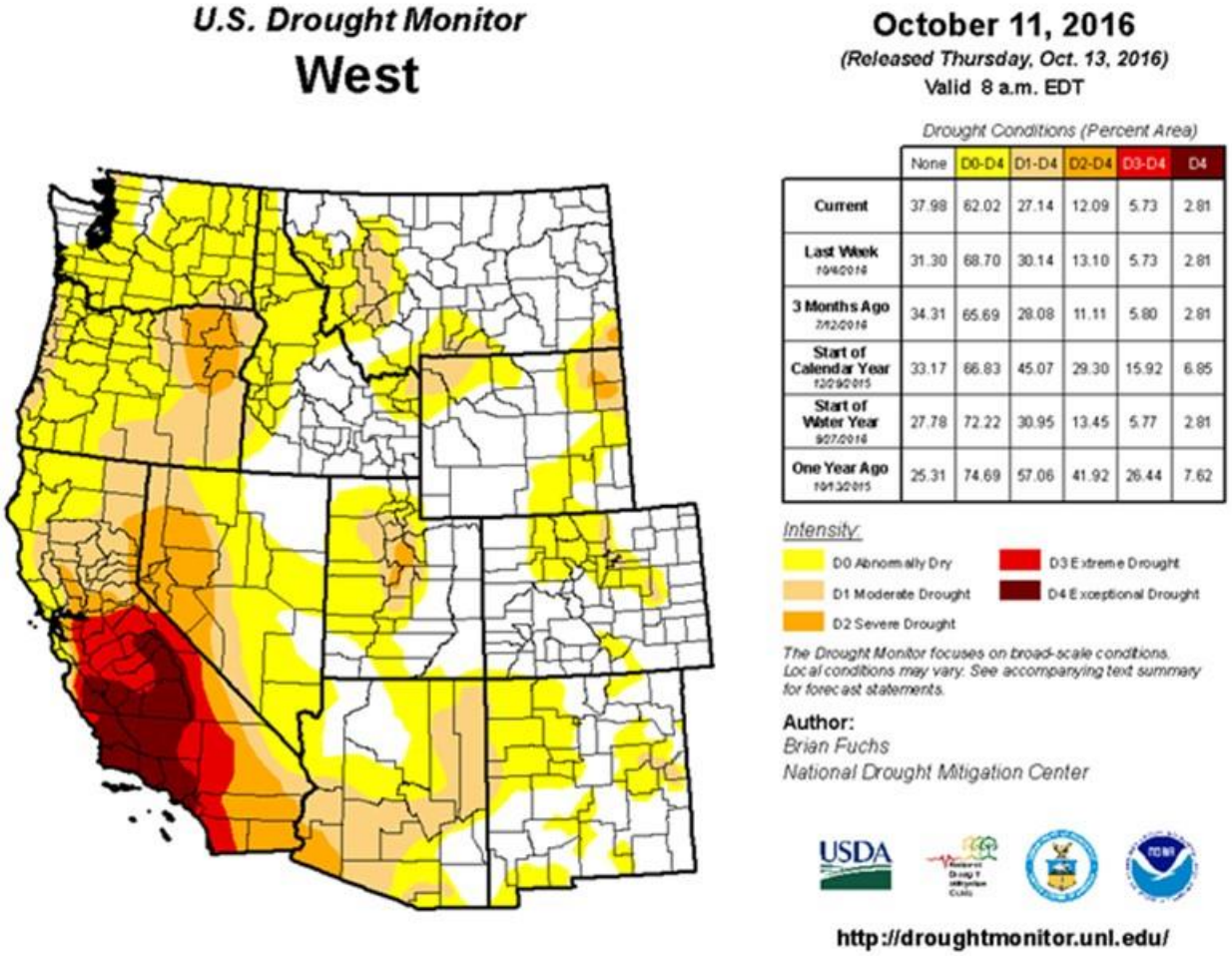


Weather

There is a permanent Remote Automatic Weather Station (RAWS) onsite in Little Valley. This RAWS seems to be very representative of wind and weather conditions at the burn site. *RAWS Name: Little Valley, WIMS ID: 260116, Elevation 6310 feet, last serviced July 1, 2016.*

Area Climatology

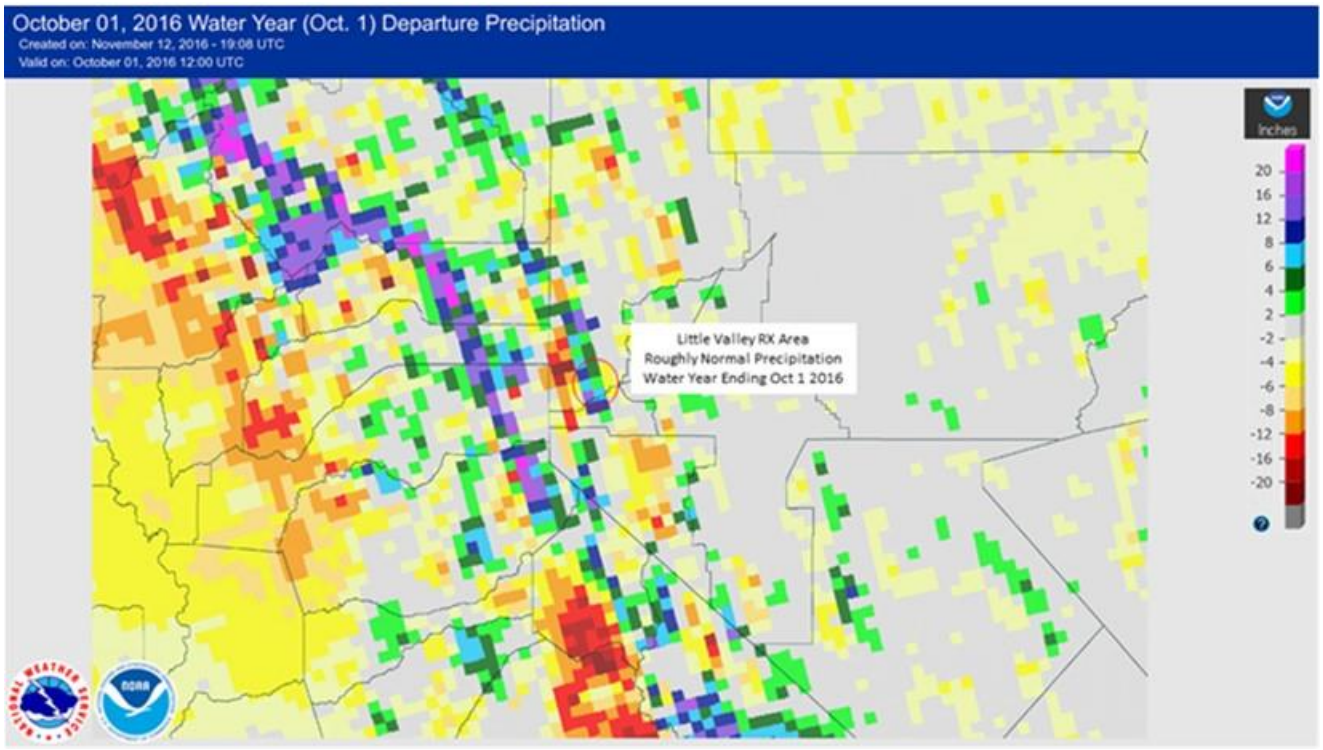
This entire area has been under a long-term drought classified as “Severe Drought” by the National Drought Mitigation Center.



Drought Definition

Hydrological drought usually occurs following periods of extended precipitation shortfalls that impact water supply (i.e., streamflow, reservoir and lake levels, ground water), potentially resulting in significant societal impacts.

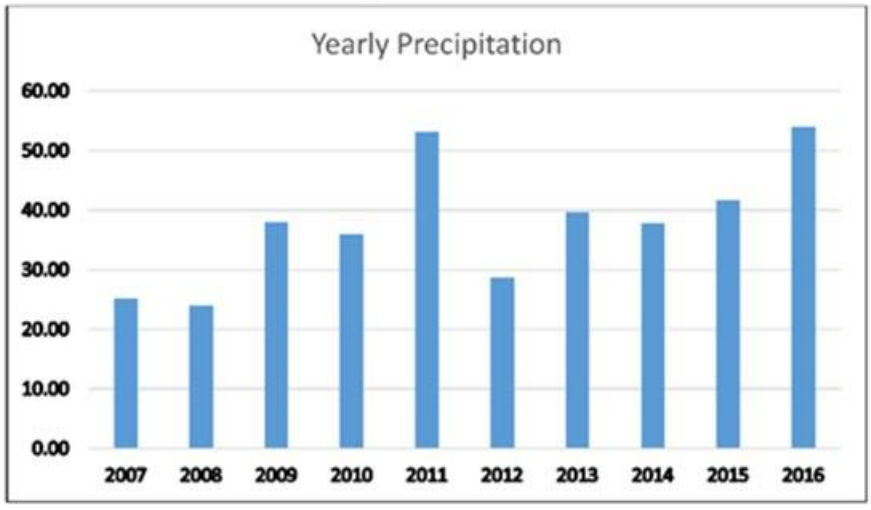
The drought has eased in the 2016 Water Year as shown by the Departure Precipitation map which shows the area has received normal or above normal precipitation this year.



The ten-year (water year) average at the Little Valley RAWS is 36.01 inches. In 2016, 53.99 inches of precipitation was recorded.

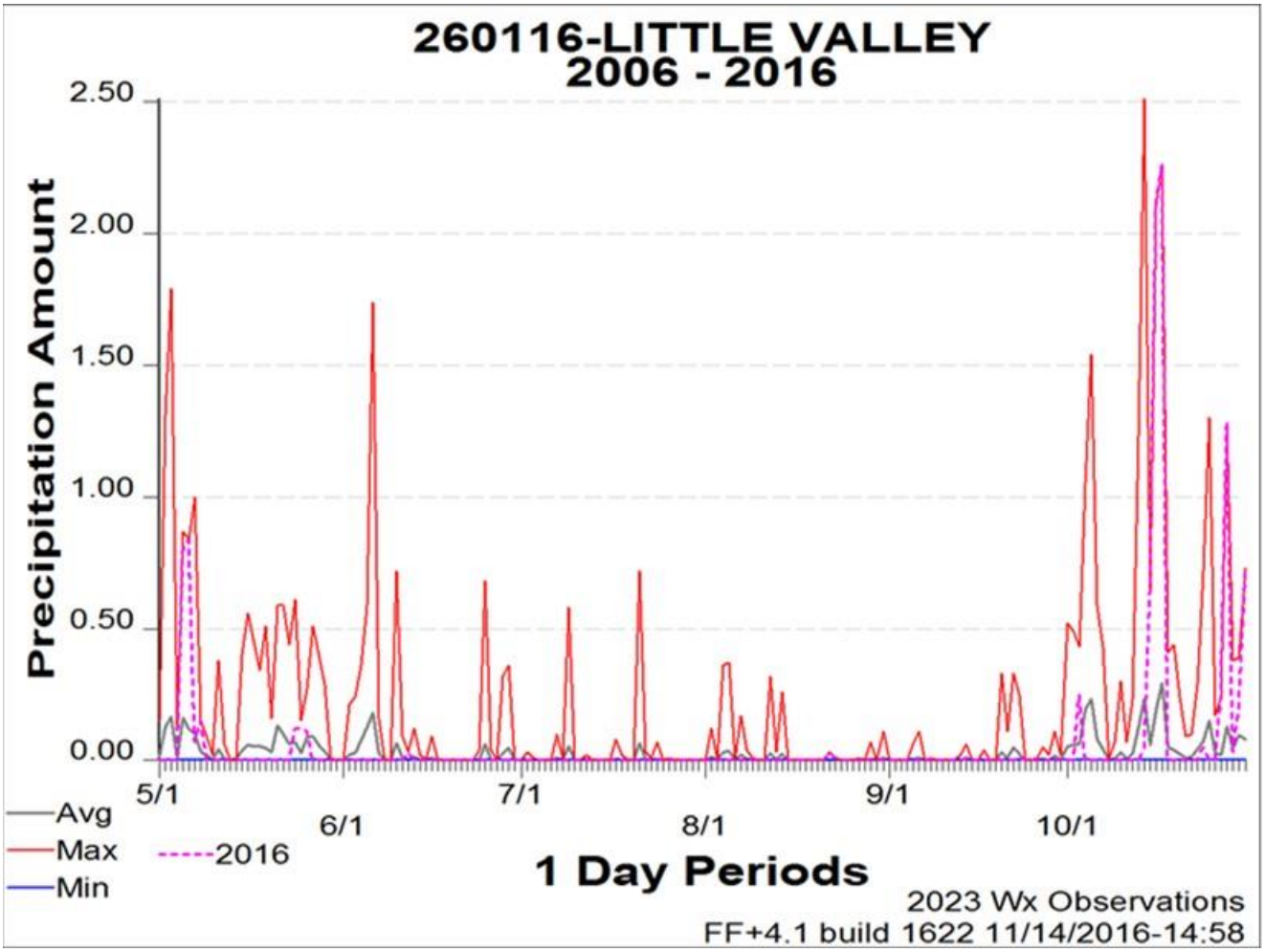
Water Year	Total Precipitation
2007	25.20
2008	23.95
2009	38.03
2010	36.00
2011	53.18
2012	28.66
2013	39.61
2014	37.82
2015	41.67
2016	53.99
Average	36.01

Precipitation Totals by Water Year
Little Valley RAWS



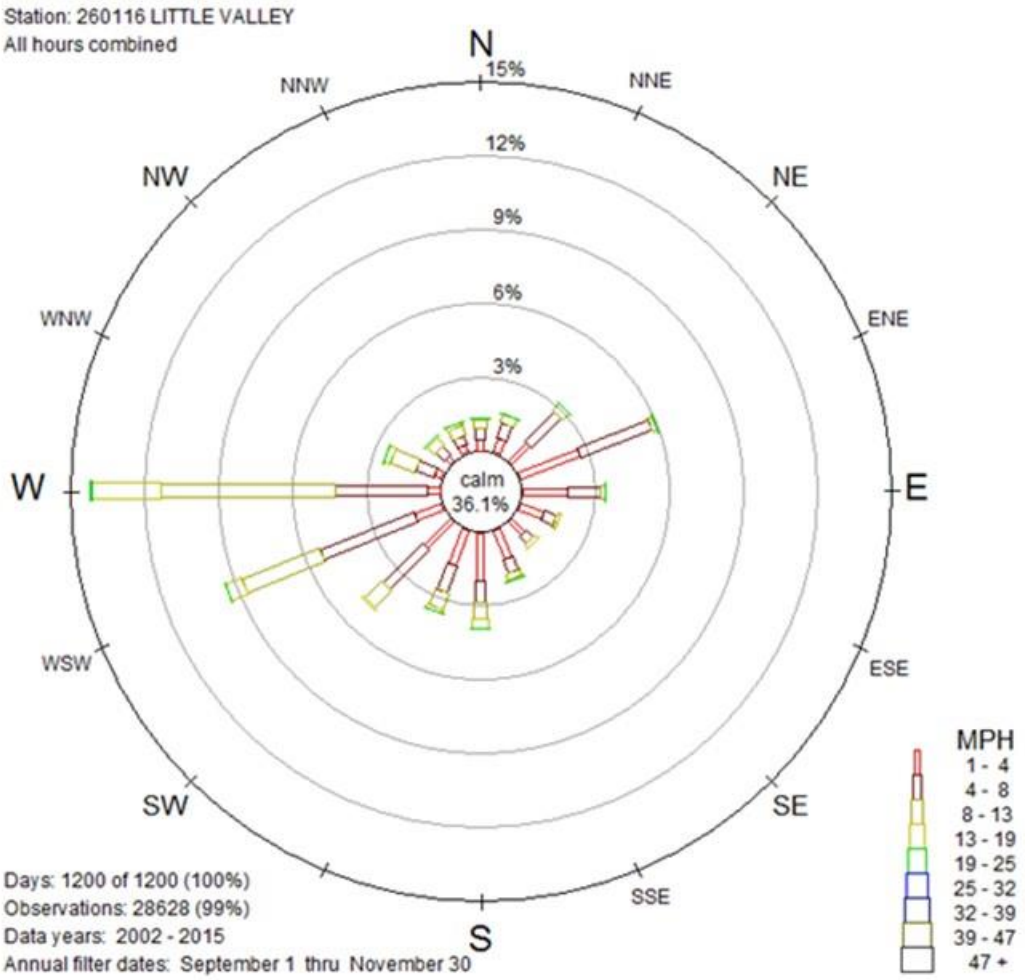
Short Term Precipitation Deficit

The Little Valley area has a yearly historical dry spell between June 1 and mid-October. The average precipitation over the last ten years at the Little Valley RAWS was 1.25 inches. This year (2016) was an exceptionally dry year during this period, with the RAWS only recording 0.09 inches. This dry spell ended on October 3 when 0.25 inches of precipitation was measured and on scene personnel reported light snow.

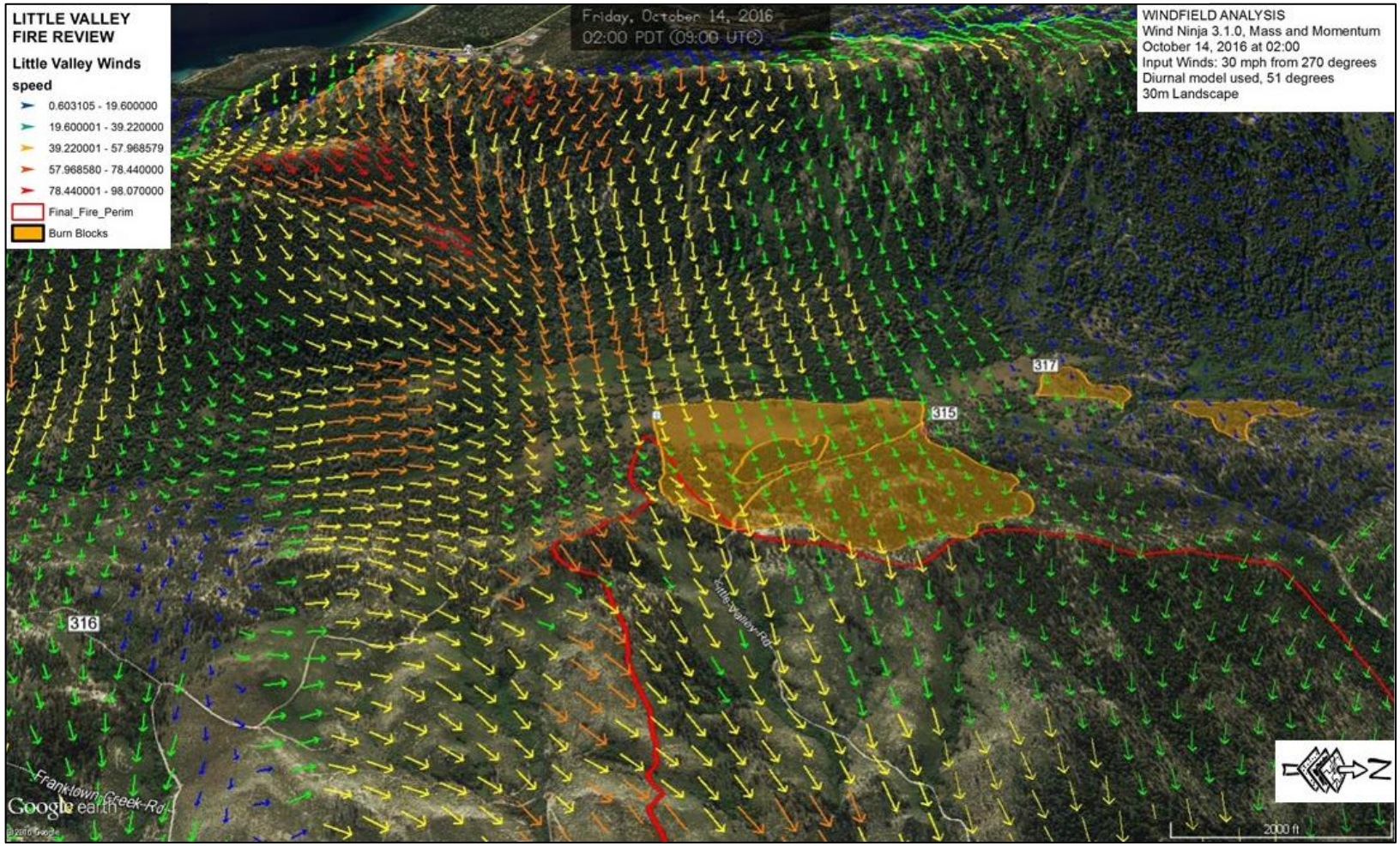


Area Winds

The Little Valley area is dominated by the local topographic winds. Within three miles, the elevation drops 3,000 feet from alpine to desert. This leads to some major up and mainly down valley winds with the average winds between 9/1 and 11/30 being 15% of the time out of the west at 8.6 mph. With the elevation and temperature gradient, the winds in Little Valley have a history of being quite gusty—with gusts greater than 20 mph 24% of the time and gusts greater than 60 mph not uncommon.



WindNinja, Wind Field Analysis
Inputs: October 14, 0200 Hours
Wind Input 30 mph from 270 degrees
Diurnal Model used, 51 degrees
Mass and Momentum



Weather Note – All Daily Values are from Little Valley RAWS and are recorded at 13:00 local time.
All Hourly Values are from Mesowest imported into Excel.

Pre-Burn Weather (September 27 thru October 3)
A high-pressure system was in place over the area through October 2 that kept minimum daily RH's between 15 and 22% and maximum daily temperatures 59-80 degrees. The daily winds during this period were between 5-12 mph, with gusts between 10 and 41 mph.

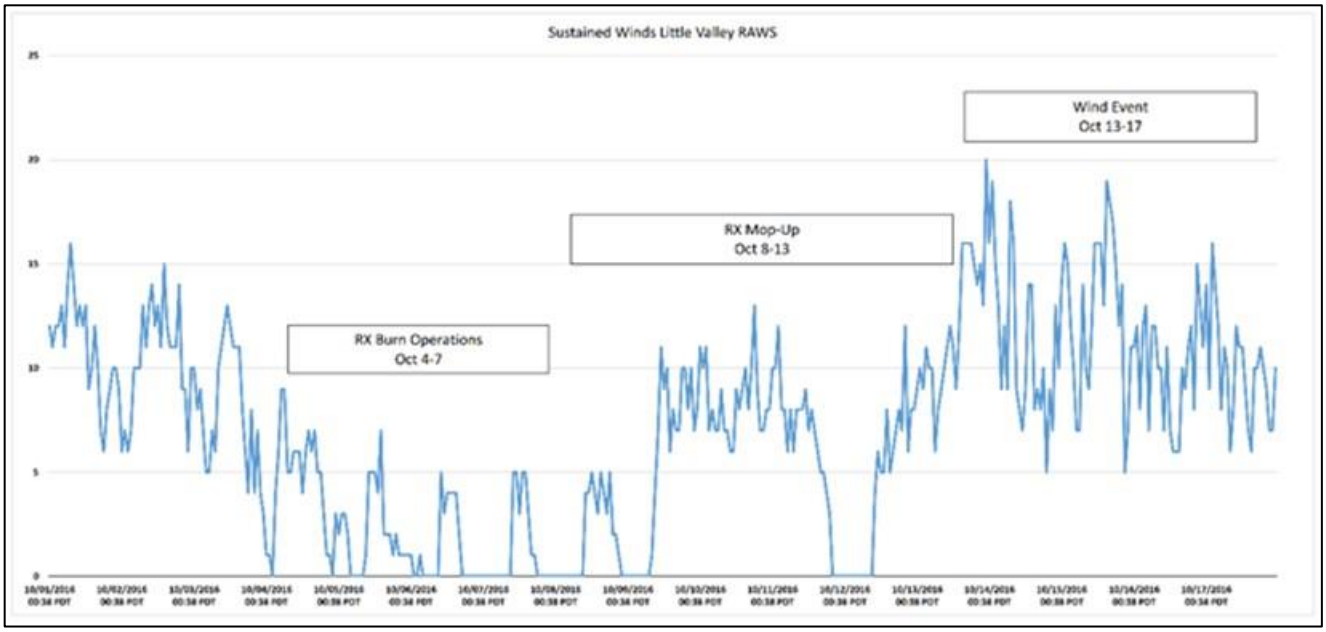
On October 3 a low-pressure system moved through the area with 0.25 inches' precipitation and light snow at the burn site. The burn was cancelled for the day and rescheduled to start October 4.

Burning/Mop-Up Operations Weather (October 4 thru October 13)
A high-pressure system became reestablished over the area after the precipitation on October 3. The minimum daily RH's started out on October 4 at 39% and by October 13 dropped to 16%. The daily maximum temperatures also rebounded during this timeframe, reaching a maximum high of 71 degrees on October 9. The daily sustained winds during this time period reached between 4 and 10 mph, with gusts between 10 and 32 mph. (The 32 mph was on October 13 as the low-pressure system was moving in.)

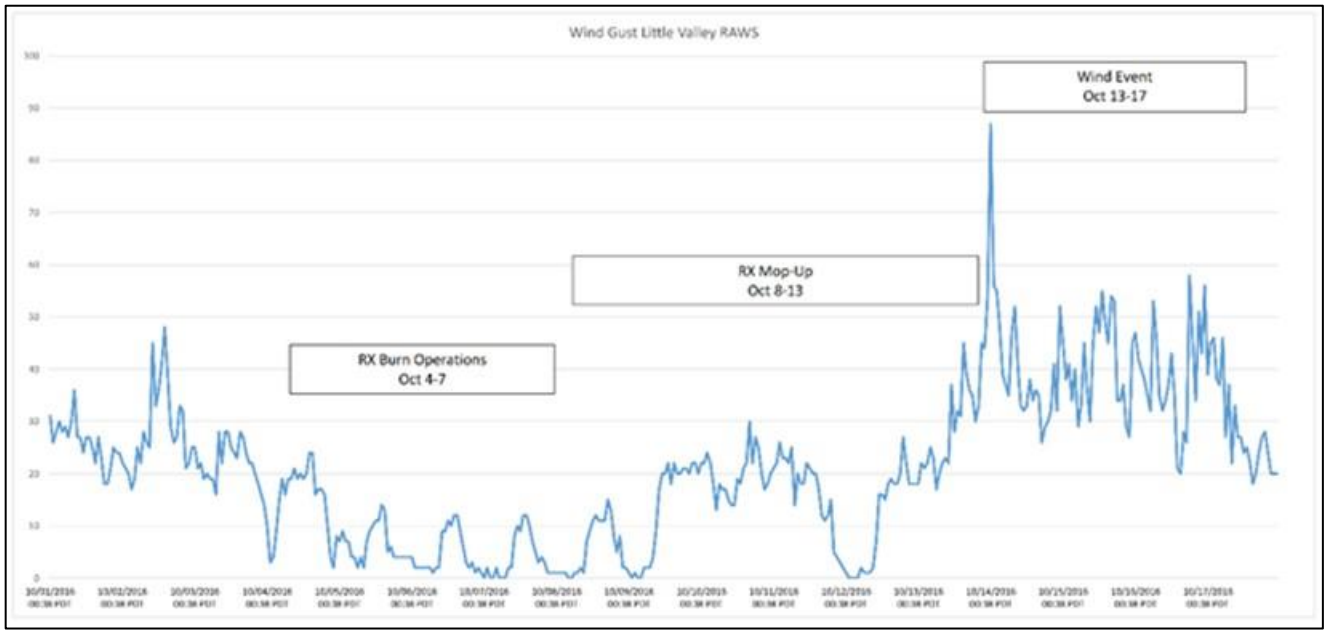
There was a Fire Weather Watch issued by the National Weather Service on October 11 at 1226 for gusty winds and low humidity. This was upgraded to a Red Flag Warning on October 12 at 1117 and was extended until October 14 at 1700.

Prescribed Fire Escape (October 14-15)
A strong low-pressure system moved in on October 14. From the RAWS data, it appears that the leading edge moved through the burn area shortly after midnight, bringing gale force wind gusts. The highest gust of 86.99 mph was recorded at 0038. This system brought daily sustained winds between 5 and 20 mph and continued consistent hourly gusts between 20 and 55 mph. This very windy weather pattern continued until mid-day on October 17.

Sustained Winds Little Valley RAWS



Wind Gusts at Little Valley RAWS



Hysplit Input Information for all runs:

Ignition Location: 39.252436 -119.876554
Ignition Time: 1900z or 1100 local
Forecast: HRRR 3km
Archive File: Hysplit.201610xx.hrra
Duration 12 hours, Averaging 2 hours, Top of layer 500 meters

Figure 1 shows Very Good ventilation with smoke transport to the east.
Figure 2 Shows the stability increasing and more smoke in the Washoe Valley
Figures 3 and 4 show the effect of stable air over the region with inversion at night
(The Ventilation Forecast is from the NWS Zone Forecast.)

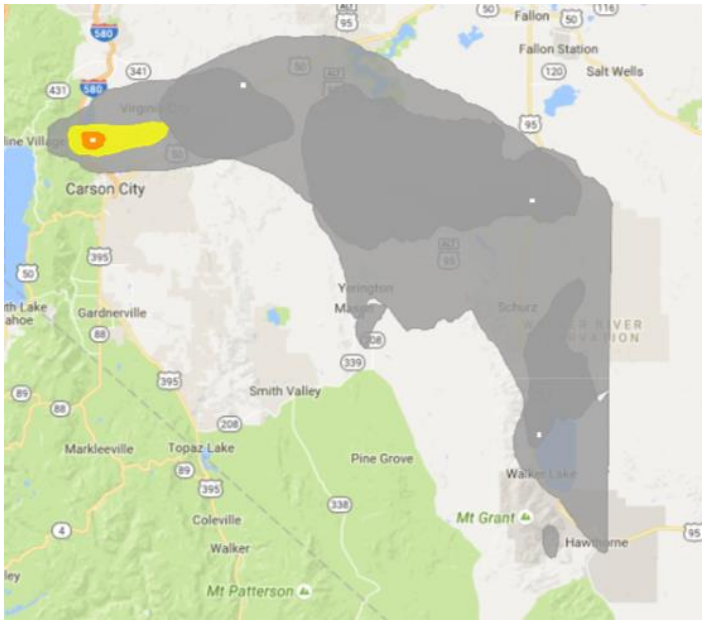


Figure 1, Dispersion 10/04/2016
Ventilation Forecast Day: Very Good

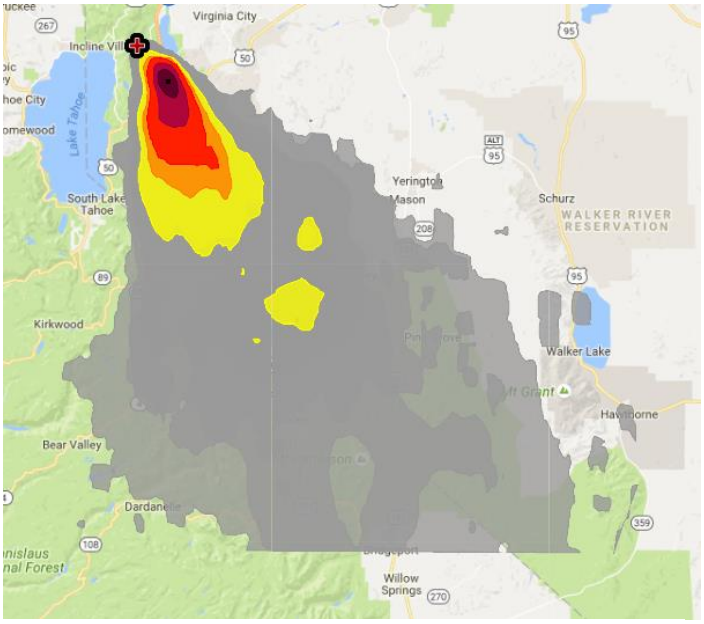


Figure 2, Dispersion 10/05/2016
Ventilation Forecast Day: Good

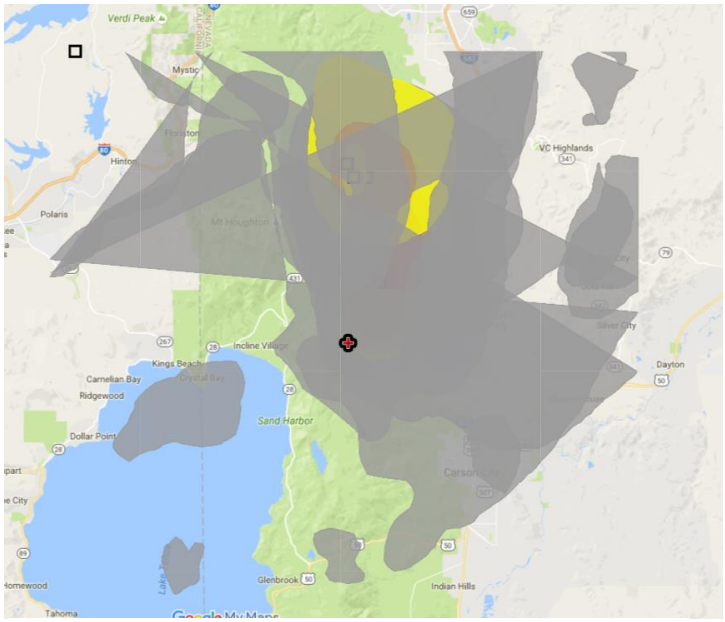


Figure 3, Dispersion 10/06/2016
Ventilation Forecast Day: Fair

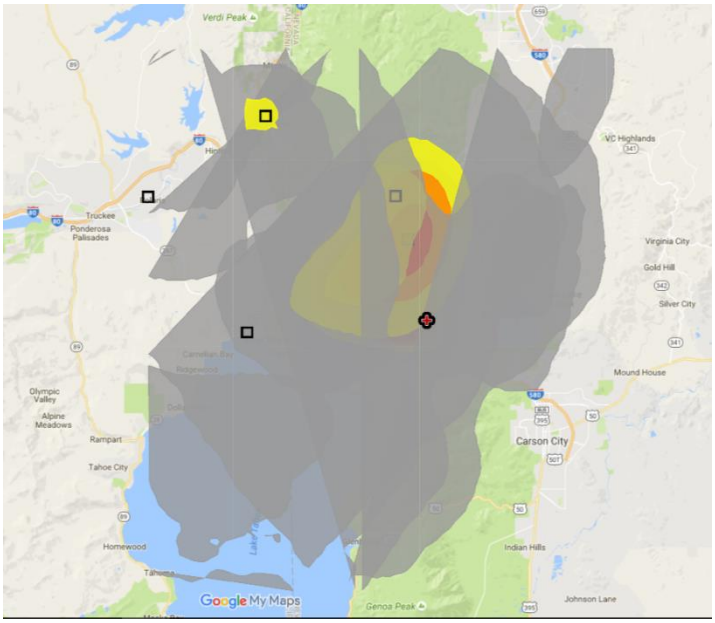


Figure 4, Dispersion 10/07/2016
Ventilation Forecast Day: Fair

Appendix C – Community Outreach

A community communication plan for the Little Valley Prescribed Fire was developed on Aug. 24 that addressed:

- Community meeting
- Fact sheet mailed to 400 citizens
- Email updates to the community
- Media updates
- Trap line
- Social media updates
- Highway information signage
- A documentary to be used for educating the public on the purpose and value of prescribed fire
- Smoke impacts to the Washoe County School District; the Washoe County Health Department; Davis Creek Park, a regional park managed by Washoe County; and Bowers Mansion Regional Park, also managed by Washoe County.

July 6, Homeowners Association Meeting

August 20, Community Homeowners Event

On Aug. 26, a fact sheet of the prescribed fire and the community meeting was sent out to 400 citizens in the Washoe Valley area. In addition, a media advisory was sent out to the media with this information.

On Sept. 8, an evening community meeting was held at the Washoe Valley Volunteer Fire Department Station. This meeting lasted more than an hour and was videotaped. (Due to limited space on the tape, only the first hour was recorded.) Approximately 15-20 community members attended. Questions were asked during and at the end of the presentation. At the meeting, community members could sign-up to receive daily updates during the prescribed fire.

Sept. 19, NDF Partner Meeting with USFS

These organizations made presentations at the Sept. 8 community meeting:

- Nevada Division of Forestry
- University of Nevada
- U.S. Forest Service
- Desert Research Institute

From October 3-7, six information updates and one “Smoke Impact” release was sent out to the media outlets and to everyone on the community list. In addition, the Nevada Division of Forestry’s Twitter and Facebook was updated at least daily. The “trap line” was also updated daily at 13 locations. Messages on the Nevada Department of Transportation highway information signs located at the south and north end of Washoe Valley also informed the highway traffic about the prescribed fire.

The Public Information Officer’s 214 unit logs confirm that they did receive calls from citizens as well as the Washoe County Health Department with concerns of the smoke and ash to public health, and to stop burning. The Public Information Officer forwarded these concerns to the State Forester.

Appendix D – Personnel Training and Qualifications Records Assessment

Personnel Qualifications

NAME	RX POSITION	FFT2						FFT1			SRB				HECM			ICT5			ICT4		SOFR			RXB3		RXB2					STL/TFLD					DIVS			PIOF												Fitness			I Courses							Comments
		RT-130	ICS-100	IS-700	L-180	S-130	S-190	RT-130	S-131	S-133	RT-130	ICS-200	S-230	S-290	RT-130	A-110	S-271	RT-130	ICS-200	S-131	RT-130	S-200	RT-130	ICS-300	ICS-400	RT-130	S- 290	RT-130	S-390	RX-301	RX-310	BEHAVE	RX-341*	RT-130	ICS-300	IS-800b	S-215	S-330	RT-130	S-390	S-339	RT-130	S-130	S-190	S-203	ICS-100	ICS-200	ICS-300	ICS-400	IS-700	IS-800	Light	Moderate	Arduous	I-100	I-200	I-300	I-400	IS- 100	IS-200	IS-300	
	RXB2	x		x		x	x	x			x	x	x	x				x	x	x	x	x				x	x	x	x	x																													Missing RX-310, BEHAVE and RX-341 completion
	RXB2(t)	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x				x	x	x	x	x	x	x																											
	DIVS	x		x		x	x	x		x	x	x	x	x				x	x	x	x	x											x	x	x	x		x	x	x																		Missing S-131 and S-330 completion.
	DIVS	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x											x	x	x	x	x	x	x	x																		
	DIVS(t)	x		x		x	x	x			x		x	x							x	x											x	x	x	x	x	x		x																	x	x					Carson City FD
	DIVS(t)	x	x	x		x	x	x	x	x	x	x	x	x				x	x	x	x	x											x	x	x	x	x	x	x	x																		
	DIVS(t)	x		x				x	x	x	x	x	x	x				x	x	x	x	x											x	x	x	x	x	x	x	x																		Missing S-130 & S-190 completion
	FIRB	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x										x				x																								
	FIRB(t)	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x										x				x																								
	FIRB	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x														x																								
	FIRB(t)	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x										x																													
	FIRB	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x										x																													
	FIRB(t)	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x										x				x																										
	FFT1	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x														x																									
	FFT1	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x														x																									
	SOFR	x		x	x	x	x	x	x	x	x		x	x				x		x	x	x	x		x																																			
	SOFR(t)	x		x	x			x	x	x	x		x	x				x		x	x	x	x											x		x	x	x																						
	PIOF (t)/FFT2	x		x	x	x																																			x	x	x	x	x	x			x	x										
	HECM	x		x	x	x	x	x	x	x	x		x	x	x	x	x																			x																								
	HECM	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x																			x																								
	HECM	x		x	x	x	x	x	x	x	x				x	x	x																			x																								
	HECM	x	x	x	x	x	x	x	x	x					x	x	x																			x																								

*RX-341 Is a requirement for Prescribed Fire Plan Preparers qualified at the RXB2 and RXB1 level

Training requirements listed above in **RED** are required in the NWCG National Incident Management System/Wildland Fire Qualification System Guide

Training requiremnets listed above in **BLACK** are additional requirements for that position as described in the NDF Fire Protection Manual

Cells of this color indicate that this course was not required at time of certifcation for position or that equivalency was granted by taking another course per agency directives.

Cells of this color indicate that training is missing in the individual training records.

Cells of this color indicate that during the 2016 year, the RXB2 was a unit instructor at the Truckee Meadows Community College on three separate occasions for the NDF additionally required training courses for the RXB2 position, which would allow certification to be granted for these additional training requirements according to NWCG Guidance.

Personnel Qualifications

NAME	RX POSITION	FFT2						FFT1			SRB				HECM			ICT5			ICT4		SOFR			RXB3		RXB2						STL/TFLD					DIVS			Fitness			I/ISCourses						Comments
		RT-130	ICS-100	IS-700	L-180	S-130	S-190	RT-130	S-131	S-133	RT-130	ICS-200	S-230	S-290	RT-130	A-110	S-271	RT-130	ICS-200	S-131	RT-130	S-200	RT-130	ICS-300	ICS-400	RT-130	S-290	RT-130	S-390	RX-301	RX-310	BEHAVE	RX-341*	RT-130	ICS-300	IS-800b	S-215	S-330	RT-130	S-390	S-339	Light	Moderate	Arduous	I-100	I-200	I-300	I-400	IS-100	IS-200	
	HECM	x		x	x	x	x	x	x	x					x	x	x																	x									x	x	x	x				
	FFT2	x		x	x	x	x								x	x	x																	x									x		x			x		
	HECM	x		x	x	x	x	x	x	x					x	x	x																	x									x	x						
	FFT2	x		x	x	x	x																											x									x	x	x						
	FFT2	x		x	x	x	x																											x									x	x	x						
	RXB2	x		x	x	x	x	x	x	x	x		x	x							x					x	x	x	x		x	x	x				x						x	x	x						Technical Reviewer. RX-301 not required
	FFT1	x	x	x	x	x	x	x	x	x																																	x	x							USFS employee
	FFT1	x	x	x	x	x	x	x	x	x																																	x	x							USFS employee
	FFT1	x		x	x	x	x	x	x	x																																	x								
	FFT1	x	x	x	x	x	x	x	x	x																																	x	x							
	FFT2	x			x	x	x																																			x	x							Missing IS-700
	FFT1	x		x	x	x	x	x	x	x																																	x	x							
	FFT1	x		x	x	x	x	x	x	x																																	x	x							
	FFT1	x		x	x	x	x	x	x	x																																	x	x							
	FFT2	x		x	x	x	x																																			x	x							
	FFT1	x		x	x	x	x	x	x	x																																	x	x							
	FFT1	x		x	x	x	x	x	x	x																																	x	x							

*RX-341 Is a requirement for Prescribed Fire Plan Preparers qualified at the RXB2 and RXB1 level

Training requirements listed above in **RED** are required in the NWCG National Incident Management System/Wildland Fire Qualification System Guide

Cells of this color indicate that this course was not required at time of certifcation for position or that equivalency was granted by taking another course per agency directives.

Cells of this color indicate that training is missing in the individual training records.

Personnel Qualifications

NAME	RX POSITION	FFT2						FFT1			SRB				HECM			ICT5			ICT4		SOFR			RXB3		RXB2						STL/TFLD					DIVS			Fitness			I/ISCourses						Comments
		RT-130	ICS-100	IS-700	L-180	S-130	S-190	RT-130	S-131	S-133	RT-130	ICS-200	S-230	S-290	RT-130	A-110	S-271	RT-130	ICS-200	S-131	RT-130	S-200	RT-130	ICS-300	ICS-400	RT-130	S-290	RT-130	S-390	RX-301	RX-310	BEHAVE	RX-341*	RT-130	ICS-300	IS-800b	S-215	S-330	RT-130	S-390	S-339	Light	Moderate	Arduous	I-100	I-200	I-300	I-400	IS-100	IS-200	
	FFT2	x																																								x								Reno FD
	FFT2	x																																								x								Reno FD
	FFT2	x				x	x																																			x	x							Reno FD
	FFT2	x																																								x								Reno FD
	FFT1	x						x																																		x								Reno FD
	FFT2	x																																								x								Reno FD
	FFT1	x			x			x																																		x								Reno FD
	FFT2	x																																								x								Reno FD
	FFT1	x						x																																		x								Reno FD
	FFT1	x				x	x	x	x	x																																	x	x							Reno FD
	ENGB	x				x	x	x			x		x	x																													x	x	x	x					Reno FD
	FFT2	x																																								x								Reno FD
	FFT2	x																																								x								Reno FD

*RX-341 Is a requirement for Prescribed Fire Plan Preparers qualified at the RXB2 and RXB1 level

Training requirements listed above in **RED** are required in the NWCG National Incident Management System/Wildland Fire Qualification System Guide

Cells of this color indicate that this course was not required at time of certifcation for position or that equivalency was granted by taking another course per agency directives.

Cells of this color indicate that training is missing in the individual training records.

Personnel from Reno Fire were not part of the mandatory staffing for the prescribed burn and were simply there for training purposes.

Appendix E – Prescribed Fire Chronology

DATE:	10/3	Test fire 20x20, extinguished		
SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/03/2016 11:50:44	RX Boss	LP	igniting small test fire / copy all notifs were made // will advd when complete
WildCAD	10/03/2016 12:20:34	LP	Log	(at 1207) RX Boss advised 20x20 area burning fine, will be monitoring, let it do its thing for a while before extinguishing // copy
WildCAD	10/03/2016 12:45:56	RX Boss	LP	extinguishing test fire
WildCAD	10/03/2016 13:13:45	RX Boss	LP	advd extinguishing still going on & if we need to contact the rx, contact RX (T) / copy
WildCAD	10/03/2016 14:55:01	RX Boss	LP	test fire extinguished , resources staying on scene & leaving shortly , will advd when they are headed down the hill

DATE:	10/4	Ignition Unit 3 and Jackpot Fuel north end of Unit 2		
SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/04/2016 09:29:36	RX Boss	LP	advd all resources mobilizing now & we will adv when they are in place and beginning test fire, all commo will come thru (T) // done
WildCAD	10/04/2016 11:24:07	RX Boss	LP	completed test fire
WildCAD	10/04/2016 11:29:40	RX Boss	LP	initiating test fire Unit 2 / (traffic with static but readable after several attempts)
WildCAD	10/04/2016 11:51:53	RX Boss(T)	LP	advd still in test phase & will update shortly
WildCAD	10/04/2016 12:07:36	RX Boss(T)	LP	advd test completed & proceeding with operations / done
WildCAD	10/04/2016 14:52:57	RX Boss(T)	LP	advised everything looking good on unit 2, starting test fire on unit 3
WildCAD	10/04/2016 15:03:30	RX Boss(T)	LP	test fires complete on unit 3, continuing with ops
WildCAD	10/04/2016 16:49:43	RX Boss(T)	LP	advised ops normal on unit #2, unit 3 is complete & in patrol status
WildCAD	10/04/2016 18:17:46	RX Boss(T)	LP	ignitions done for the day, holding resources on both Unit 2 & Unit 3, will advise when they start releasing
WildCAD	10/04/2016 19:03:00	RX Boss	LP	advised (approx 1850) Unit 3 completed, good portion of Unit 2 is done & they will continue that tomorrow, will advise when resources start heading to ICP // advd nightshift

DATE:	10/5	Ignition Unit 2 and southeast end of Unit 1		
SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/05/2016 06:18:06	B Boss	CLH	Have had a look at fire // Ops normal // all is holding // Briefing @ 0800 and hope to be on the hill @ 1000
WildCAD	10/05/2016 08:48:18	RX Boss(T)	LP	advd morning briefing complete & ops plan for the day is to complete Unit 2 and a portion of Unit 1 / copy
WildCAD	10/05/2016 10:49:56	RX Boss(T)	LP	advised burns from yesterday looking really good, they are going to proceed with Unit 2 // copy (traff on BLM Mccl, loud & clear)
WildCAD	10/05/2016 12:08:57	RX Boss(T)	LP	ops normal, getting really good fuel consumption & will give another update in about an hour
WildCAD	10/05/2016 13:26:41	RX Boss(T)	LP	completed & secured ridgeline on Unit 2, now continuing with the interior & will give another update in approx an hour // copy
WildCAD	10/05/2016 15:28:56	RX Boss(T)	LP	everything looking good, we will probably wrap up firing here within the 1-1 1/2 hours
WildCAD	10/05/2016 16:19:23	RX Boss(T)	LP	looking good, 90% & monitoring, will begin small fire on Unit 1 at the s/e corner ridge to secure that area & will advise again in approx hour
WildCAD	10/05/2016 18:02:10	RX Boss(T)	LP	completed ignitions for the day, completed 90 acres on Unit 2 and 10acres on Unit 1, Unit 2 is pretty much done (couple small pockets to monitor), will be keeping resources on the line monitoring for now & will advise when we start releasing // copy
	10/5 Briefing	Extended holding mop-up as needed to secure Unit 3		
	10/5 Briefing	Have [Name of Person] kick loose [Name of Person] to recon Unit 1 and come up with ignition plan for S.E. corner of Unit 1		
	10/5 Briefing	Two firing teams for Unit 2 blackline, one to finish blackline along ridge and other to tie from jackpot of down timber back to road		
North	10/5 06:00	Units all within containment lines. Active burning continues in unit 2 overnight with flanking fire		
North	10/5 10:44	Good burning conditions along ridgetop in Unit 2		
North	10/5 16:00	Ignitions in Unit 2 90% complete		
North	10/5 18:00	All ignition operations complete for the day. In Unit 1 and 2. Unit 2 is complete		

DATE:	10/6	Ignition Unit 4 and small area of Unit 5		
SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/06/2016 06:19:50	B Boss	CLH	Fire is looking good and holding /// going to do some clean-up work and maybe not put up so much smoke// going to try for 20 acres on Unit 4
WildCAD	10/06/2016 08:58:34	RX Boss(T)	LP	getting resources in place at this time, will begin firing & cleaning up some pockets on Unit 1 & Unit 2 // copy
WildCAD	10/06/2016 11:32:54	BB-t	RC	Starting test fire in Unit 4
WildCAD	10/06/2016 11:39:37	BB-t	RC	Test fire successful continuing burn ops
WildCAD	10/06/2016 12:39:51	RX Boss(T)	LP	ops normal, everything looking good, black line around Unit 4, shortly we will begin interior ignitions // copy
WildCAD	10/06/2016 13:31:33	RX Boss	LP	just about done with unit 4 ops normal & will adv further shortly
WildCAD	10/06/2016 14:01:56	RX Boss(T)	LP	just about done with Unit 4, looking good, will be holding crews on 4 to do patrolling & will advise further in about an hour
WildCAD	10/06/2016 14:54:47	RX Boss(T)	LP	done with ignitions Unit 4, beginning on Unit 5 3-4 acres & will update later
WildCAD	10/06/2016 17:04:31	RX Boss(T)	LP	update halting ignitions at this time & keeping resources on the line to monitor // 15 ac completed on unit 4 & 3 acres on Unit 5

DATE:	10/7	Ignition west side of Unit 1, Last day of ignitions		
SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/07/2016 06:07:38	B Boss	CLH	Fire is looking good and holding // Ops Normal// will be working on Unit 1 today.
WildCAD	10/07/2016 08:44:18	RX Boss(T)	LP	update: will have resources patrolling & securing any heat, looking at burning Unit 1 today & approx ignition @1100 / copy also advd of email from Air Qual, fwd to PIO? / affirm send to PIO & SO // copy
WildCAD	10/07/2016 10:01:55	DV51	LP	advd finishing up Unit 5 tomorrow and everyone will be off hill approx 1900, no need for nightshift after tonight, patrolling every day until further notice / copy
WildCAD	10/07/2016 11:57:08	BB-t	RC	Initiating test fire on unit 1
WildCAD	10/07/2016 12:10:45	BB	RC	Hold off on test fire,
WildCAD	10/07/2016 12:28:56	RX Boss(T)	LP	beginning another test fire & will advise further in a few
WildCAD	10/07/2016 12:39:04	BB-t	RC	Beginning firing ops on unit 1
WildCAD	10/07/2016 15:08:04	RX Boss(T)	LP	everything looking good, looking to be finished with this unit in the next hour, will give you an update
WildCAD	10/07/2016 15:43:21	RX Boss(T)	LP	advd backing some spots, done igniting for the day, keeping resources on line to monitor and will update after a while
WildCAD	10/07/2016 15:51:40	RX Boss(T)	LP	advd 60 acres today and advd no ignitions for tomorrow / copy
	10/7 Briefing	Quick patrols of all units, walk the line		

	10/7 Briefing	Unit patrol with truck
	10/7 Briefing	Other engines will patrol road and mop-up heavies with heat 50ft along road
	10/7 Briefing	Have all holding resources in Unit 1 and in place by 11:00
	10/7 Briefing	Unit 1 base all firing off of wind direction
	10/7 Briefing	Walk and get familiar with Unit
	10/7	Ignition west side of Unit 1, Last day of ignitions

DATE:

SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/07/2016 06:07:38	B Boss	CLH	Fire is looking good and holding // Ops Normal// will be working on Unit 1 today.
WildCAD	10/07/2016 08:44:18	RX Boss(T)	LP	update: will have resources patrolling & securing any heat, looking at burning Unit 1 today & approx ignition @1100 / copy also advd of email from Air Qual, fwd to PIO? / affirm send to PIO & SO // copy
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WildCAD	10/07/2016 11:57:08	BB-t	RC	Initiating test fire on unit 1
WildCAD	10/07/2016 12:10:45	BB	RC	Hold off on test fire,
WildCAD	10/07/2016 12:28:56	RX Boss(T)	LP	beginning another test fire & will advise further in a few
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	10/7 Briefing	Other engines will patrol road and mop-up heavies with heat 50ft along road		
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	10/7 Briefing	Unit 1 base all firing off of wind direction		

Carmichael	10/7 Briefing	Walk and get familiar with Unit

DATE:	10/8	Holding		
SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/08/2016 06:18:07	B Boss	CLH	Done a little walk around and everything is holding fine// order for the day is Mop-up.
WildCAD	10/08/2016 15:43:06	RX Boss(T)	LP	advd mop up going good and everything else doing fine in the Valley, planning on releasing resources around 1730 and heading back down to Eastlake
	10/8 Briefing	Holding minimum 50 ft mop-up focus on any smoke and heavies in all units with a focus on Units 1 and 2		
North	10/8 09:18	All resources on the line and beginning mop-up for 50 ft in all units		
North	10/8 11:20	Begin bucket work in Unit 2 with H405 to cool down some hotspots near the ridgetop and rocks		

DATE:	10/9	Holding, Most heat in Units 1-3		
SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/09/2016 08:04:59	RX Boss	LP	advd completed recon, all holding most heat in units 1-3 & trainee will be running ops today // copy // also show me returning to Eastlake // copy
WildCAD	10/09/2016 10:17:56	RX Boss(T)	LP	all resources briefed continue mop up around perimeter & will check back in a couple hours
WildCAD	10/09/2016 13:53:45	RX Boss(T)	LP	update: everything going good Units 5 & 4 are looking real secure and continuing mop up on 1-3, will update you in a while / copy
WildCAD	10/09/2016 18:31:04	CCSO	LP	Marge recd report of smoke in Washoe Valley // advd per burn boss (T) there is drift off of one of the units from RX but is secure // copy
	10/9 10:00 Briefing	Secure Unit 5, 4 and along road of Unit 2 and below Study area Unit 1		
	10/9 13:00	Mopped Unit 3		

DATE:	10/10	Holding, Interior Mop-up Units 1,2,3		
SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/10/2016 09:22:59	B Boss	CLH	All units looking good.// will be doing interior mop up on 1, 2 & 3.// all resources on scene
WildCAD	10/10/2016 17:18:58	B Boss	LB	everything secure, enroute back to eastlake with B5120
	10/10 09:30	Unit 5 no heat		
	10/10 09:30	Unit 4 secure around perimeter		
	10/10 09:30	Continue to secure and mop-up Unit 3		
	10/10 09:30	Mop-up below research area Unit 1		

DATE:	10/11	Holding		
SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/11/2016 10:16:19	BB-t	RC	Briefed and will continue mop-up 100ft interior
WildCAD	10/11/2016 12:52:54	BB	RKG	Everything is looking good continuing mop up will call back in a couple hours
	10/11	Tie in with ESC1 continue mop-up 100 ft interior Unit 1		
	10/11	Helitack mopped up Unit 3 and secured Unit 2 along ridge		
	10/11	B-5160 work along road of Unit 2 up through saddle 100 ft		
	10/11	Unit 1 little heat remaining by study area		

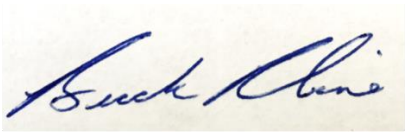
DATE:	10/12	Holding, Units 3,4,5 little to no heat, Units 1-2 Mop-up 100 ft in		
SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/12/2016 09:50:49	BB-t	RC	Burn is looking good units 3, 4 and 5 little to no heat, 2 and 1 units will continue to mop up 100ft in
	10/12	Crews on scene Helitack cold trailing Units 4,5,3		
	10/12	B-5120, 5160 working heat 100 ft in on Unit 1 and along road of Unit 2 100ft		
	10/12	Units 4,5 no interior heat		
	10/12	Unit 3 interior creeping in grass		
	10/12	Unit 1 and 2 mopped up 100 ft in		

DATE:	10/13	Holding, Several small smokes with heat pockets in all Units		
SOURCE	DATE/TIME	FROM	TO	DETAILS
WildCAD	10/13/2016 13:01:08	BB-t	RC	Everything looking good picking up several small smokes with heat pockets on all the units, BB and Trainee heading back to Eastlake, crews will be heading off the hill around 1500
North	10/13 08:45	Minor smokes near road in Unit 2 and one smoke 50 ft from south boundary in Unit 1. Mop-up began and on-going throughout today. A patrol of Unit 2 will occur as well		
North	10/13 13:01	Some mop-up continuing, Unit 2 patrolled, looks good. Crew mopped up a few smokes. Crew directed to be off the hill by 15:00 headed into Eastlake		

Signatures

Team Leads

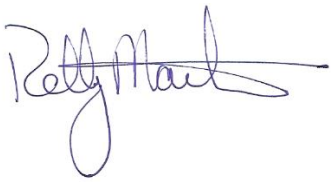
Bob Houseman, Incident Commander, USFS, F&AM, NIMO



Buck Kline, Assistant District Manager, Satilla District, Georgia Forestry Commission

Keith Mousel, Withlacoochee Forestry Center Manager, Florida Forest Service

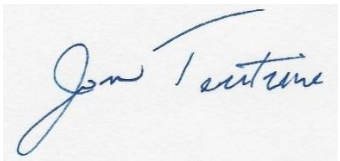
Mike Melton, State of Utah, Southwest Region Fire Management Officer-Fire Investigator



Kelly Martin, Chief of Fire & Aviation, Yosemite National Park

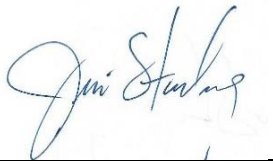
Rob Beery, GIS, Fire Behavior Analyst

Terri Knauth, Safety Officer, USFS, F&AM, NIMO



Jon Teutrine, Operations Section Chief, USFS, F&AM, NIMO

Mark Regan, Assistant Fire Marshal, Battalion Chief, Public Information Officer, North Lake Tahoe Fire Protection District



James Starling, Logistics Chief, USFS, F&AM, NIMO

Paul Keller, Writer Editor, Wildland Fire Lessons Learned Center