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Pacific Southwest Region

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Cottonwood Prescribed Burn Escape
Facilitated Learning Analysis

Review requested by:
Pacific Southwest Region – Region 5
Regional Forester

Front cover photo: Timeline of Cottonwood Rx Escape and Initial Attack Gear, Cleveland National Forest, Palomar Ranger District.

The Facilitated Learning Analysis Team commends the Fire staff of the Cleveland National Forest for their professionalism and candor while participating in this review and analysis. The team greatly appreciate the efforts of the members of the Forest and District staffs for handling the logistics and GIS support for the FLA.

FACILITATED LEARNING ANALYSIS TEAM

Duane Nelson, Eldorado National Forest
Brenda Wilmore, Region 2
Heather McRae, Shasta-Trinity National Forest
Wayne Nomi, Law Enforcement & Investigations, Region 5
Laura Mayer, Region 6

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Table of Contents

Introduction -- Background

On a spring day, on the flanks of Palomar Mountain in southern California, a Forest Service team ignited a broadcast burn in cut and piled brush, and surface fuels within the Cottonwood Fuelbreak located on the Palomar Ranger District (District) of the Cleveland National Forest (Forest). Light winds blew across the fireline and carried flying embers into the surrounding old-growth chaparral, landed in dry tinder, and sprang into a spot fire located outside the project boundary. Fast acting crews quickly contained the spot fire. More wind-borne embers found highly flammable rat's nests and piles of shredded bark among the brush, bursting into another spot fire, which was again successfully contained by diligent fire crews. But a third spot fire located in the thick 10-foot tall brush grew too quickly for the scrambling fire crews. Embers from that spot fire flew further into the surrounding thick brush, starting their own fires that spread quickly, and torching out the canopies of the tall chaparral. A dark column of smoke built steadily above the firefighters.

The Burn Boss saw the building column of smoke outside the fire line and heard the radio chatter from the crews chasing the spot fires. He ordered the lighting crews to stop the prescribed lighting and assist with holding the containment lines. He thought chances were good that the spot fires outside the planned burn perimeter could be fully contained, but he also saw that conditions were reaching a tipping point. He placed an order through Dispatch for helicopters to drop water on hot spots but was told that they were many minutes away. He considered the vast rugged hillside of highly flammable chaparral that was threatened by the growing spot fires. He ordered more hand crews and engines. He then called the District Fire Management Officer (DFMO) who was watching the events from a distant vantage point. They discussed fire suppression tactics, resource orders, contingency plans, and concerns about the difficult terrain and heavy fuels that were ahead of the growing spot fires. They agreed that if conditions continued to worsen, they may need to order air tankers. They considered whether they should declare the incident a wildfire.

"I was comfortable one moment, but very quickly became uncomfortable…" -- Burn Boss/IC

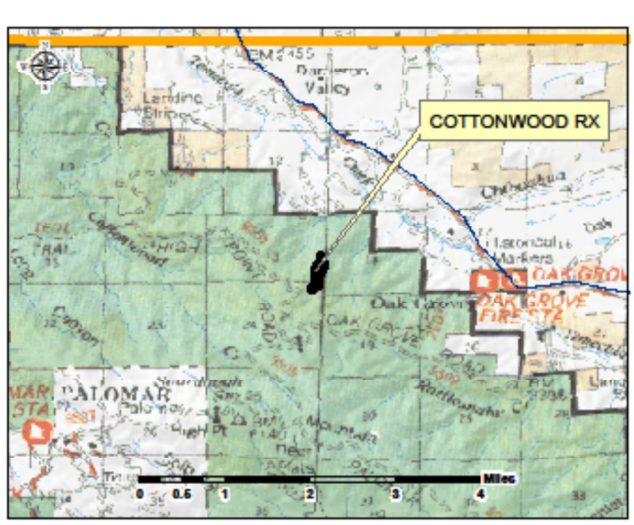
"When we first made plans, the fire looked different." -- Burn Boss/IC

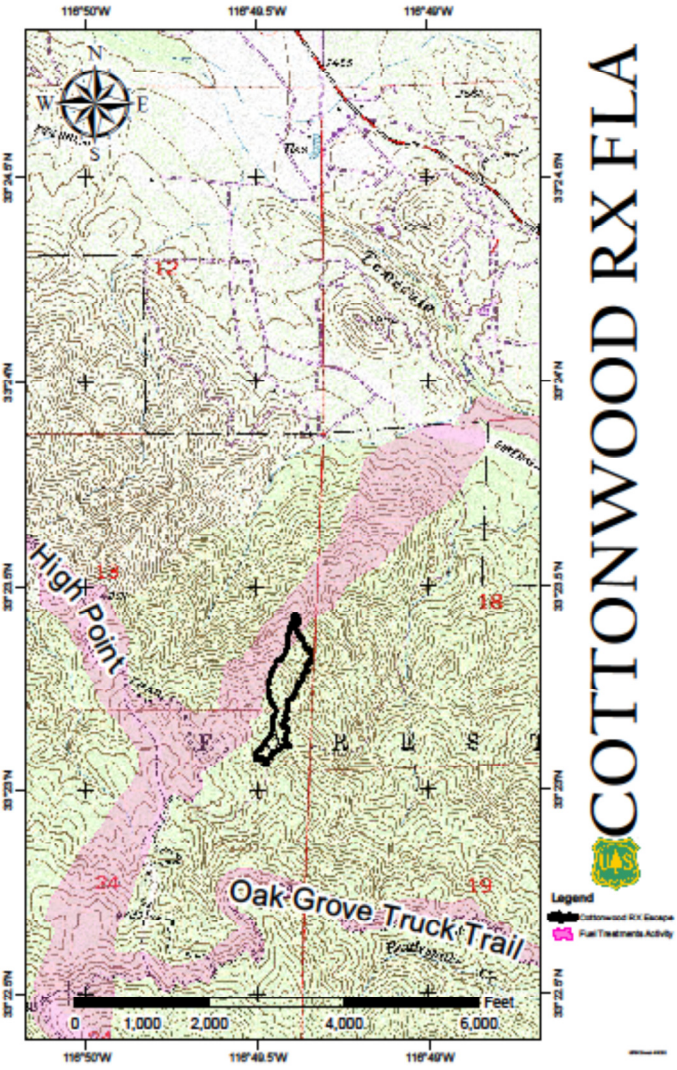
Three and one half hours after igniting a successful test burn, the Burn Boss declared the Cottonwood Prescribed Burn to be a wildfire and assumed his new role as Incident Commander (IC).

Helicopters, hand crews, and engines arrived on the scene. Helicopter water bucket drops knocked the heat out of the flaming front and hot spot fires. Within three hours of

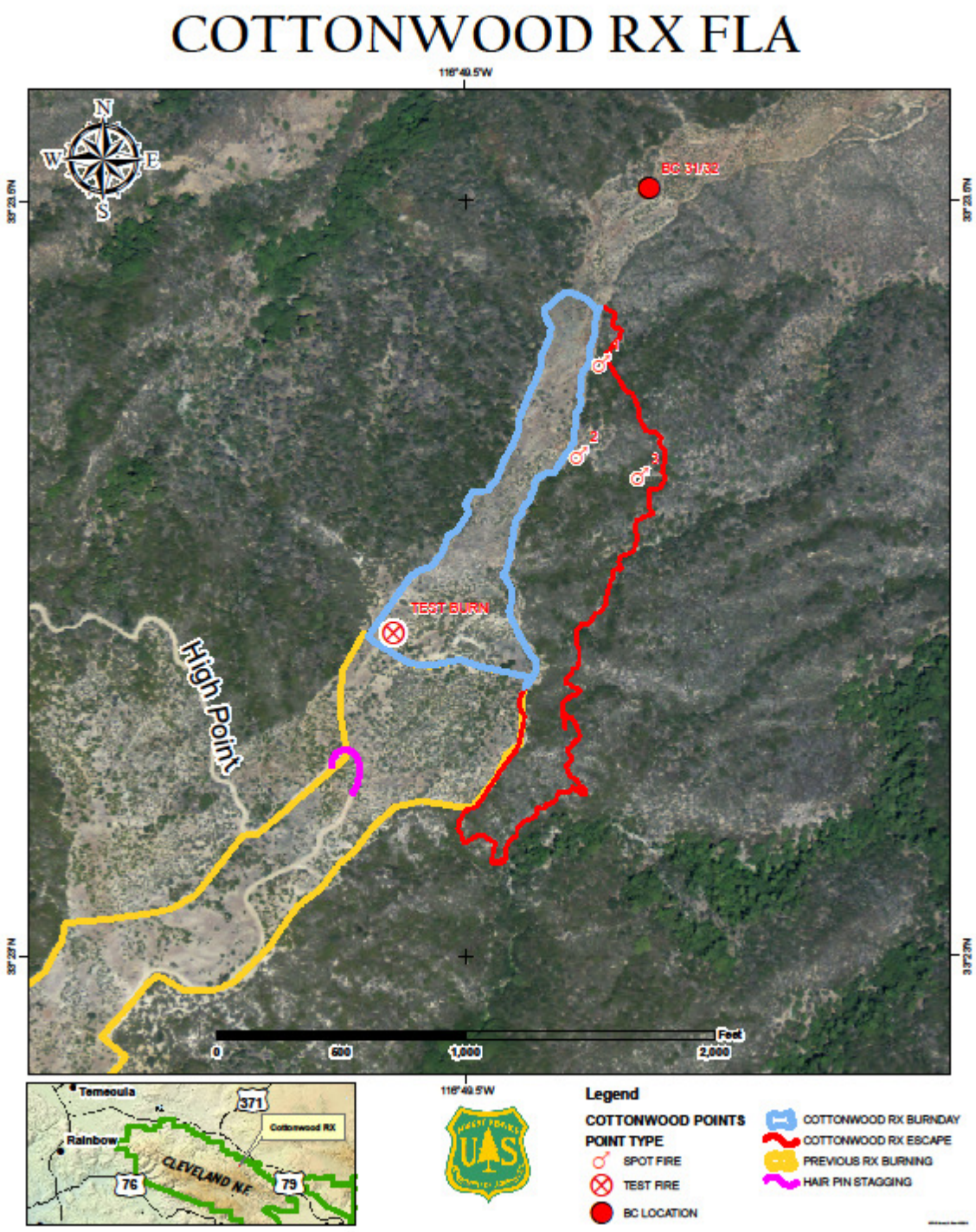
being declared a wildfire, the column from the Cottonwood wildfire was knocked down, and robbed of most of its heat by the air assault. Hand crews built containment lines and hose lays were extended from engines to the perimeter of the wildfire. At 1630 hours, the IC was comfortable enough with the current wildfire conditions that he released the helicopters back to their bases. As the sun set over Palomar Mountain, fire crews completed the containment lines and prepared for a night of patrol, mop-up, and reinforcing the hastily cut fire containment lines while the fire overhead managers started making a plan for the next day.

Vicinity Map





Incident Map



What Was Planned

On April 3, 2012, the Palomar Ranger District (District) planned to burn a 40-acre section of the Cottonwood Fuelbreak, a fuelbreak that had been established in the 1970's. Periodic prescribed broadcast burns have been used to maintain the fuelbreak over the last 40 years. The objective of the burn on April 3 was to complete burning on the Cottonwood section of the fuelbreak. The crew started the ignition adjacent to an area that had been burned a few weeks earlier. The plan was to carry fire down the fuelbreak's ridgeline to the valley floor. A flat spot about ¼ of the way down the ridge had been identified as a trigger point. Upon reaching this point, the burn boss would evaluate whether ignition should continue to the valley floor.

This project was a considered a moderate-complexity burn. The Burn Boss had been on the Forest less than a year, and this was the second prescribed burn he had conducted on this District. The Firing Boss and Holding Boss had previous experience burning on this project. One of the Assistant District FMO's was on the burn to provide local information to the Burn Boss who was still considered new to the Forest.

Brush had been cut within the fuelbreak about two-years ago, and was stacked into loose piles. Hand line was in place on both sides of the fuelbreak. All fuels, including the piles, were ignited using strip firing techniques. Due to the distance from the roads and elevation gradients, hose lays were not put in place because of the high probability of the hoses breaking due to high head pressures. Not "plumbing a unit" that is considered distant from roads was a common practice on the District when burning remote sections of the fuelbreak system.

What Happened

A briefing was done for all burn personnel. A test fire was conducted while the Holding Boss and Firing Boss observed the fire behavior. When the Holding and Firing Bosses were comfortable with the test fire, the Burn Boss was informed that results were good and requested permission to begin general ignition. The Burn Boss agreed to the ignition. Ignitions continued at a speed that was comfortable for both firing and holding operations. Around 1130 hours, a spot fire was located outside the hand line. At this time, weather conditions were within the Burn Plan prescription. Ignition was stopped and personnel were sent to contain the spot fire.

The Cottonwood prescribed burn from the community of Oak Grove along CA 79 at the time the escape was declared.

Two additional spot fires were then located. The Burn Boss contacted the District FMO to discuss the situation. The Burn Boss placed an order for helicopters through Dispatch and was informed there would be a delayed response time. The Forest FMO then contacted the Southern California Geographic Area Coordination Center (South Ops) to discuss the aircraft order. Following observations of fire behavior, discussions with District and Forest fire overhead managers, and also considering the response time of air resources, the Burn Boss decided to declare the Cottonwood Prescribed Burn a wildfire. The Forest FMO again contacted South Ops.

"Every time we light on this project we have some spot fires. It's common and part of the job." -- District FMO

The Burn Boss assumed the IC position on the wildfire. The Holding Boss became a Division Supervisor on the wildfire and the Firing Boss returned to work with his crew. Additional helicopters were ordered along with six hand crews and two strike teams of Type 3 engines.

A Law Enforcement Officer (LEO) overheard radio conversations from the prescribed Burn Boss ordering aircraft resources and consulted with the Forest's Special

Agent. The Forest Special Agent learned from the ECC (Dispatch) that the prescribed burn had been converted to a wildfire. ECC Dispatch concluded that a Wildland Fire Investigator was not necessary, since the wildfire cause appeared obvious. However, the Forest Special Agent, based on Forest Service policies, determined that a Fire Investigator was in fact needed, partly due to previous illegal activity in the prescribed burn area. Two LEO's, one of them being a qualified Wildland Fire Investigator, responded to the Incident Command Post (ICP). While driving to the ICP, the two LEO's communicated with, and met, the Assistant Forest FMO. A third LEO, also a qualified Wildland Fire Investigator, returned to duty status from a day-off, and responded to the incident. At approximately 1930 hours, the three LEO's met with the IC at the hairpin turn (staging area) and started to coordinate the fire "origin and cause" investigation. The LEO's requested witness statements from the IC and two other witnesses, both who were nearing conclusion of working on the wildfire. The IC made arrangements with the two other witnesses to provide statements at the hairpin staging area, when they came off the fire line and after they concluded their fire control activities. All three witnesses provided their written statements later that evening. The next day, one LEO attended the morning operational briefing and proceeded to the area of the fire "origin" to conduct a forensic examination. The LEO photographed the undisturbed portions of the "origin" and released that area for mop-up by hand crews on the containment line. The LEO's were also present to provide law enforcement support due to current and historic Marijuana cultivation activities in that area.

Chronology of Events

Date & Time	Event
4/17/2009	Burn Plan signed by the Cleveland National Forest Supervisor.
10/21/2011	Agency Administrator Pre-Ignition Approval Check signed by the Forest Supervisor. Approval expires on 10/21/2012.
4/2/2012	
1544	Spot Weather Forecast for Cottonwood Prescribed Burn project requested.
4/3/2012	
0517	Spot Weather Forecast for Cottonwood Prescribed Burn project completed.
0900– 0915	On-site Briefing conducted on the road.
0955	Test Fire Ignition observed and determined to be successful, Started lighting.
1115	Wind shift to westerly flow.
1130	Burn progressing well. Burn Boss and DFMO discuss taking prescribed fire down the hill further.
1130	Spot Fire 1 detected.
1135	Burn Boss and Forest FMO discuss status of fire and helicopters availability to support holding operations by phone.
1200	Spot fire 2 detected.
1230	Burn Boss placed order for helicopters.
1230	Forest FMO calls Duty Officer at South Ops to discuss ongoing burn status.
1245	Crews started pulling hose to a 3rd Spot Fire.
1253	Burn Boss requests another helicopter.
1305	Burn Boss feels there are enough resources on scene, needs helicopters to knock down the heat so containment line can be completed.
1330	Burn Boss, DFMO, and FFMO considering air tankers (via phone conversations).
1335	Discussions continued between Burn Boss, DFMO, and FFMO about additional helicopters, number of resources ordered, financial cost, values-at-risk, and wildfire conversion.
1343	**Burn Boss declared Prescribed Burn an Escaped Wildfire.**
1345	FFMO notifies Forest Supervisor and South Ops of conversion to wildfire and leaves message for Assistant Regional Fire Staff.
1348	Two more helicopters ordered.
1430	Forest Supervisor notifies Regional Forester of conversion to wildfire during a scheduled video conference.
1530	Regional Fire Director calls FFMO for update on escape and notification process.
1550	Cal Fire e-mail released with info of an escaped control burn, gets wide distribution.
1600	Fire intensity knocked down by aerial assault.
1630	All aircraft released.
1930	3 LEO's arrive on scene.
2140	Started releasing engines and hand crews.
4/4/2012	
1159	Final fire size outside burn unit mapped at 14.2 acres.
1630	Released all resources.
1800	Cottonwood Fire contained and controlled.
4/11/2012	Cottonwood Fire declared out.

Lessons Learned

I. Rational for Converting the Prescribed Burn to a Wildland Fire

When the third spot fire began to outpace the holding crews, the Burn Boss and the District Fire Management Officer (DFMO) discussed ordering aerial resources to contain the spot fire. Although there was concern about costs depleting limited hazardous fuels project funds, they agreed that helicopters were needed quickly and that air tankers may be needed if the fire continued to spread unabated. When the Burn Boss and DFMO concurred that the escape may outstrip the ability to control with the resources on-scene, the decision was made to declare an escape. A concern was later raised that the prescribed burn had been converted to a wildfire to preserve Hazardous Fuels funding on the Forest.

In reality, the discussion of funding was a secondary consideration as the Burn Plan has very specific wording to identify when a prescribed burn will be converted to a wildfire.

"The burn will be declared an escape by the Burn Boss if the fire becomes uncontrolled. Uncontrolled is defined by the fire spreading outside of the project boundary and it cannot be controlled quickly by the resources at the scene and contingency resources, and if control will take additional resources and time commitment to achieve control. The burn will also be declared an escape if the fire remains in the project area but burns too hot and exceeds the burn prescription, and it cannot be controlled without additional resources and time commitment." From Prescribed Fire Plan, Palomar Fuelbreaks.

"The language in the Interagency Guide about conversion to a wildfire is clear…but it's murky" -- Forest FMO

Lesson Learned:

a. The Burn Boss needs to have a good understanding of the Contingency and Wildfire Conversion elements in the Burn Plan to know the boundaries of his or her decision space.

b. There should be open communication between the Forest and Regional Office Fuels Management staff about funding issues when it is anticipated that a prescribed burn may exceed planned costs.

II. Notification Process from the Field to the Regional Office

The Palomar Fuelbreak Burn Plan has specific notification direction for informing the Regional Office of a Wildfire Conversion. However, it does not clearly identify who is responsible for upward reporting.

> *"The Regional Office, Fuels Specialist, Operations will be notified within 24 hours of any declared wildland fire resulting from a prescribed fire." -- Prescribed Fire Plan, Palomar Fuelbreaks*

In an era of e-mail, Twitter and smart-phones, informal notices of the burn escape were quickly distributed among the fire service personnel and other fire agencies. Due to the rapid transmission of the informal messages, the Regional Forester was informed of the wildfire conversion before the Regional Fuels Specialist or Fuels Operations Assistant Director ahead of the formal channels of notification.

Lesson Learned:

a. If the Regional Office expectation is for 'real time' notification or something less than 24 hours, the RO needs to provide that direction to the forests.

b. The Forest should clarify the notification process in the burn plan including who is responsible for upward reporting, the time frame expectation and appropriate communication chain.

III. Communication between LE&I, Fire Management and Dispatch (ECC)

> *"You can't easily mitigate psychology by policy…" – Forest Fuels Officer*

The ECC did not initially dispatch Law Enforcement and Investigations (LE&I) to the incident when it was converted to a wildfire, because of their assumption that the cause of the fire was already known. LEO's responded to the wildfire, and arrived at 1930 hours. On the way to the staging area, the LEO's communicated with Fire Management staff, but not the IC**,** about access routes, despite narrow one-way roads that could have resulted in traffic congestion or accidents. The IC also had a perceived lack of clarity when the LEO's arrived on-scene about checking in with the IC. Some fire personnel were concerned and puzzled by the need to fill-out witness statements that evening while suppression actions were still being taken. When fire personnel were interviewed and/or asked to provide statements, on the fire line, it created anxiety among the witnesses. There was also concern about the possibility the Cottonwood Incident was getting special attention due to it being an escaped prescribed burn.

Lessons Learned:

a. The ECC should notify LE&I about escaped burns, as well as wildfire initial attacks. Forest Service directives (FSH 5309.11-20) mandate the notification of LE&I for all fires occurring on or threatening National Forest System (NFS) lands and that all wildland fires occurring on or affecting NFS lands be investigated (FSH 5109.18-50). To assure smooth communications during initial attack, the ECC and

LE&I need to formalize and implement standardized notification procedures so that all required investigations and incident support can occur. LE&I and/or other qualified Wildland Fire Investigators should be included on the initial dispatch for all wildland fires occurring on or affecting NFS lands.

b. LE&I needs to communicate with the IC prior to arrival and check-in upon arrival. The IC should be notified by all responding LE&I resources while en-route to the incident to be able to coordinate travel routes, pre-arrival special instructions, and to ensure that the IC and/or Operations Section Chief (OSC) incorporates LE&I into the list of resources on the incident. Once on-scene, LE&I should formally check-in, and establish primary points of contact for Incident Law Enforcement Support Operations and Fire Investigation Operations. Through effective coordination with the IC, more efficient LE&I operations can be achieved and integrated into overall suppression efforts.

On a fire, LE&I normally fulfills two main missions: (1) Incident Law Enforcement Support Operations, and (2) Fire Investigation Operations. Depending on the available LE&I resources, these two missions may be managed by a single person or divided among several officers. When the missions are divided, the Incident Law Enforcement Support Operations normally remain under the Incident Command Structure (ICS) organization, while the Fire Investigation Operations transitions to a cooperating entity, vs. a participating entity.

c. Fire Management staff and LE&I should pre-plan and share information, at least annually, to reduce apprehension and build working relationships. High reliability organizations typically employ frequent and regular coordination meetings and have well-established relationships. Fire organizations frequently pre-plan, train, and "game" specific scenarios to improve their performance. Inclusion of LE&I resources into operational planning would contribute to smoother integration of law enforcement at the incident and better support for Fire Investigation Operations.

"Operating in a vacuum between Fire, Fuels, and LE&I is no longer an option…" – Forest Supervisor

Fire Management staff and LE&I should hold pre-season meetings to discuss functions, roles, and build relationships. Although these types of discussions appear to have occurred at the higher chief officer levels, the information may not have necessarily filtered down to the level of responding units. Education and information shared at fire operations meetings, incident briefings, and staff meetings can prove to be ideal forums for these types of discussions, interactions, and outreach. Suggested topics include Personal Protection Equipment (PPE)

requirements, response protocols, and support of the fire investigation by the incident response ICS organization.

IV. Prescribed Burn Planning and Implementation

Interviews and informal discussions triggered several “ah ha” comments from the Facilitated Learning Analysis (FLA) participants. The lessons identified by the District will help strengthen relationships between the Fire Management staff and Forest leadership, and boost potential risk-awareness when planning and implementing prescribed burn operations.

“Becoming aware of what I don’t know makes me want to learn more.” -- Acting DR

Lessons Learned:

a. Too many competing priorities can prevent us from recognizing and managing the risk of low probability, high consequence outcomes and putting undue reliance on, “doing what has always worked before”.

b. Burn overhead personnel (Burn Boss, Fire Boss, and Holding Boss) should walk the burn unit as a group, noting any potential trouble spots in advance of ignition while discussing how to resolve them.

c. The District Ranger (and Acting District Ranger)should have clear delegation that outlines and details that position's roles and responsibilities for prescribed burns, and wildfires.

Recommendations

I. Agency Administrator -- District Rangers hosting prescribed burn projects should to be more involved in the burn plan development and project implementation.

- Insert a concurrence signature line on the burn plan for the District Ranger. The Palomar Ranger District Fuelbreak System burn plan notification reads as follows; "the burn boss will contact the District Ranger and/or DFMO face-to-face 1-3 days before burning." This should be strengthened to ensure that the District Ranger is notified in advance and concurs with the operation.

- The approving Agency Administrator should have a discussion with the burn plan preparer -- particularly about the Complexity Analysis to understand the risks inherent with the project and what mitigation measures have been taken to reduce any risks.

II. Burn Plan -- Critically review older burn plans to see if they adequately reflect current conditions. Modify and update them to meet specific needs.

- Determine whether current fuels conditions are accounted for (e.g., unburned piles in the unit).

- District Fire Management staff or the Burn Boss should consider reviewing the burn plan at least annually with the approving Agency Administrator.

- The Burn Management organization should thoroughly review the burn plan prior to implementation to understand what the burn plan requires and to understand the decision space provided within the burn plan. Consider conducting a sand table or Google Earth scenario if an on-site visit is not feasible.

- The burn plan for the Palomar RD Fuelbreak includes five distinct segments for a total of 2,029 acres. Critical holding points and/or contingency details could be better defined if the units were addressed individually in specific elements of the burn plan.

- A Burn Boss check-list can be a useful tool for 'dotting the i's and crossing the t's' throughout project implementation (i.e., have all pre-burn considerations been met, is the smoke permit current, have the proper notifications been made, etc.).

- Take an objective look at all burn plans through periodic third-party (off-Forest or off-District) reviews.

- If an Incident Action Plan is prepared for a prescribed burn, ensure consistency with the burn plan.

III. Increase the Number of Qualified Wildland Fire Investigators on the Forest and improve the coordination between LEO's and Fire Prevention Technicians.

On an average year, the Cleveland National Forest (NF) responds to 500 initial attack fires per year, of which about 90 of them were stat fires. By policy, each one requires an origin and cause investigation. Forest Fire Management staff estimates that less than 50% of these fires are investigated. At present, the Forest has seven qualified Wildland Fire Investigators, of which all are from LE&I. In many other National Forests, Fire Prevention Technicians serve as first-line Wildland Fire Investigators on a vast majority of fires occurring on or affecting NFS lands. This same concept can be adopted by the Cleveland NF to expand its wildland fire investigations expertise.

- The cadre of Wildland Fire Investigators should be expanded to strive for a 100% investigation of the Forest's wildland fires due to the limited number of on-Forest, qualified Wildland Fire Investigators.

Secondarily, LE&I strives to get all of its personnel Wildland Fire Investigator qualified, but the limited number of seats in FI-210 classes currently impedes this objective from occurring.

- The Region should consider increasing the number and frequency of FI-210 classes.

IV. Fuelbreak Network and Maintenance -- The Cleveland NF should reassess whether the fuelbreak network serves a credible strategic function and assess whether its current maintenance methods are optimal.

> *"Prescribed burning in chaparral is like trying to burn a cup of gasoline in an ocean of gasoline." -- District FMO*

Though it was outside the scope of the FLA review, there was discussion in the field about whether the fuelbreak network, particularly the fuelbreaks on secondary ridges, provides a cost-effective strategic or tactical purpose. It was also noted that maintaining these fuelbreaks with prescribed burning does come with significant risk of escape, despite the skillfulness of the practitioners.

- The Forest should consider analyzing the fuelbreak system to assess its effectiveness on a landscape scale. Alternative maintenance methods should also be considered that reduce the risks, when fire is part of the treatment (e.g., burning hand-piled brush under wet conditions).

- The Forest should also consider the feasibility of utilizing non-fire treatments, such as grazing with goats, or herbicide vegetation control.

Appendix A

FSM 5140: ESCAPED PRESCRIBED FIRE REVIEW ELEMENTS

The FLA team found the fire personnel at the District and Forest level to be professional, experienced and knowledgeable of the burn area site and the local conditions (social and environmental). The Complexity Analysis and the Prescribed Fire Burn Plan were well written and met or exceeded the 2008 Interagency Prescribed Fire Planning and Implementation Procedures Guide. The following seven elements address the FSH 5140 escaped prescribed fire review requirements:

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

- Local seasonal severity is tracked with monthly live fuel moisture sampling. The live fuel moisture in the chaparral fuels, although dry, was not outside of a normal range for the time of season when the burn was implemented.

- The District fire personnel have a good working-relationship with the weather service and concur that spot weather forecasts are usually fairly accurate. The Burn Boss was aware that the spot weather forecast called for the RH's to reach 15% on the day of the burn and that the burn prescription had a lower RH limit of 20%. Consequently, instructions that were given during the briefing included increasing the cycle for taking and reporting current weather conditions from 1-hour intervals to ½-hour intervals as the RH dropped into the 20's. The burn overhead team also had identified several places where the burn could be secured if ignition needed to be halted for any reason.

- Several of the overhead and local fire management personnel have burned this fuelbreak multiple times. They are very familiar with the fuels, and local terrain-weather interactions.

2. An analysis of the actions taken leading-up to the wildfire declaration for consistency with the Prescribed Fire Plan.

- The Burn Boss followed the direction for converting to a wildfire as outlined in the burn plan.

- The burn plan has very specific wording to identify when a prescribed burn will be converted to a wildfire. "The burn will be declared an escape by the Burn Boss if the fire becomes uncontrolled. Uncontrolled is defined by the fire

spreading outside of the project boundary and it cannot be controlled quickly by the resources at the scene and contingency resources and if control will take additional resources and time commitment achieve control. The burn will also be declared an escape if the fire remains in the project area but burns too hot and exceeds the burn prescription, and it cannot be controlled without additional resources and time commitment." While the direction in the burn plan is more limiting than current policy allows: "a prescribed fire must be declared a wildfire when the fire has spread outside the project boundary, or is likely to do so, and cannot be contained by the end of the next burn period", the potential for rapid rates-of-spread in the adjacent chaparral fuels and the narrowness of the Forest boundary surrounding the project area may not allow for a 24-hour response.

3. An analysis of the Prescribed Fire Plan for consistency with policy.

- The burn plan is consistent with current policy.

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

- The prescription and environmental elements are adequate and meet policy requirements. Because the burn plan and prescription were developed in 2008, a rigorous review could highlight some parameters that could be eliminated or revised to better address the fuels on site.

5. A review of the approving line officers qualifications, experience, and involvement.

- The Cleveland NF Forest Supervisor approved the burn plan; and the Agency Administrator Go/No-Go checklist meets FSM 5140 requirements.

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

- One member of the prescribed burn overhead was qualified for the position with the exception of lapsed RT-130 (Fire Line Refresher) training. That individual has the required training, completed task books, experience, and current Work Capacity Test for the position filled on the burn team. Lack of completion of RT-130 did not contribute to the escape.

- Another member of the burn team overhead was still identified as a "trainee" for the position in IQCS. That individual has a completed task book for the position but that specific information had not yet been entered into IQCS. This situation did not contribute to the escape.

- All other key personnel assigned to the prescribed burn were qualified for the positions they were performing.

7. A summary of causal agents contributing to the wildfire declaration.

- The potential for high intensity fire behavior and continued rapid growth in a decadent chaparral stand with few suppression options.

- The public's perception of an “escaped prescribed fire” in relation to recent prescribed fire related fatalities elsewhere in the country.

- Resources on-site included the required contingency resources identified in the Burn Plan. Ordering additional resources triggered the conversion to a wildfire per the Burn Plan.

- The Burn Boss and District Fire Management staff was also concerned about committing costly aerial resources to the rapidly spreading spot fire using the project's hazardous fuels funding.

(CJT: 5.1.2012)