Bald Mountain Wildland Fire

Firefighter Injury and Engine Burnover Incidents

Lessons Learned Review

July 11, 2019

Contents

Cover Photo: Photo taken by personnel on-scene during initial attack on the Bald Mountain Fire.

PURPOSE

The purpose of this Lessons Learned Review (LLR) is to document the sequence of events that occurred before, during, and after two separate incidents, a Bureau of Land Management (BLM) firefighter injury (Incident 1) and a local area fire department engine burnover (Incident 2), that occurred during initial attack on the Bald Mountain Fire.

The team was tasked with identifying the following:

- Facts of the events and developing a chronological narrative of the events;
- Underlying reasons for success or failures;
- What was learned and what should/could be done differently in the future; and
- Recommendations that would prevent future similar occurrences.

EXECUTIVE SUMMARY

Two incidents occurred during the initial attack response on June 20, 2019 for the Bald Mountain Fire, an injury to a BLM firefighter (Incident 1) and the burnover of a local fire department engine (Incident 2). While both incidents occurred on this fire, they were not related and were mutually exclusive of each other.

In **Incident 1**, while conducting mobile attack, a BLM firefighter was struck by the tire of a moving engine, impacting his foot and lower leg and pulling him to the ground, with the engine continuing to roll over his lower left leg. The resulting injury was non-life threatening, but resulted in a bone contusion and soft tissue damage, which lead to a medical recommendation of no-duty for two weeks.

Roughly 1 hour later, **Incident 2** occurred when an equipment malfunction related to water flow warranted the engine to stop and troubleshoot the malfunction. Both firefighters moved to the black side of the truck, during which time a spot fire ignited on the green side of the engine, rapidly spreading and impacting the engine. An attempt was made to move the engine to the black, but the crew was driven back by the fire. The two engine crewmembers utilized their escape route though the black to the Bald Mountain Road, approximately 20 yards away.

NARRATIVE

This narrative was developed directly from WildCAD dispatch transcripts or personnel testimony.

The lightning-caused Bald Mountain fire was discovered on June 20, 2019, at 1542, on state-owned land. The fire was located northwest of Fillmore, Utah. Ownership consisted of state and private lands. The fire area was composed of gentle sloping terrain (0 to 25 percent slope) associated with elevations ranging from 4,700 to 4,800 feet above mean sea level. The area is a mix of rangeland and agricultural fields, with associated ranches in the vicinity. Fuels in the fire area consisted of fine flashy fuels (short grass) and sagebrush. Live fuel moistures in the area were at or above normal for the season, with sagebrush ranging from 170 percent to 190 percent. Fine, flashy fuels (grasses) were dense in the fire area due to the wet winter and spring this year and were a mix of cured and near-cured at the time of the fire. The energy release component in the area was below the 50th percentile. At the time of the fire, a cold front and associated storm were passing through the area, producing erratic, gusty winds, and lightning. On-site weather observations were taken by the County Fire Warden at 1600 and 1820 hours, and are presented in the table below.

Time	Location	Temperature (ºF)	Relative Humidity (%)	Wind Speed (mph)
1600	Center-East of State section, off 2-track road	77	19	18 to 24, WSW Gusts 56
1820	Bald Mountain Road near engine burnover site	70	12	8 to 10, NW

Incident 1 (Injury): Local resources were dispatched for initial attack following report of the fire. The first two federal resources, a BLM Type 3 Engine (BLM Engine) and an USFS Type 4 Engine (USFS Engine), arrived on scene at 1604. The BLM Engine was staffed with 3 personnel: an Engine Captain (BLM Captain), a Firefighter 1 trainee (BLM Crewmember 1), and a Firefighter 2 (BLM Crewmember 2). Two additional BLM firefighters (BLM Chase 1 and BLM Chase 2), both Firefighter 2-qualified, arrived with the engine in a chase pickup. At 1621, the Incident Commander (IC), from the USFS, arrived on-scene; an IC trainee (IC(t)) was also designated, coming off the USFS Engine already on-scene.

The BLM Engine engaged in direct, mobile attack on the heel of the fire along with the USFS Engine. The USFS Engine went north, with the BLM Engine headed south. At this time, fire behavior was described as very active and being pushed by erratic, 30 mph winds. The BLM Engine was being driven by the BLM Engine Captain[1], with the two assigned engine crewmembers dismounted, working hoses in conjunction with the two additional BLM firefighters from the BLM chase truck. At some point, while attacking the west flank of the fire, BLM Crewmember 2, who was using the booster line on the front passenger side of the BLM engine, was not feeling good due to smoke and a previous illness, and switched out with BLM Crewmember 1. BLM Crewmember 1 transitioned out from the booster line to the 1.5 inch "shorty" hose to get better water volume due to observed fire behavior; he then began to use the 1.5 inch "shorty" hose to attack the fire. The BLM Captain stated that BLM Crewmember 1 was never more that 10 to 12 feet from the front right quarter panel of the engine and that his only visual contact with BLM Crewmember 1 was his hard hat. A short time later, there was a shift in the winds and the firefighters noticed that they were getting large amounts of smoke directly into their faces. At some point after this, BLM Crewmember 1, on the hose, got a face full of smoke which caused him to react by either stopping or moving unconsciously into the path of the moving BLM Engine (he could not recall his exact reaction). The BLM Captain stated that the engine was in gear and his foot was on the gas at this time. Immediately after this, the front passenger tire on the BLM Engine impacted BLM Crewmember 1's left foot and lower leg, causing him to be knocked to the ground. The BLM Captain stated that he saw the hard hat disappear and almost immediately heard a scream. He immediately took his foot off the accelerator and put the engine into reverse. The other three crewmembers (BLM Crewmember 2, BLM Chase 1, and BLM Chase 2), who were located to the outside, rear drivers side of the engine, came to the front of the engine, when they also heard the scream from BLM Crewmember 1. The injured firefighter, BLM Crewmember 1, was assisted with getting away from the engine and the IC was notified over the radio of the injury. At the same time, BLM Crewmember 2, an Emergency Medical Technician-Basic, did a limited patient assessment.

Incident 2 (Engine Burnover): The engine involved in the burnover incident, a local area fire department engine (Local Engine), arrived on-scene at 1730. The Local Engine was staffed by the Local Engine Captain and a local firefighter. They were given direction to tie in with the USFS Engine and work with them to hold a slop-over on the northwest flank of the fire. They engaged in suppression off of the Bald Mountain Road, on state land, working to the north toward a disk line located approximately 50 yards north of the Bald Mountain Road. They were performing mobile attack on the edge of the black,

[1] The BLM engine did not have an Engine Operator (ENOP) due to a vacancy in the position on this engine. This is a common theme with position vacancies within not just the BLM, but other Federal and State agencies, particularly within rural areas of the west such as Fillmore, Utah.

from the green side of the fire line due to tire hazards and residual heat from dense sagebrush stubs located in the black. The Local Engine encountered inadequate water volume and pressure from their hardline nozzle at approximately 20 yards north of the Bald Mountain Road. The Local Engine Captain stopped to assist the firefighter in switching to a one-inch attack line. While both were on the passenger side of the Local Engine, a spot fire crossed the Bald Mountain road and was quickly fanned by the high winds, driving the spot fire quickly toward the Local Engine. Within 30 seconds of getting out of the engine, the Local Engine Captain observed fire come under the engine, between him and the engine. At that point, the firefighter retreated through the black back to the Bald Mountain Road. The Local Engine Captain attempted to get into the engine from the passenger side and move it, but was forced out by fire. The Local Engine Captain then retreated through the black to the Bald Mountain Road, meeting up with the other firefighter who had already retreated.

The firefighter then contacted a personal friend who was on the USFS Engine, via cell phone, to request assistance with suppressing the Local Engine which was now on fire. The USFS Engine, along with additional engines from area local fire departments that were on scene, responded to the scene to suppress the Local Engine.

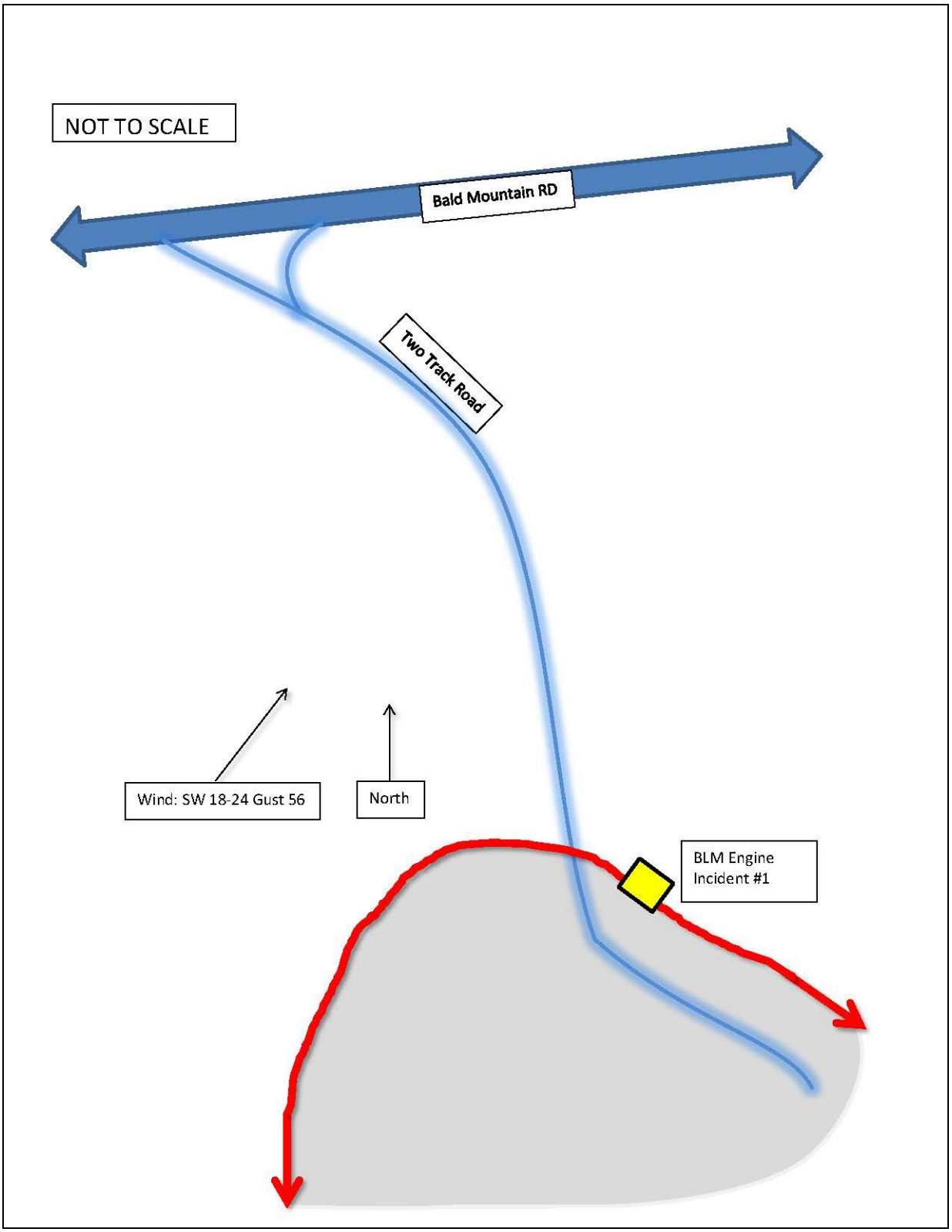
The Local Engine Captain received minor burn injuries to his face and was treated and released from a local medical facility.

TIMELINE – JUNE 20, 2019

- **1542:** Fire reported.
- **1545:** Initial attack resources dispatched.
- **1604:** First federal resources arrive on-scene, one BLM engine and one USFS engine (Unsure if any local area departments were on-scene at this time).
- **1619:** Fire estimated at 5 to 10 acres. Established IC and IC(t).
- **1621:** IC #1 arrives on scene. IC(t) also on scene.
- **1639:** IC #1 reports to Dispatch that firefighter had his foot run over by a heavy engine.
- **1642:** Dispatch notifies Fishlake National Forest FMO of firefighter injury. Dispatch Center Manager also notified.
- **1644:** IC(t) orders ambulance.
- **1645:** Dispatch notified Millard Public Safety Dispatch (PSD) and asked for an ambulance to respond.
- **1648:** Notified Great Basin Coordination Center on-duty dispatcher of injured firefighter, initially reported as USFS employee, later corrected that it was a BLM employee.
- **1651:** Dispatch asked IC(t) to confirm if employee was USFS or BLM. Confirmed BLM.
- **1653:** BLM West Desert District FMO informed of injured BLM firefighter.
- **1654:** BLM Fillmore FOS notified dispatch that he was aware of injury to BLM employee and would head to the hospital.
- **1701:** IC #1 arrived at hospital with injured firefighter; ambulance had been cancelled.
- **1704:** Dispatch contacted IC(t) to check on size-up. Nothing given.
- **1749:** IC #1 departed hospital, enroute back to fire. BLM Fillmore Field Manager arrived at hospital.
- **1756:** State Area Duty Officer reported a local area fire department engine was burned over. All firefighters ok. Dispatch Center Manager notified.
- **1758:** IC #1 returned to incident, tied in with IC #2.
- **1808:** Dispatch notified Great Basin Coordination Center on-call dispatcher of possible local area fire department engine burnover with no injuries.

- **1812:** Dispatch contacted State Area Duty Officer to get more information on the incident or jurisdiction. Cell coverage issue reported. State area duty officer reported he would call back and was unsure of fire ownership.
- **1819:** Dispatch notified BLM Fillmore FOS of potential engine burnover with unknown jurisdiction.
- **1839:** IC #1 reported to dispatch that injured BLM firefighter had no broken bones, but received a deep tissue injury.
- **1842:** IC(t) reported to dispatch that an engine burned. Stated wind picked up and embers got under truck. Reported that the engine was not drivable but did not know extent of the burn. Estimated wind gusts of 40 to 50 miles per hour.
- **1846:** Full size-up received by Dispatch from IC(t).
- **1847:** BLM Fillmore FOS gave Dispatch updated information and reported that BLM West Desert District FMO and BLM Fillmore Field Manager had been notified of the engine burnover.
- **1849:** BLM Fillmore FOS reported to dispatch that injured BLM firefighter had nothing broken, but had a deep tissue injury with potential 2 week or greater recovery.
- **1851:** Fire estimated at 50 acres.
- Dispatch notified State Line Officer of engine burnover.
- **1907:** Dispatch reported updated information on injured BLM firefighter and engine burnover to the Great Basin Coordination Center on-call dispatcher.

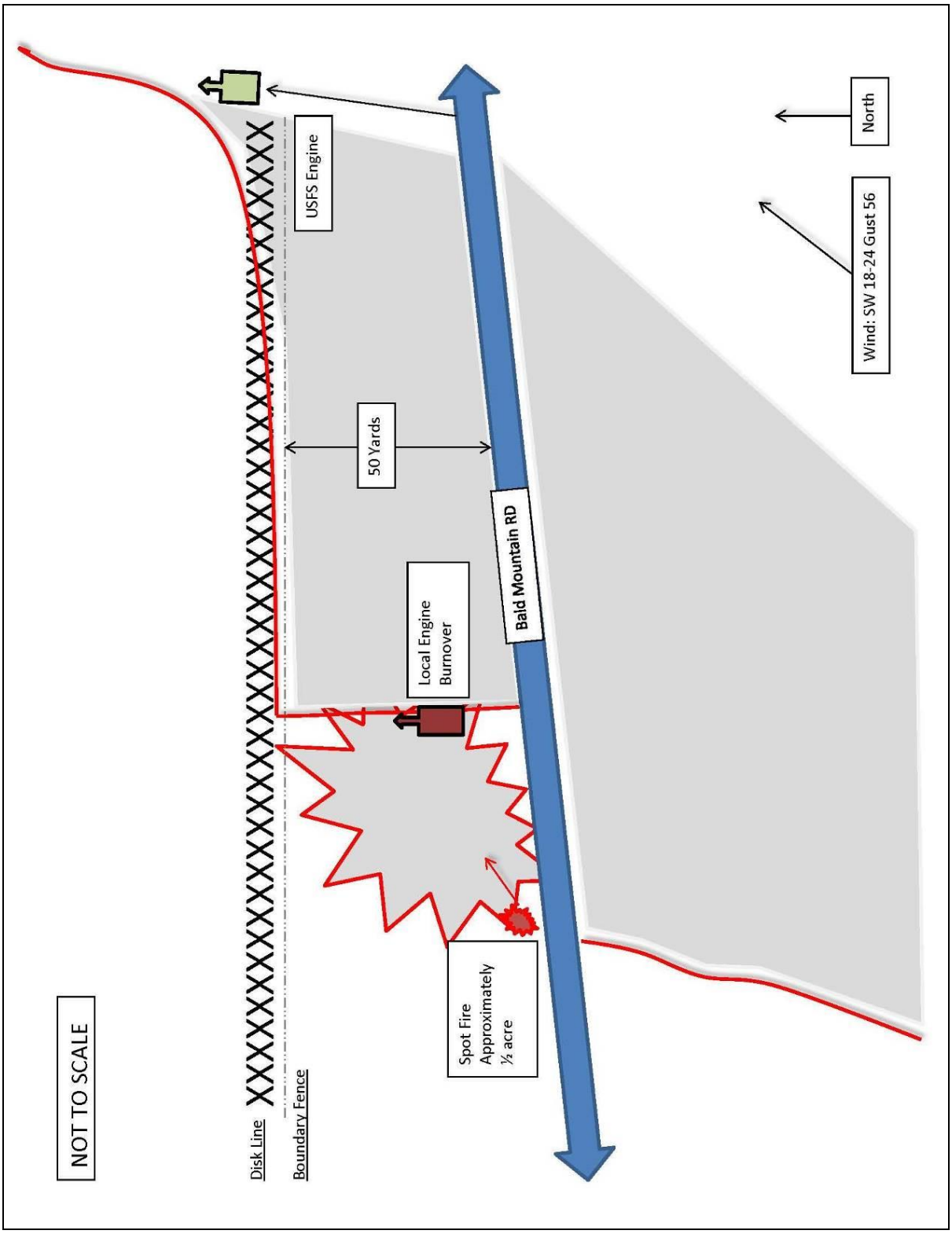
Post-fire view of section of fire, showing burned area and fine fuel loading.



Approximate sketch of Incident #1 (BLM Firefighter Injury).

Post-fire view of area where Incident #1 occurred.

Representative photo of mobile attack using an engine. Photo is not from this incident and is provided for reference purposes only.



Sketch depicting Incident 2 (engine burnover).

Picture taken from the location of where the local engine burned over. The person in the photo holding the pink flagging is located where the spot fire started.

View of Local Engine burnover site from Bald Mountain Road. Pink flagging depicts the escape route that the Local Engine crew took across the black to the Bald Mountain Road.

Local engine involved in burnover (Incident 2).

FINDINGS – INCIDENT 1 (FIREFIGHTER INJURY)

Contributing Finding

Finding 1-1

Personnel positioning during mobile attack operations.

Discussion: During mobile attack operations, due to the impacts of smoke on visibility, the BLM Crewmember 1 operated the hose too close to the BLM Engine. The BLM Captain did not maintain full view of BLM Crewmember 1 while he was operating the hose and the BLM Engine was in motion.

Recommendations: Firefighters, while engaged in mobile attack, should ensure that the engine operator can maintain full view (from top of the head to bottom of the boots) of personnel operating hoses/nozzles. Based on published BLM risk assessments, which state that a spotter should be used during mobile attack, when adequate staffing levels allow, a spotter should be utilized. Engine danger zones stickers (see below) should be made available to firefighters operating on engine to inform and remind them of danger areas where engine operator visibility of ground personnel is reduced. An image of this sticker can be found of the National Interagency Fire Center website[2].

[2] https://www.nifc.gov/training/EquipmentProgram/FireVehicleTraining/BL300/dangerzone_2014.jpg

Non-Contributing Finding

Finding 1-2

Medical response protocols and communication to dispatch.

Discussion: The Richfield Interagency Fire Center (RIFC) was notified of the injury by the IC at 1639, with no patient assessment or Medical Incident Report. At 1644, the IC(t) requested an ambulance and provided a very limited assessment on the injured firefighter to RIFC. He requested the ambulance to meet the IC and patient on Cedar Mountain Road. The plan was to meet the ambulance enroute to the hospital, using the BLM chase pickup to transport the injured. Due to delays with the ambulance, the IC and the injured BLM Crewmember 1 arrived at the hospital in Fillmore before the ambulance had left the hospital. At 1701, the IC reported to RIFC that the patient had arrived at the hospital.

According to the WildCad log and interviews with the Center Manager, a full patient assessment (Medical Incident Report) was not given to the Dispatch Center. There was no designation of an Incident within an Incident IC. Additionally, the original Incident (fire) IC transported the injured firefighter and communicated a transfer of overall command via cell phone to the new IC. Transfer of command was not communicated to the Dispatch Center.

Recommendations: When an Incident within and Incident (IWI) occurs, designate a separate IC for the IWI, follow Medical Incident Report guidelines, and communicate all information to directly to the Dispatch Center via the radio. Reliance on the use of cell phones over communication directly with the Dispatch Center via radio, should be minimized. Dispatch Centers are the "communication conduit" for all incident personnel.

Per the RIFC Manager: "*Communication via radio provides situational awareness for all incident personnel. Radio communication also provides information for more dispatchers to be "in the loop", which allows other dispatchers to engage and provide assistance to the IWI (notifications, medical response, etc.).*"

FINDINGS – INCIDENT 2 (ENGINE BURNOVER)

Contributing Finding

Finding 2-1

Equipment maintenance and readiness.

Discussion: When the Local Engine arrived on scene and began to work direct suppression on the fire line, the hose operator observed a lack of adequate water flow and pressure due to an equipment malfunction. Due to this, the decision was made to stop and switch hose lines. The Local Engine Captain and firefighter both went to the passenger side of the vehicle to switch hose lines, which resulted in an inability to see when the spot fire approached and impacted their engine.

Recommendations: Equipment checks should be performed prior to leaving the station and travelling to the incident, to ensure that crews arrive with equipment in working order.

Non-Contributing Findings

Finding 2-2

Radios left in the Local Engine while both crewmembers were outside the engine.

Discussion: Both the Local Engine Captain and crewmember did not take handheld radios with them, which were available in the engine, when they were working outside the engine. Due to the lack of radios, it effected their ability to contact other resources for assistance following the engine burnover and their escape through the black back to the Bald Mountain Road.

Recommendations: If handheld radios are available, they should be carried by firefighters when outside of vehicles.

Finding 2-3

Wearing and carrying PPE when on the ground.

Discussion: While it is not uncommon to dismount equipment and not take all PPE when working directly around their engines, the crew did not have all their PPE, specifically fire shelters, readily available when the burnover occurred.

Recommendations: Fire resources should not rely upon vehicles as safety zones. Resources should consider using a web belt to carry a fire shelter when performing engine operations and/or have fire shelters readily available on the exterior of the vehicle.

Finding 2-4

Communication during Incident Commander transition.

Discussion: The local engine burnover incident occurred during (or within approximately one-half hour of) the transition from the original IC to the final IC. The final IC (County Fire Warden) noted during interviews that there was some confusion/issues during the transition, as also noted above in Finding 1-2.

Recommendations: Ensure that transfer of command are communicated, via radio, to the Dispatch Center and all resources on-scene in a timely manner.

COMMON FINDINGS (ENTIRE INCIDENT)

Finding C-1

Fuel loading, weather, and potential for problematic fire behavior.

Discussion: The 2019 fire season has gotten off to a slow start due to the significant moisture and cooler temperatures that occurred throughout the winter and spring. However, this has led to a higher fine fuel load across the west, which was on its way to being available to burn. On this incident, the weather, specifically gusty, erratic winds, played a significant role in influencing fire behavior and the availability of fuels to burn. On both incidents, crews had to change tactics and switch hose types due to booster reels not providing adequate water volume to attack the fire.

Recommendations: When fire conditions do not represent what was anticipated based on current predictive forecasts, take time to gather accurate information on fire behavior and weather, and provide that information to all on-scene and incoming resources. Ensure that on-site weather and fire behavior observations are taken and recorded to inform decision making and tactics. Consider providing on-site weather observations to meteorologists at the National Weather Service and the Geographic Area Coordination Center to help build a data pool in areas where RAWS coverage is poor.

Finding C-2

Training, Qualifications, and Work-Rest Review

Discussion: Team reviewed applicable training records and work-rest documentation and found that all were up-to-date and within policy.

Recommendations: Continue maintaining good documentation of qualifications, training, and experience.

REVIEW PROCESS

A six-person Lessons Learned Review (LLR) team, consisting of representatives from the State of Utah Division of Forestry, Fire, and State Lands (FFSL), and the BLM, conducted the incident review. The review included an analysis of human, material, and environmental factors. The process included interviews, verification of documentation, a visit to the accident scene, site photography, and timeline review.

The review team consisted of the following individuals:

- Preston Ley (Team Lead), UT DNR FFSL, Acting Lone Peak Conservation Center Manager
- Randy Turrill (Subject Matter Expert), BLM Color County District, Fire Operations Specialist
- Nathan Barrons (Subject Matter Expert), UT DNR FFSL, Acting State Safety Coordinator
- Ryan Riddle (Subject Matter Expert), UT DNR FFSL, Fire Warden – Iron County
- Ron Rodrique (Subject Matter Expert), BLM Utah State Office, State Safety Manager
- Randy Kyes (Writer/Editor), BLM West Desert District, Fuels Planner

June 24, 2019: At 1100, the LLR team gather and revived an in-briefing at the Utah Department of Natural Resources headquarters from Edwin Roberson (State Director, BLM Utah) and Brian Cottam (Director, Utah State Division of Forestry, Fire and State Lands). Once the team lead received the signed Delegation of Authority, the LLR Team developed a plan for gathering information and scheduling interviews. Four members of the team split into two-person groups and travelled to Fillmore, Utah, to gather on the ground information and conduct interviews. The team lead and writer/editor remained in the Salt Lake City area, working remotely to gather additional information and prepare this report. Two members of the team visited the site of the local area fire department engine burnover and conducted interviews with the assistant fire chief and firefighter who were present during the incident. The other two

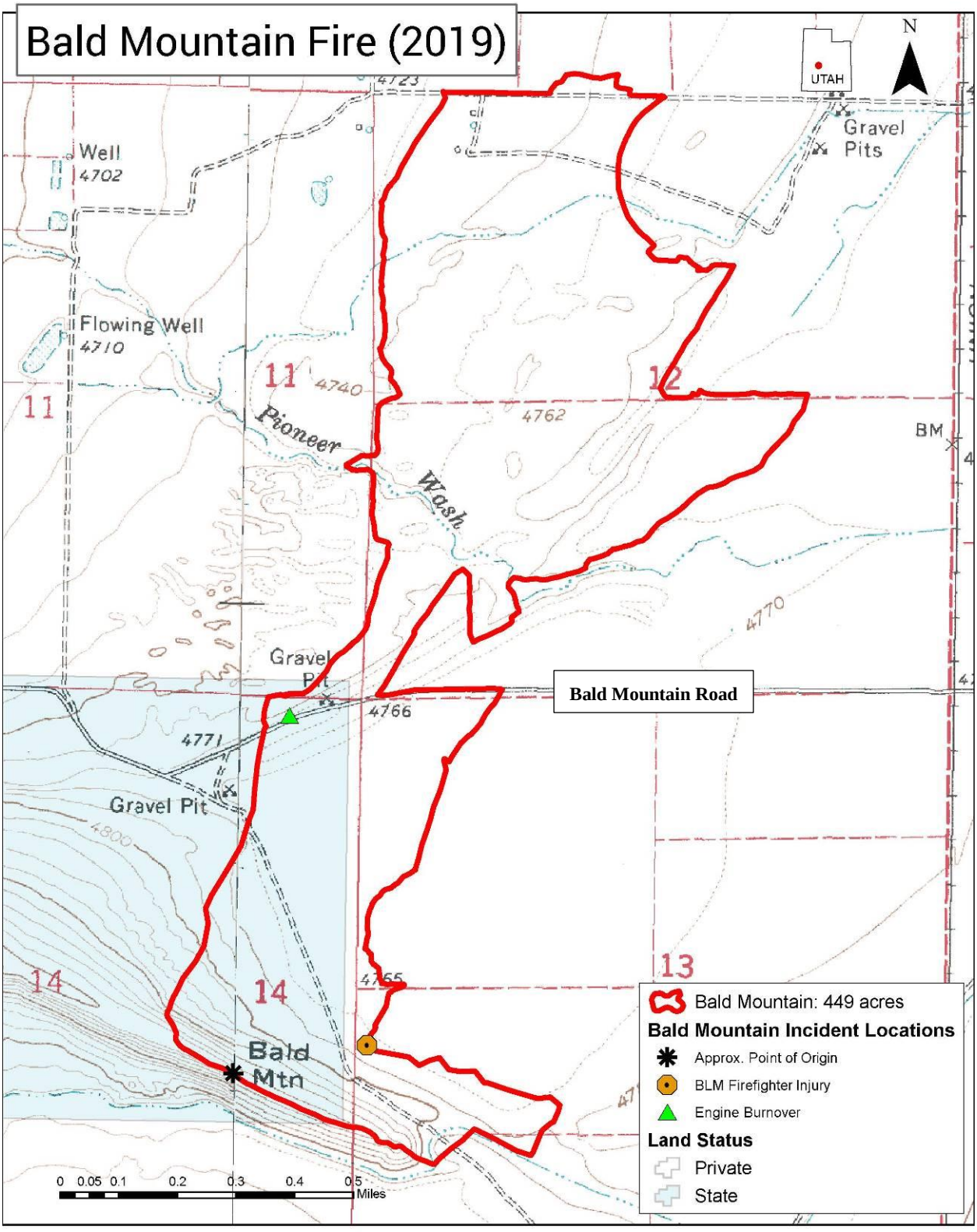
person group met with and interviewed the injured BLM firefighter. The four person field team rested overnight in Fillmore.

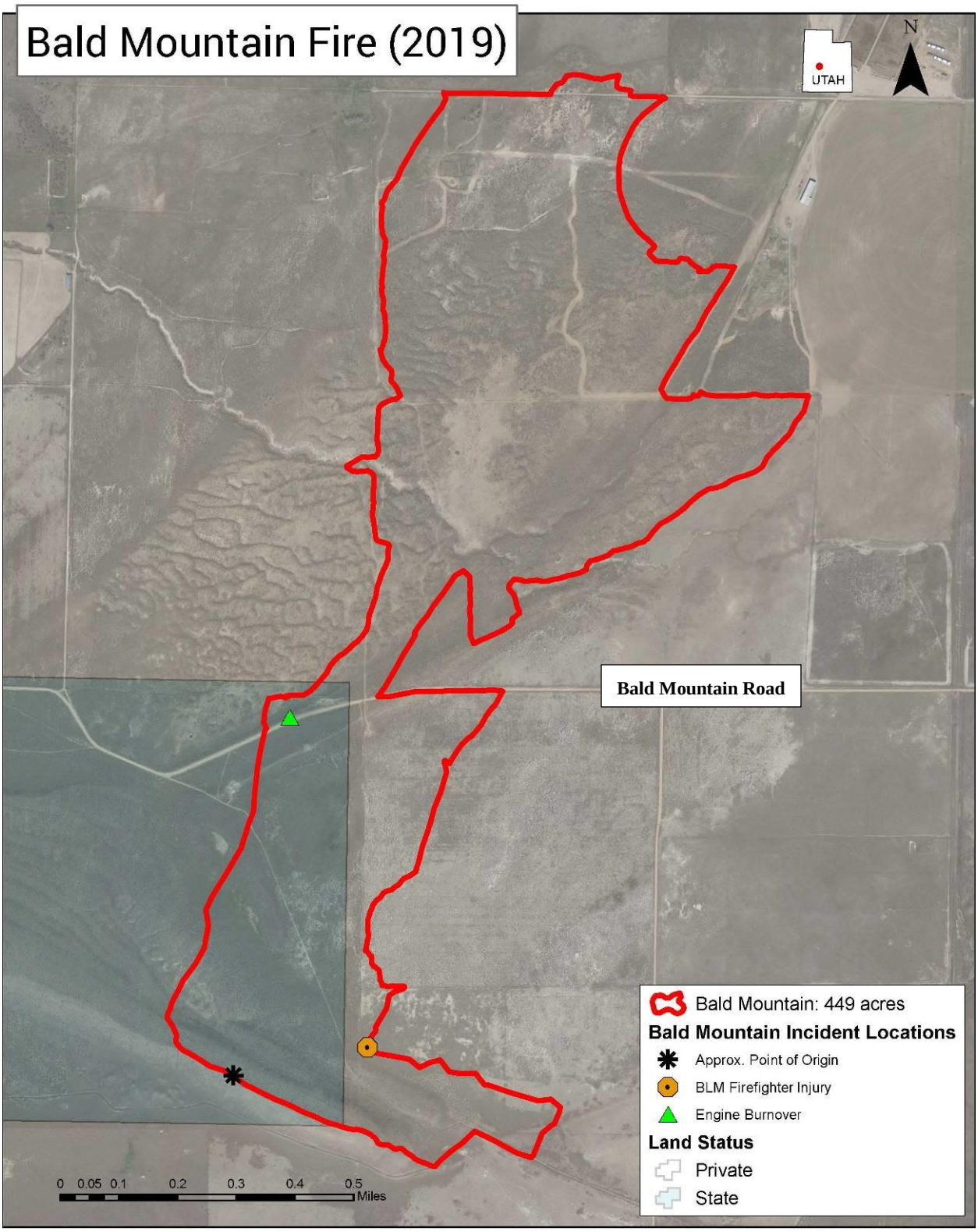
June 25, 2019: The LLR team held a conference call at 0800 hours to provide updates on the previous day's activities. Following the call, two team members travelled to the Richfield Interagency Dispatch Center, located in Richfield, Utah, to interview dispatch center staff and the Millard County Fire Warden and Assistant Fire Warden. The second two person team travelled to the BLM-USFS fire station in Fillmore, Utah to interview the BLM Engine Captain and other fire personnel present during the injury incident. Following completion of interviews and site visits, the four person field team returned to the Salt Lake City area.

June 26, 2019: The LLR team reconvened as a group at the Lone Peak Conservation Center in Draper, Utah to consolidate their findings into this report.

June 27, 2019: The LLR team reconvened as a group at the Lone Peak Conservation Center in Draper, Utah to consolidate their findings into this report. A meeting presenting the rough draft findings to the Agency Administrators was held at 1500 at the Utah Department of Natural Resources headquarters.

MAPS


Bald Mountain Fire (2019)
N
UTAH
Well
4702
Gravel
Pits
Flowing Well
4710
11
4740
12
4762
BM
Pioneer
Wash
4770
Gravel
Pit
Bald Mountain Road
4766
4771
Gravel Pit
4800
14
14
Bald
Mtn
13
0 0.05 0.1 0.2 0.3 0.4 0.5
Miles
Bald Mountain: 449 acres
Bald Mountain Incident Locations
Approx. Point of Origin
BLM Firefighter Injury
Engine Burnover
Land Status
Private
State


Bald Mountain Fire (2019)
UTAH
N
Bald Mountain Road
Bald Mountain: 449 acres
Bald Mountain Incident Locations
Approx. Point of Origin
BLM Firefighter Injury
Engine Burnover
Land Status
Private
State
0 0.05 0.1 0.2 0.3 0.4 0.5
Miles