

Accident Investigation Report
Coyote Basin Fire – Chainsaw Injury
Jurisdiction - Moffat County, CO
Mutual Aid – Northwest Colorado Fire Management Unit-BLM

Wednesday, May 9, 2012



Investigation Team

Garner Harris	Date
South Zone FMO – Northwest Colorado Fire Management Unit (NWCFMU) - BLM Meeker, CO	
Investigation Team Leader – Operations	

Josh Graham
Central Zone AFMO - Upper Colorado River Unit (UCR) - USFS
Rifle, CO
Team Member - Subject Matter Expert (SME) – Chainsaw Operations

Barry Oelrich
State Safety & Occupational Health Manager– Colorado State Office (COSO) - BLM
Lakewood, CO
Team Member – Safety

Executive Summary:

On Wednesday, May 9, 2012 at approximately 1845 hrs, a BLM engine crewmember (Swamper) was injured during suppression operations on a mutual aid fire with Moffat County. During the construction of saw line Swamper reached to deflect falling brush from hitting the sawyer. In the motion his right leg made contact with the bar of the chainsaw.

Narrative:

5/9/12 1301 – BLM resources (Engine 1) stationed in Meeker, CO were dispatched to assist Moffat County with an escaped agricultural burn on private land.

5/9/12 1331 – Engine 1 arrived on scene. The fire was located on private land east of Moffat County Road 57, three miles north of the Moffat and Rio Blanco county line. The fire was approximately 15-20 acres in size and burning actively in pinion/juniper, sagebrush, gambel oak, and grass.

5/9/12 1617 – Additional BLM resources (Engine 2) arrived on scene and tied in with Engine 1. Fire in the SE corner had jumped containment lines and was established in 2-3' sagebrush in a narrow canyon bottom and heavy gambel oak on the N facing slope

5/9/12 1640 – Engine 1 is reassigned from the W flank to assist Engine 2 with mobile attack. The crew from Engine 1 took a break to eat. Engine 1 had been constructing a combination of saw and hand line for three hours. Engine 2 began constructing saw line and putting in a hoselay from the end of the dozer line, S up the oak brush slope.

5/9/12 1800 - Engine 1 joined Engine 2 with line construction in heavy gambel oak (2 ½ to 3 ½ inch diameter and 12-15 feet tall) on a 50-60% slope.

5/9/12 1845 - The sawyer from Engine 1 completed a cut on a large stem of gambel oak and it began to fall towards him. The sawyer crouched to brace for impact, released his finger from the throttle, and placed the chainsaw with the bar pointing to his left on the ground uphill. Swamper, standing just below and to the left noticed the falling oak, and in an attempt to protect the sawyer, stepped uphill and reached to deflect the brush. In the motion Swamper's right leg came into contact with the chainsaw on the ground. The slowing chain caught Swamper in the right leg just below the knee resulting in a 2" laceration.

5/9/12 1845 to 1924 – (Post injury and medical transport actions) Initial medical aid was administered at the scene and it was determined that Swamper needed to be transported to the nearest hospital for further medical care. The injured party was able to walk. Engine 1 Captain escorted Swamper to the road for evacuation. The severity of the injury and condition of Swamper did not warrant an ambulance for transportation. It was determined the fastest mode of transport would be to utilize a Moffat County Deputy vehicle to drive directly to Pioneers Hospital in Meeker, CO; twenty five minutes away. Ordering an ambulance to the scene for transport would have taken approximately 1 hour 15 minutes for arrival, loading and return to Meeker, CO. To have ordered an ambulance from Craig, CO would have taken closer to 90 minutes, round trip.

Dispatch was informed of the medical transport plan. Dispatch was requested to notify BLM Fuels employee to meet them at Hospital.

5/9/12 1924 – Swamper arrived at the hospital, the laceration was cleaned and nine stitches were required to close the wound. Swamper returned to duty the next day and was placed on Light Duty status.

From the time of the injury to arrival of Swamper at the hospital was less than 45 minutes.

Dispatch and Medical Aid logs were utilized to construct the above timeline of events.

Investigation Process:

In accordance with *Interagency Standards for Fire and Fire Aviation Operations* (Red Book), Chapter 18 Reviews and Investigations, a Wildfire Accident investigation team was assembled to visit the scene of the accident and complete the investigative process.

A three person BLM/USFS Review Team conducted the review. The investigation included an analysis of human, equipment, operating procedures, and environmental factors. The process included interviews, verification of documentation, visit to the accident scene, site photography, mechanical inspection of the chainsaw, and timeline review.

Wildfire Accident Investigation Team members included:

Team Lead – Garner Harris, NW CFMU (BLM)

Subject Matter Expert (SME) - Chainsaw Operations – Josh Graham, UCR (USFS)

State Safety Manager – Barry Oelrich - COSO (BLM)

Garner Harris (Team Lead) received Delegation of Authority from the Associate Northwest Colorado District Manager on 5/10/12 at 0800.

The team received an in-briefing at the White River Field Office by the NWCFMU, Assistant Fire Management Officer (AFMO) on 5/10/12 at 0830.

Prior to the site visit Josh Graham, SME, conducted an inspection of the chainsaw that was being utilized at the time of the accident. The inspection determined:

Note: The chainsaw had been “rehabbed” and placed back into service prior to the SME inspecting it for the investigation.

- The Stihl 041, equipped with a 24” bar and Full Comp chain had no notable flaws.
- The chain break was working properly and the chain tension was snug.
- The idle setting was correct at this elevation, adjusted so that the chain would not move when saw is at idle and the chain break disengaged.

The investigation team, with Engine 1 Captain and the NWCFMU, AFMO arrived at the accident scene at 1030 the same day, and concluded preliminary team activities that afternoon.

At the accident site, Engine 1 Captain indicated the location where the saw team was working at the time the injury occurred. The following elements were noted by the investigation team:

- The crew was working on a 60% or 30 degree slope building fire line up hill in heavy gambel oak brush.
- The oak brush averaged in size from 2.5 inch diameter to 3.5 inch and a height of 12-15 feet.

- The crew was building direct fire line.
- Examination of the oak stumps in the area of the accident disclosed that the chain was sharp and functioning correctly.
- This was the second season that the sawyer and Swamper had worked together on the same module.
- Swamper was working to the left of the sawyer throwing brush from his right to his left and down the hill. Swamper had his right leg up hill for stability and balance.
- The sawyer had completed cutting a 12 foot stem which started to fall towards him, he crouched, placing the saw down on the ground in front of him to brace for impact.
- With the bar of the saw now pointing to his left and his finger off the throttle the oak fell.
- Swamper, who was to the left of the sawyer noticed the falling stem and quickly tried to protect the sawyer, reaching up to stop the stem from striking the crouched sawyer. In the motion to catch the falling oak, Swamper stepped uphill on the left side of the sawyer drawing his right leg into the saw on the ground.
- Due to the high angle of the slope, Swamper was closer to the saw than realized. .
- The sawyer was unaware of any contact with Swamper.

Findings and Recommendations:

Finding #1: The sawyer was wearing current standard issue orange chainsaw chaps and all required PPE. Swamper was not wearing chaps but was wearing all other required fireline PPE.

Discussion: It was discussed between Engine 1 Captain and the investigation team that although the *Interagency Standards for Fire and Fire Aviation Operations* (Red Book), Chapter 07-11, Safety & Risk Management - Leg Protection, “All chainsaw operators will wear chaps meeting United States Forest Service Specification 6170-4F or 4G”. It does not address the use of chaps for assistant chainsaw operators or swampers.

During the investigation Engine 1 Captain informed the investigation team that it is standard practice for the engine modules stationed in Meeker, CO to have both the sawyer and swamper wearing chaps even though the swamper may work in many different roles such as laying hose or operating the engine. Being one of the first big fires of the year, Swamper overlooked wearing his chaps.

It is taught in S-212 Wildland Fire Chainsaws, that both the chainsaw operator and the swamper wear chainsaw chaps. Swamper has not attended S-212 thus is not assigned to actual operation of the chainsaw.

This injury could have been prevented if Swamper were wearing chaps. A large number of chainsaw injuries are inflicted to swampers by working in close proximity sawyers.

Recommendations:

- 1) It is recommended that the Red Book match the protective requirements stated in S-212, both sawyer and swamper wear chaps.
- 2) It is recommended that local units review and update current 2012 Chainsaw Operations Risk Management Worksheets (RMW) in order to add the following practices as control measures:

- a) Require the swamper wear chaps. (The mandatory PPE for a sawyer is already documented in the RMW).
- b) That a safety circle of 10 feet (10 foot radius or 20 foot diameter) should be maintained around sawyers while operating a chainsaw that no one without chaps should enter until the sawyer either shuts the saw down or engages the chain break and gives the signal to proceed.

Finding #2: This is the second accident on this Unit (different zones) in less than two years where employees appear to be unaware of the administrative and operational processes for Accident Investigations (see [Plug Hat Fire, Finding #2](#)). This lack of understanding resulted in the loss of evidence preservation; the chainsaw involved in the accident was taken back to the station and “rehabbed”, cleaned and placed back into service. The investigation team was unable to inspect the saw in the condition it was in at the time of the accident.

Recommendation: With the increased emphasis on High Reliability Organization (HRO) culture (training, reporting and learning) there is an emphasized need for firefighters and supervisors to fully understand the accident investigation process. In order for our firefighters to develop a more effective “Learning Culture”, they need to have the constraint to take a step back after an incident and identify the possible need for further review of what’s just happened. In order to learn from our accident and incidents, an Investigation Team must be able to obtain accurate and clear finding to establish causal factors which will lead to root causes. It’s from these root causes we are able to learn what actually occurred and create useful corrective actions that enable us to lessen the likelihood of the accident reoccurring. It’s recommend a “what to do when an accident occurs” type training be developed by the COSO Fire and Safety programs, This training will be provided to all wildland firefighters in the state to educate them to understand the chain of events that takes place after an incident/accident happens.

Commendations:

Commendation #1: The NWCFMU should be recognized for fostering a reporting culture. By reporting these incidents and lessons learned, they are practicing good risk management and reinforcing many of the HRO principles:

- **Reporting Culture** - Safety cultures are dependent on knowledge gained from near misses, mistakes, and other “free lessons.” People must feel willing to discuss their own errors in an open, non-punitive environment.
- **Just Culture** - An atmosphere of trust where people are encouraged to provide essential safety-related information yet a clear line is drawn between acceptable and unacceptable behavior.
- **Learning Culture** - The combination of candid reporting, justice, and flexibility enables people to witness best practices and learn from ongoing hazard identification and new ways to cope with them.

Commendation #2: The NWCFMU suppression resources and Craig Dispatch Center staff should be recognized for their timely response and actions taken to facilitate immediate first aid, medical transport of the injured party, and notification of the NWCFMU Fire Management Officer, Associate Northwest Colorado District Manager, COSO-BLM Fire Management Staff, White River Field Office Manager, and COSO Human Resource Specialist-OWCP.

Conclusions and Observations:

Fortunately, the resources on scene, grasped the multi-jurisdictional issues of getting Swamper off the fire and to the hospital. A good working relationship between the BLM and local law enforcement greatly reduced the amount of time it would have taken to have Swamper transported in an ambulance.

This Zone has good proactive practices for chainsaw operations in place:

- Currently the engine modules stationed in Meeker, CO have swampers wear chaps even though they may work in many different roles such as laying hose or operating the engine. Note: Currently this is an unwritten / undocumented “standard practice” for the engine modules stationed in Meeker.
 - This is a current practice that needs to be an established control measure and documented in the Chainsaw Operations Risk Management Worksheet (RMW) for NMCFMU suppression resources. Along with having these practices in place, they must include documentation, additionally the unit must ensure the practices/procedures, are implemented during training as well as in operational functions, such as Initial Attack.

The old adage, “Train like you fight; fight like you train” comes into play. If we as an organization want to excel in the HRO world, we need to take this to heart. Statements such as, “Being one of the first big fires of the year, Swamper overlooked wearing his chaps.” need to become obsolete and unacceptable in our organization. Train like you fight...

Will accidents continue to occur? Yes, unfortunately they will, we cannot circumvent human free will, but we must do our best to train to the standards we set and ingrain a safety mindset into all of our operations. High reliability organizations require people at all levels to be constantly thinking about ways in which their systems may fail. This includes both attentiveness to major failures and an awareness of small breakdowns in the systems that increase the risk of larger failures. Weick and Sutcliffe describe this aspect of mindfulness as "preoccupation with failure."

Maps/Photos/Illustrations:

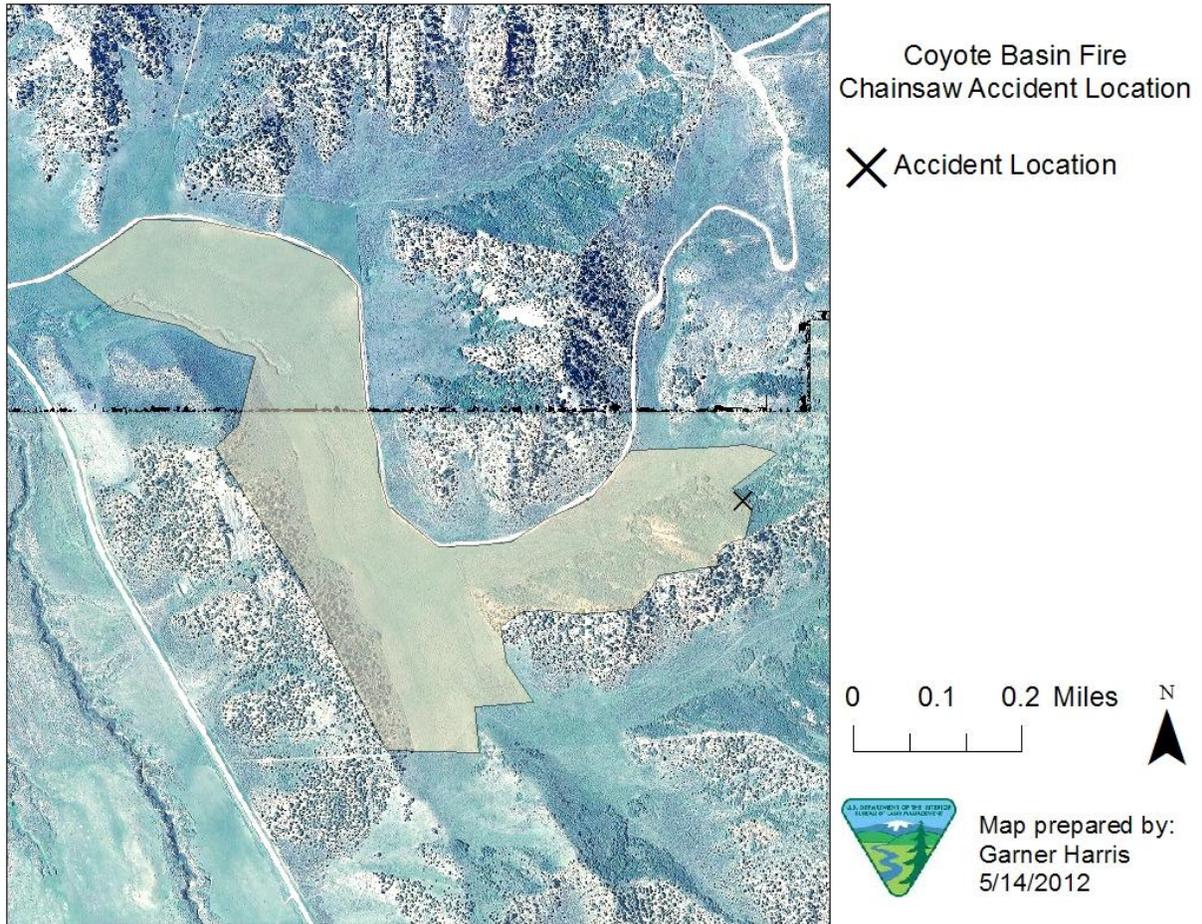


Figure 1: Map of Accident Location



Photo 1: Accident site from uphill



Photo 2: Accident Site side view



Photo 3: Stump A at accident site



Photo 4: Stump B at accident site



Photo 5: Damage to Kevlar NOMEX pants



Photo 6: Post medical treatment

Appendices:

APPENDIX A: Craig Dispatch Log

APPENDIX B: Craig Dispatch – Medical Aid Log

APPENDIX C: Risk Management Worksheets: Chainsaw Operations & Fire Engine Suppression Operations

APPENDIX D: S-212 Certificate for Chainsaw Operator

Records:

Record #1: Statement of Victim

While clearing brush along the fireline, a large oak brush was falling towards the sawyer causing him to flinch and crouch to brace for impact. When I reached to deflect the brush from striking the sawyer my right leg came into contact with the bar of the chainsaw as I stepped uphill.

DATE OF STATEMENT: 5/9/12

Record #2: Witness Statement

While swamping in thick oak brush on a steep slope, I turned around after throwing brush downhill & noticed injured party (name withheld) had stepped back away from the sawyer. He said he was trying to catch a small tree from falling towards the sawyer (name withheld) and the saw chain had glanced his leg.

DATE OF STATEMENT: 5/10/12