



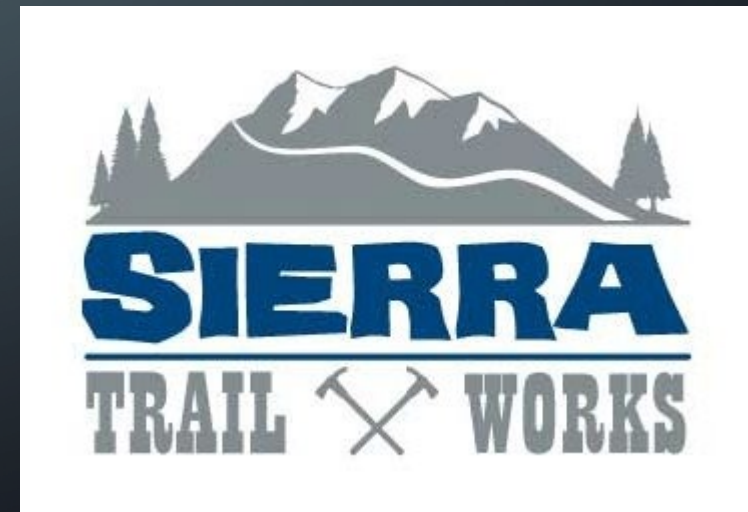
MANAGING RISK IN TRAIL CONSTRUCTION ACTIVITIES

AMERICAN TRAILS WEBINAR – JANUARY 2024

KEVIN JOELL

KEVIN JOELL

- 29 years of trail building as both a volunteer and professional contractor
- 24 years in the fire service (Volunteer, Firefighter, Training Officer, Fire Inspector, Operator, Captain)
- 5 years in industry as a Machinist



DISCLAIMER

- I'm not a lawyer and have no intention of providing legal advice
- I'm not an insurance agent and cannot explain accurately what will or won't be covered by a policy
- Good judgement comes from experience, experience comes from bad judgement. Learn from mistakes and don't repeat them.

OBJECTIVES

We're going to talk about:

- Things that can hurt you
- Things that can kill you
- Things that can cost you money

IMPACTS (PHYSICAL OR MONETARY INJURY)

- You
- Your crew
- Company/Organization/Agency
- Trail users
- Adjacent residents

COMPONENTS FOR A LAWSUIT

- Standard or Duty
 - Breach
 - Injury
 - Damages
-
- Anyone can sue anyone, for anything, at any time. Will it stand up in court?

SUBJECTS

- Trail Work safety protocols
- Tailgate Safety Talk
- PPE Recommendations
- Respiratory Protection
- First Aid
- Tool Safety
- Hazard Trees
- Fire Safety
- Notification Signage
- Reducing risk to users
- Theft/Vandalism/Site Security
- Operating Vehicles
- Operating Equipment
- Environmental Protection

TRAIL WORK SAFETY PROTOCOLS

- Agency Specific
 - My recommendation is to utilize the USFS Job Hazard Analysis if you don't have any others to reference

U.S. Department of Agriculture Forest Service		1. WORK PROJECT/ACTIVITY	2. LOCATION	3. UNIT
JOB HAZARD ANALYSIS (JHA) References-F SH 8709.11 and -12 (Instructions on Reverse)		Trail Work	Forest Wide	0519 LTBMU
		4. NAME OF ANALYST	5. JOB TITLE	6. DATE PREPARED
		Paul Potts	Road manager	05/01/2013
7. TASKS/PROCEDURES	8. HAZARDS	9. ABATEMENT ACTIONS Engineering Controls * Substitution * Administrative Controls * PPE		
NOTE		Please remember what we discussed in the Safety Journey... There is NO work worth risking your safety. Don't be driven by the pressure to deliver a target. If you feel something may be unsafe...SPEAK UP, and analyze the situation. Lastly, Remember the 5 practices. -Jeff		
DRIVING TO THE JOBSITE		Review Driving JHA for complete hazard and abatement actions.		
WALKING IN THE FIELD	Falling down, twisted ankles and knees, poor footing	Always watch your footing. Slow down and use extra caution around logs, rocks, and animal holes. Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. Wear sturdy laced boots with non-skid Vibram-type soles for ankle support and traction. Field going personnel must wear appropriate PPE when working or traveling in the field (boots, heavy duty pants, hardhat, gloves, eye protection).		
	Falling objects	Wear an approved hardhat for protection from falling limbs and pinecones, and from tools and equipment carried by other crewmembers. Stay out of the woods during extremely high winds. ANSI Standard approved eye protection should be worn as part of normal field PPE. Complete R-5 Hazard Tree Awareness training.		
	Damage to eyes	Eye protection should be worn as part of field work PPE. Watch where you walk, especially around trees and brush with limbs sticking out. Exercise caution when clearing limbs and brush. Ultraviolet light from the sun can be damaging to the eyes; wear eye protection that offers significant protection from UV-A and UV-B radiation.		
	Bee and wasp stings	Be aware of likely places to find bees (downed logs, stumps, holes in the ground), keep watch for bees coming and going from a likely nest site. If stung, watch for respiratory problems. Notify dispatcher and get person to a doctor immediately if there is trouble breathing. Gently scrape stinger off if one is present. Apply analgesic swab and a cold pack if possible, and watch for infection. Flag the location of any known nests and inform other crewmembers. Advise packing an inhaler and Benadryl or Epi-pen if you are prone to severe allergic reaction.		
PUBLIC CONTACT	Angry or violent individuals Random acts of violence	Before coming out of the woods and to your vehicle, look for any disturbance or unknown individuals. Park your vehicle where you can take the shortest route to and from the building. If a person approaches you and looks angry or threatening, don't feel obligated to speak with the person. If you are uncomfortable for any reason with the situation, <u>leave the area</u> and contact your supervisor, Camino and/or Law Enforcement. (if you need to, make up an excuse to leave, i.e., you need to respond to a reported fire). If you are uncomfortable with the situation, you can use your radio to alert Camino, advise them		

Safety Briefing (should take about 10 min, skip items not applicable)

Consider warm-up stretching before, during, or after safety [briefing](#)

Remind everyone to sign in, please notify your crew leader if you leave [early](#):

Environmental

-Weather - Wind / Heat / Cold / Snow / Rain

-Sun - Sunscreen/ Heat stroke

-Hydration and snacks – stay hydrated and fueled up, offer where it is available

Special Hazards

-Fire Danger / Project Activity Levels / Terrain traps / Escape Routes

-Hazard Trees / [Pine Cones](#)

-Rolling objects on Steep slopes

-Other Trail Users / Disgruntled Public

-Things that Bite or Sting-

Ticks, Mosquitos, Spiders, Bees/Wasps(allergies?), Snakes, Scorpions

-Animals-Bears/Cougars/Coyotes/Dogs]

-Shooting (only mention if applicable)

PPE

-Helmets

-Gloves

-Eye Protection / Ear Protection (only mention if applicable)

-Long Sleeves/Pants

-Footwear

-Share medical or physical limitations privately with your crew leader

Situational Awareness

-Communicate with crew

-Fingers and Toes

-Working around equipment (only mention if applicable)

Tool Safety

-Carry pointy end away on the downhill side

-Keep your dime (10") carrying or using

-Storing tools at the jobsite: perpendicular to the trail, head uphill

-Sharp edges, wear [gloves at all times](#) when handling

-Right tool for the right job, if it's not a rock bar or pick, don't pry with it

-Avoid overhead swinging, or callout first

-Eye Injury from shrapnel

-Switch tools often

-Protect your back

Emergency Situation

-Notify Crew Leader of injury immediately

-Identify Medical Training among crew **and** location of first aid kit

-Cell Phones – Confirm Service

-Radio- Identify location and verify channel and who will use

-Confirm descriptive location of worksite

-Identify who will set up LZ or return to access point to lead in emergency responders

Today's Projects – Brief description of overall project and focus for the [day](#)

Get a head count to confirm number of [volunteers](#)

TAILGATE SAFETY TALK

- Keep it brief but comprehensive
- It may be the only training that a new volunteer receives before picking up tools and going to work
- Follow a checklist
- For continuing projects, brief returning volunteers/employees on new hazards, weather forecasts, decision points, rally locations.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- My recommendation, and requirements on many USFS districts:
- Long sleeves
- Long pants
- Sturdy shoes (no crocs, sandals, flip flops)
- Gloves
- Hard hat or bike helmet
- Eye protection



ADDITIONAL PPE

- Operating equipment or power tools – Ear protection
- Operating chainsaws – Chaps
- Rock Work/Armoring – Knee pads
- Rock Drilling/Splitting/Grinding – N95 respiratory protection
- Wood Preservatives/Sealer/Stain – Chemical protective gloves



RESPIRATORY PROTECTION

Provide for respiratory protection to protect airway from:

- Dust
- Smoke
- Work operations that produce airborne particulates:
 - Rock drilling/cutting/grinding
 - Airborne Silica standards
- Recommend wearing an N95 mask with exhalation valve

Clear Day – No Mask



Smoky Day – Wearing Mask



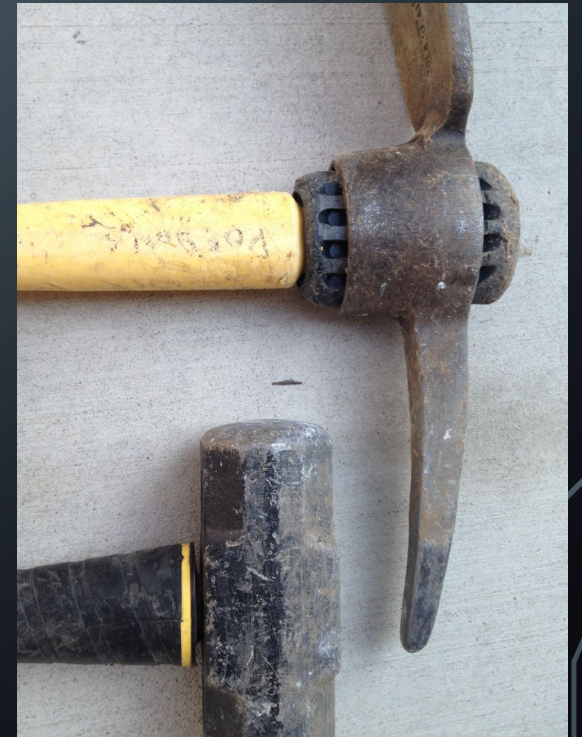
FIRST AID

- Training
 - When required, generally the minimum is CPR and a 4 hour First Aid class.
- Supplies
 - FAK
 - Bleeding Control
 - Tourniquet (C.A.T. is my preferred)
 - QuikClot



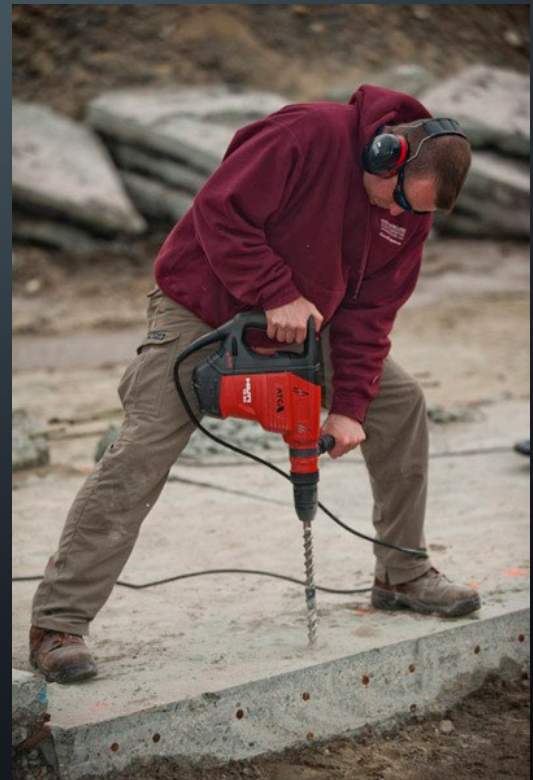
TOOL SAFETY

- Use the right tool, in the right way, for the right job
- CUSS
 - Carrying tools
 - Using tools
 - Storing tools
 - Safety with tools
- Inspect for damages and remove from site if necessary



POWER TOOLS

- Follow directions
- Keep work area clear
- Stable stance/Good grip
- Manage and protect power cord
- Awareness of cordless tool batteries
 - Store out of the sun
 - Keep dry
 - Avoid counterfeits and knock-offs





HAZARD TREES

- These can present a hazard anywhere you have trees:
- Dead/Dying/Storm Damaged/Insect Damage
- ‘Tree Strikes and You’re Out’ training document
- Minimize time under suspect trees
- Maximize distance from suspect trees



Forest Health Protection
Pacific Southwest Region
April 2012 (Report # RO-12-01)



Hazard Tree Guidelines For Forest Service Facilities and Roads in the Pacific Southwest Region

Peter A. Angwin, Daniel R. Cluck, Paul J. Zambino,
Brent W. Oblinger and William C. Woodruff

These hazard tree guidelines provide a means to identify and abate hazard from trees that are likely to fail and cause injury to either people or property on Forest Service system roads or at Forest Service facilities (i.e. campgrounds, boat ramps, trailhead parking, summer home tracts, administrative kiosks, information centers, etc.) in California. They are intended to provide consistent direction on hazard tree identification and abatement and their use is highly encouraged and fully supported by Forest Health Protection (FHP) staff.

It must be recognized from the outset that even under the best of circumstances and with the highest standard of care, our ability to predict tree failure is not infallible. Simply put, we are limited in our ability to reasonably foresee all tree failures all the time. However, by exercising good professional judgment using a systematic approach such as the one suggested in these guidelines, it is possible to significantly reduce (but not totally eliminate) the risk of injury to people and damage to property (Figure 1).

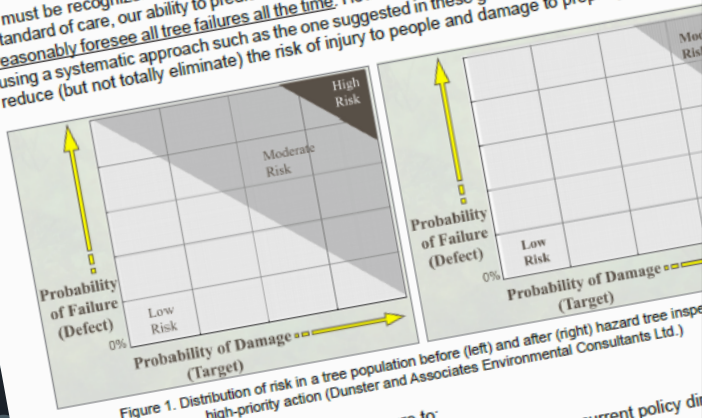


Figure 1. Distribution of risk in a tree population before (left) and after (right) hazard tree inspection and high-priority action (Dunster and Associates Environmental Consultants Ltd.)

The specific objectives of these guidelines are to:

1. Describe the need for hazard tree management and review current policy in the National Forest System.
2. Explain hazard tree evaluation procedures and describe a hazard tree rating system appropriate for:

Tree Strikes You're Out

Introduction

Snags are dead or dying trees. Hazard trees can be dead, dying, or green trees that are unstable. Over the years many people who have worked in the wood have been killed or injured in accidents involving hazard trees. On the Plumas, and elsewhere in western forests, snags are becoming an ever-increasing hazard after years of draught, fire exclusion, and bug kill. Because of safety concerns, a committee has been formed to study this problem and develop ways to help employees become more aware of this issue. Results of a forest survey indicate that many people have had accidents or close calls due to snags and other hazard trees.

This pamphlet has been developed, with information from the National Snag Hazard Task Force and others. We hope to increase awareness and educate employees about the dangers of hazard trees and how to work safely in the woods. The information in this pamphlet will help employees to:

1. Recognize indicators that will identify hazard trees.
2. Identify what work situations could put employees in danger (Watch-Out Situations)
3. Apply appropriate safety guidelines.

Fact: There are several million snags on the Plumas.

Fact: All these snags will come down.

Question: Will you be under one when it comes down?

Hazard Tree Indicators

- Numerous downed trees.
- Leaning trees.
- Dead or broken tops and/or limbs hanging in the trees.
- Absences of needles, bark, or limbs.
- Possible of rot indicated by conks, broken tops, basal scars, cat faces, numerous down limbs, ants, abundance of woodpecker holes.
- Stump holes burning in the area.
- Smoke or fire burning in the base or tops of either dead or live trees may indicate rot and / or weakening of tree.

Watch Out Situations

- Snags are falling or have fallen in work area.

Hazard Tree Management

By James T. Blodgett, Kelly S. Burns, and Bradley M. Lalande
Plant Pathologists, Rocky Mountain Region

USDA Forest Service, Rocky Mountain Region
State and Private Forestry and Tribal Relations
Forest Health Protection

Technical Report R2-73

May 2021



Mott Canyon Hazard Tree Incident



Lake Tahoe Basin Management Unit
August 25, 2016

base. The group decided that before they worked on the trail again, they would have to take the snag down.

On Thursday, August 25 there were seven different work groups (20 volunteers) assigned to the trail segment. They had a pre-work briefing, discussed work assignments, specific tasks, safety issues/concerns and identified the highest qualified medical person (Wilderness First Responder).

"I heard a crack and saw it falling - I yelled to John but it fell too fast."

The group from the previous day went back to the snag area. Because they are not allowed to cut standing trees and knowing that asking someone from the Forest Service to come cut it would halt their progress, they prepared to pull it down using the same equipment they use to move big rocks. As John was preparing the rigging another crew member was above the snag and heard it crack. He saw the snag begin to fall and yelled at John to warn him but the snag fell too fast. The snag hit John on the left rear side of his hard hat and shoulder. He was 35 feet away from the base of the snag.



Stump

Snag

Scuff marks on John's hard hat



Looking back at stump from where John was struck

"The hardhat probably saved his life. We put on our hardhats as soon as we leave the vehicle."

Wilderness First Responder



FIRE SAFETY

Ways you can start a fire on a trail project:

- Metal on rock – swinging tools, pedal strike, equipment blade/bucket/tracks
- Fueling operations/Fuel leak/Hydraulic leak
- Equipment - overheating/electrical/debris buildup in the belly pan
- Hot Work – grinding/cutting/welding/blasting

HYDRAULIC FLUID LEAK IGNITES

- <https://www.youtube.com/watch?v=1Kgv8gQYE58>

FIRE SAFETY

Ways to reduce the risk of starting a fire or stopping an incipient fire:

- Easy access fire extinguisher on or near any powered equipment
- Plan work around fire weather conditions
 - Do higher risk activities in the AM
- Stop work during Red Flag Warning or Industrial Fire Precaution Level Restrictions.
- Pre-wet areas around hot work, welding blankets as screens, choose better methods (Sawzall vs. grinder)
- Fire water on site or easily accessible
 - Backpack Pump/Portable tank + pump



6MFS

ALL

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Calendar

Aviation

Felling Safety

Fire
Communication

Firefighter
Health - First
Aid

Leadership

Misc Fireline
Hazards

Operational
Engagement

This Day in
History

Vehicles -
Roads

Weather -
Fire Behavior

Week of
Remembrance

6MFS
Committee
Home Page

Avoiding Fuel Geysering



Category: Misc Fireline Hazards
Printer Friendly Version

Page Last Modified / Reviewed: Mar 2022

Fuel geysers continue to be reported and the potential for injury is real. In 2018, there were 28 incidents of fuel geysers reported: 23 chainsaws, a leaf blower, and four jerry cans. A fuel geysers can happen on any equipment with a fuel tank including fuel bottles and containers. Even chainsaws with two-way vents may "geyser" at high temperatures or high elevation. Users should assume all gas-powered equipment and fuel containers are pressurized.



Fuel – Know Your Fuel

- Fuel volatility changes seasonally and geographically.
- Think locally. Using fuel from a cooler climate (i.e., Idaho) in a warmer climate (i.e., Texas) increases the geysering potential.
- As elevation increases, boiling point temperatures decrease. 125°F at 8,000 feet is approximately equivalent to 140°F at 1,000 feet.

Fuel Bottles and Containers

Fuel bottles (i.e., Sigg bottles), fuel containers (i.e., dolmars or jerry cans) can geysers even after the cap is removed. To mitigate possible fuel geysers and/or potential injury from fuel bottles and cans, use the following procedures:

- Keep containers in the shade and away from any external heat source.
- **Never** open a fuel tank within 20 feet of any heat source.
- **Gently shake the container to release surface tension. Too much agitation will create pressure.**
- Open container slowly, pointing opening away and cover the opening with a cloth and glove.

Engine Powered Equipment

- **Never** use fuel that was stored in a fuel container for longer than one month. Older fuel may lead to poor engine performance and increased operating temperatures. Older fuel may also have higher volatility for the current conditions.
- **Always** check the fuel level in the tank before taking any action. Fuel levels above ½ tank are more likely to geysers.
- **Never** open a fuel tank within 20 feet of any heat source.
- **Only after the above mitigations are completed;** put the equipment in a cleared area, cover the cap with a cloth or glove, and open slowly.

Example of a fuel geysers

https://www.youtube.com/watch?v=Ja9t4PtJx_Q

STIHL SAFETY Video

<https://www.youtube.com/watch?v=wjSczHOYli8&t=458s>

NOTIFICATION SIGNAGE

- Much easier building new trail with minimal users present than doing maintenance along an existing trail
- Notification signage at trailhead/intersections/access points
 - Expected times and dates
 - Option for other routes
- Work area signage
 - Approaching the work site
 - Ensure good sight lines to signs



TRAIL ACCESS NOTICE

Construction activities related to repair and culvert replacement will be occurring on the Keystone Canyon Trail with staging of equipment and materials at the East Keystone TH.

Temporary Trail Closures and/or access/parking restrictions may be in place MON - FRI 7 am to 5 pm

Expected dates are March 17-27



TRAIL
ACCESS
NOTICE

#CSW-90582
#NVW-50579



ADVANCED FLOW



BICYCLES ONLY

- Experienced Riders Only
- Jumps and Drops present
- Inspect features before riding
- Do not create go-around lines or modify features to suit your riding ability. Improve your riding ability to match the features.
- Use caution in windy conditions
- Downhill travel only
- No walking on berms or jumps
- No Dogs on sculpted dirt trails
- Stay off when wet or muddy

TEMPORARY SIGN

USER SAFETY

- Introduced hazard vs. naturally occurring hazard
 - Tools left on trail
 - Borrow pit left open
 - Items placed in the fall zone (decorative rocks, sign posts, etc...)
 - Rebar





SITE SECURITY - BACKCOUNTRY

- Theft and vandalism is fortunately pretty rare on remote projects but not unheard of.
 - Animals causing damage is more likely
- My preferred method of site security is camouflage
 - Make your worksite minimally noticeable
- Trail cameras
- Cables and locks when needed
- Tool caches hidden



MOULTRIE

● 68 °F

CAMERA 1

14 AUG 2022 12:55AM



MOULTRIE

☾ 48 °F

CAMERA 1

17 SEP 2022 05:57AM



MOULTRIE

☾ 55 °F

CAMERA 1

07 NOV 2022 10:59AM



SITE SECURITY – FRONT COUNTRY

- Deterrents
 - Keeps the honest people honest
- Temporary fencing, Cargo containers, Jobox, Cables/Chains/Locks
- Surveillance trailers



OPERATING VEHICLES - OHV

- ATV or UTV safety training courses – online or in-person
- Hands-on orientation (OJT)
- Use PPE
- Online Course Example:
<https://safetraining.com/course/atv-utv-training-online-course/>



OPERATING VEHICLES - STREET

- Probably the highest risk activity you have as a business/agency/organization
- Ways to reduce that risk:
 - Defensive driver training
 - CDL training
 - Cone course – spatial awareness
- Online Defensive Driver Training Example:
<https://www.nsc.org/safety-training/defensive-driving/courses/online>



OPERATING EQUIPMENT

- Keep uninvolved people away
- Be aware of your blind spots
- Training progression
- PPE
- Restraints
- Rollover prevention
 - understand your center of gravity



OPERATOR GETS LESSON IN SEATBELT USE

- <https://www.youtube.com/shorts/0yyCmOB7tb8>

Informational Summary Report of Serious or Near
Serious CAL FIRE Injuries, Illnesses and Accidents



GREEN SHEET

Bulldozer Rollover Fatality

July 14, 2018

Ferguson Incident

18-CA-SNF-000745

18-CA-MMU-014430

California Southern Region

SUMMARY

On Saturday, July 14, 2018 a CAL FIRE Bulldozer was operating on the Ferguson Incident in Mariposa County, California. During the early morning hours, the CAL FIRE Bulldozer experienced a rollover which resulted in fatal injuries to the Heavy Fire Equipment Operator (HFEO 1).

Ferguson Incident
Green Sheet
Page 16 of 18



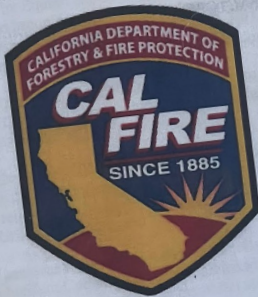
View looking at the fall line and Dozer 1 final resting place



View looking north along the trail at the fall site

San
21c

California Department of Forestry
and Fire Protection
Serious Accident Investigation Report



San Benito-Monterey Unit
Bulldozer Rollover
Fatality

October 8, 2007

Colorado Incident
07-CA-BEU004103
07-CA-CSR000098

California Southern Region



Simulated movement within cab of CAL FIRE D4641 during rollover
(Note single lap belt)



Simulated movement within cab of CAL FIRE D4641 during rollover

GREEN SHEET

California Department of Forestry and Fire Protection
(CAL FIRE)

Informational Summary Report of Serious CAL FIRE
Injuries, Illnesses, Accidents and Near Serious Accidents



Dozer Rollover Fatality
July 26, 2016

Soberanes Incident
16-CA-BEU-003422
16-CA-BEU-003518

California Southern Region

A Board of Review has not approved this Informational Summary Report. It is intended as a safety and training tool, an aid to preventing future occurrences, and to inform interested parties. Because it is published on a short time frame, the information contained herein is subject to revision as further investigation is conducted and additional information is developed.

Lookouts

Communications

Escape Routes

Safety Zones



Lookouts

Communications

Escape Routes

Safety Zones



ENVIRONMENTAL PROTECTION

- BMP's
 - Sediment reduction precautions
- Spill kit on site

THANK YOU!

- Questions?
- Resources folder:

