

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



GREEN SHEET

Limbing Accident

April 24, 2018

C-Faller Training

18-CA-TUU-000116

California Southern Region

SUMMARY

On April 24, 2018, at approximately 1429 hours, a CAL FIRE Fire Captain who is an Advanced Faller (C-Faller) Cadre Member was struck by a grounded tree limb that was under tension from a felled tree that had landed on top of it during an Advanced Faller Training Course. The Fire Captain was limbing the felled tree when the tensioned limb beneath the felled tree released and struck him in the head, knocking him off his feet downhill into tree debris and rendering him unconscious. The Fire Captain suffered significant injuries to his head, neck and chest that required hospitalization.

CONDITIONS

The accident occurred in a remote area of the Sequoia National Forest off Balch Park Road in Tulare County, CA. A narrow, winding one-lane paved road accesses the area. This portion of Tulare County has a large amount of tree mortality surrounded by thick brush in steep, mountainous terrain.

Weather:

Temperature: 84° Fahrenheit

Relative Humidity: 31%

Winds: 3 – 9 MPH

Visibility: clear

Fuel Type: Fuel Model 10, Timber: mixed conifer, oak, and assorted ground litter.

Road Conditions: A rural narrow, winding one-lane paved road.

Topography: Multiple intersecting drainages with steep slopes.

SEQUENCE OF EVENTS

The CAL FIRE Advanced Faller (C-Faller) Cadre was in the Tulare Unit conducting a 4-day C-Faller Course. The first day had been in the classroom at Porterville Air Attack Base, and included CAL FIRE policy review, chain saw operations, chain saw safety, limbing, bucking and felling techniques, hazards, course expectations, Incident Action Plan (IAP) review, PowerPoint programs and video review. The remaining three days were to be conducted in the field utilizing tree mortality areas on the Sequoia National Forest that had been pre-designated for the course.

C-Faller field training on April 24, 2018 started at 0830 hours at CAL FIRE Bear Creek Fire Station in the Tulare Unit. All cadre members and students met for a daily safety briefing, IAP review, emergency procedures overview, identification of training groups and the completion of pertinent documentation (IIPP-6). Following the meeting, all cadre members and students proceeded up Balch Park Road approximately 21 miles to the training location. Once at the cut site, the pre-designated groups proceeded to their predetermined cutting areas. Each group worked in areas that were pre-identified to ensure the safety of all personnel. Each group included an Instructor (C-Certifier), a Proctor (C-Faller) and two to three students.

As the day progressed, each student rotated between cutting with the Instructor and the Proctor. The day had been progressing well with routine rotations, and multiple large diameter trees had been successfully felled.

One group working at the top end of the training grounds had rotated, and was working one-on-one with their students. The Proctor (P1) had taken his students (S2) (S3) to an opposing slope adjacent to the other half of their group to cut. The area P1 identified provided him a clear view of the area where the other members of his group would be cutting, and was at a safe distance. The Instructor (FC1) from his group had identified a tree to be felled by the student (S1) under his tutelage. The tree was a large, dead Ponderosa pine at the toe of the slope. The tree measured 36 inches in diameter at breast height (DBH) and stood approximately 115 feet tall.

S1 assessed the tree and determined that it was to be felled up-slope to prevent it from obstructing a watercourse downslope, and FC1 agreed. FC1 and S1 discussed the hazards, the type of cut to be made, identified two escape routes, and cleared (swamped) the base of the tree for access and egress. Both FC1 and S1 identified that the intended lay of the tree was through a narrow gap between an oak tree (live) and smaller dead pine trees and brush. They agreed that the tree to be felled was going to contact the limbs of the oak tree during the fall, and with the possibility of falling limbs and debris on contact. Once a complete size-up of the tree was completed, and the identified escape routes were established and validated, FC1 directed S1 to begin his cut. S1 proceeded with his undercut, and readied himself to put his back cut into the tree. As is standard, and policy, S1 yelled, "back cut, up the hill" to alert the other members of his team, and any approaching personnel of his intention to fall the tree. After validating that he had been heard, S1 proceeded with his back cut. The tree began to fall in the intended direction of the lay. During the fall, the top portion of the tree brushed the limbs of the oak tree (as FC1 and S1 had discussed) causing some oak limbs to break loose and fall to the ground ahead of the tree. As the tree came to rest on the slope, it split into three sections after contacting ground litter and terrain. The bottom section of the tree measured 45 feet in length at the break. The second section measured 47 feet and had landed atop the fallen oak limbs, and the third section (top of the tree) measured 23 feet, and was entangled at the base of the oak tree in a near-vertical position.

Once the tree was felled, S1, under the direct supervision of FC1 assessed the area for hazards such as hanging limbs or other collateral debris. S1 yelled "clear" after confirming that the oak limbs that had been brushed during the fall had been grounded. S1 planned to limb the felled tree and to flush cut the stump. FC1 advised S1 that he would assist in limbing the tree due to the length, and that he would start limbing from the first break in the tree toward the tip, and that S1 could start by cutting the stump flush, and limbing from the base up to the first break. S1 agreed, and FC1 proceeded to ascend the hill.

FC1 reached the first break in the felled tree and began to limb the pine. FC1, wearing full PPE including helmet, chaps, gloves, eye and hearing protection proceeded to limb the felled tree with his chain saw. FC1 had limbed approximately 24 feet of the felled tree when he encountered the large oak limbs that both he and S1 had witnessed get broken free from the oak tree by the falling pine. The limb had

multiple forks and had come to rest beneath the felled pine tree in a near-vertical position. The limb measured 8 inches in diameter at the break with multiple forks ranging in size from 3-5 inches in diameter. The length of the limb, including the forks ranged from 5 to 17 feet in length. FC1 proceeded to assess the bind of each pine limb and cut it free with his chain saw.

Unbeknownst to FC1, when the pine broke the oak limbs loose, and they fell ahead of the tree, the broken end of the oak limb contacted the ground first (likely due to weight) and stuck into the soil approximately 18 inches deep. This suspended the limb and the multiple forked branches of the limb into the air only to then be contacted by the falling pine as it came to rest on the ground. As the pine came to rest, it lay atop the broken end of the oak limb and placed the entire load of the felled pine onto the limbs. This downward pressure and the fact that the oak was a live tree allowed the limbs of the oak to bend under extreme pre-loaded tension and pressure. The felled pine tree limbs also directly contacted multiple sections of the oak limbs providing for additional tension. As FC1 proceeded to limb the tree, he reached the oak limbs and with a single, partial cut released the full, pre-loaded tension of the upper portion of the oak limbs. This violent release of tension projected the limbs of the oak downward and outward, contacting FC1 on the left temple area of his helmet. This contact propelled FC1 backward off the felled pine, and downslope into a field of tree litter. FC1 was knocked unconscious by the initial impact. P1, S2 and S3 all heard a loud "crack", and since they were training within view of FC1 and S1, they each turned toward the sound. P1 immediately noted that FC1 was down, and could hear his chain saw idling. S2 and S3 were also able to see that FC1 was down, lying on his left side. P1 yelled FC1's name as he proceeded to his location. P1 traversed approximately 500 feet across slope to reach FC1's location. S2 and S3 also made their way to FC1. P1 was the first to arrive and found FC1 unconscious with agonal respirations and an actively bleeding head wound. At approximately 1429 hours, P1 reported "man down" to the designated C-Faller Course Safety Officer (SOF) via the assigned tactical frequency. With the report, the SOF instituted the "Incident within an incident" (IWI) protocol in order to collect accurate and sufficient information. P1 reported "traumatic head injuries with entrapment". The SOF immediately contacted the CAL FIRE Tulare Unit ECC (Visalia) to report the injury. He ordered an air ambulance to the CAL FIRE Bear Creek Fire Station (pre-designated medivac location in the course IAP) and an Advanced Life Support (ALS) ground ambulance to the scene. Meanwhile, P1 was not able to fully access FC1 because the oak limbs had fallen and was lying on top of FC1. P1 noted that there was still so much tension on the oak limbs that he was unable to lift them. By this time, S1 had made his way up the hill from the stump having heard the loud crack, as well. He assisted P1 in cutting the still-tensioned oak limbs from above FC1 so that they could further assess his injuries. FC1 remained unconscious with agonal respirations as they completed an assessment of his injuries. Both S2 and S3 arrived to assist in the care of FC1. All personnel at the site worked to control the bleeding, and care for the injured FC1. After approximately 2-3 minutes, FC1 regained consciousness. He was confused, and became combative with the personnel working on him. Moments later, FC1

began to communicate with personnel, and started to breath normally. Personnel worked to maintain cervical spine (c-spine) precautions, and to control the bleeding from his head wound. FC1 was placed in a c-collar. He again became combative, and kept attempting to get up. The personnel at the site continued to reassess FC1 for additional injuries. Due to the rural location, and extended ALS care and transport times, the SOF determined that FC1 would be extricated to the road above the accident site, and be transported in a CAL FIRE vehicle to meet up with responding ALS resources. By this time, all cutting / training had been stopped, and multiple personnel (both cadre and students) were assisting in the rescue and extrication of FC1. Though still confused, FC1 was adamant that he would not tolerate being strapped down to a spine board. After reassessing him for other injuries, only noting the head laceration, and wanting to expedite his extrication, personnel determined that they would assist FC1 up the steep slope to the awaiting CAL FIRE vehicle (V1). FC1 agreed with the extrication plan, and agreed to remain in a c-collar due to the mechanism of injury, and head laceration. Personnel proceeded to assist FC1 up the slope for approximately 192 feet to the pre-positioned CAL FIRE vehicle. Approximately 45 minutes after the accident occurred, the SOF notified Visalia that the patient had been extricated, and was outbound with CAL FIRE staff to rendezvous with the responding ALS resource. V1 proceeded outbound on Balch Park Road with FC1, S1 and additional CAL FIRE personnel to CAL FIRE Bear Creek Fire Station. V1 made it approximately 7 miles on Balch Park Road when they met the responding ALS ground ambulance at Blue Ridge Road. CAL FIRE personnel transferred FC1 into ALS care. The ground ambulance then proceeded code three the remaining 13 miles to the CAL FIRE Bear Creek Fire Station to meet the awaiting ALS air ambulance. FC1 was transferred into the air ambulance and transported to a trauma center in Visalia. FC1 was admitted into the ICU for the treatment of his injuries.

INJURIES/DAMAGES

FC1 was diagnosed and treated at the trauma center for a concussion, head laceration, pneumothorax, broken ribs and a C-5 vertebrae fracture.

SAFETY ISSUES FOR REVIEW

- Maintain situational awareness, and validate as conditions change
- When possible, clear the intended lay prior to initiating the felling operations to prevent unexpected or adverse effects of other materials during the fall.
- When engaged in chain saw operations, it is imperative to work in teams in order to maintain personnel accountability and safety.

INCIDENTAL ISSUES/LESSONS LEARNED

- FC1 was wearing full, appropriate PPE for chain saw operations. His PPE performed as expected, and was instrumental in limiting the extent of the injuries, specifically the helmet.

- Situational awareness, while limbing, bucking and/or falling must constantly be refreshed and validated, taking into account differentiations in terrain, tree types, binds, collateral materials affected by felled trees, and specie-specific hazards.
- Ensure that when working in mountainous or adverse terrain, equipment necessary for the extrication of injured personnel is on-site, such as stokes litters, rope rescue gear and/or sked-type devices.
- Ensure that a properly equipped trauma kit is on-site when working in adverse terrain. In this case, the bleeding was controlled quickly with the use of clotting gauze (Quick Clot) from a personal medical kit carried by one of the students.

PHOTOS/SITE DIAGRAMS/MAPS

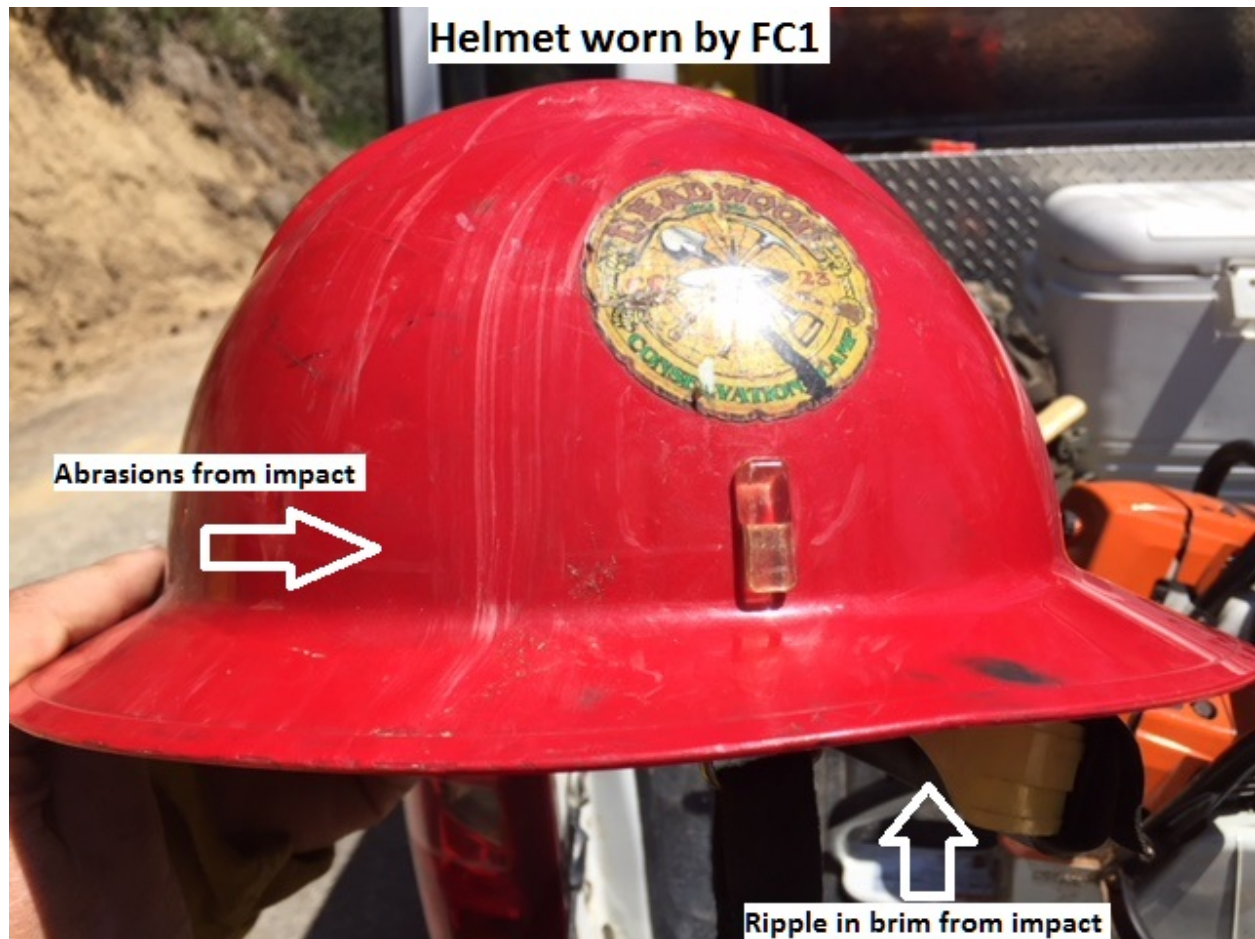


Figure 1: The helmet worn by FC1



Figure 2: Recreation of the position FC1 and his equipment was found.



Figure 3: Uphill view from the base of the tree showing the debris field.

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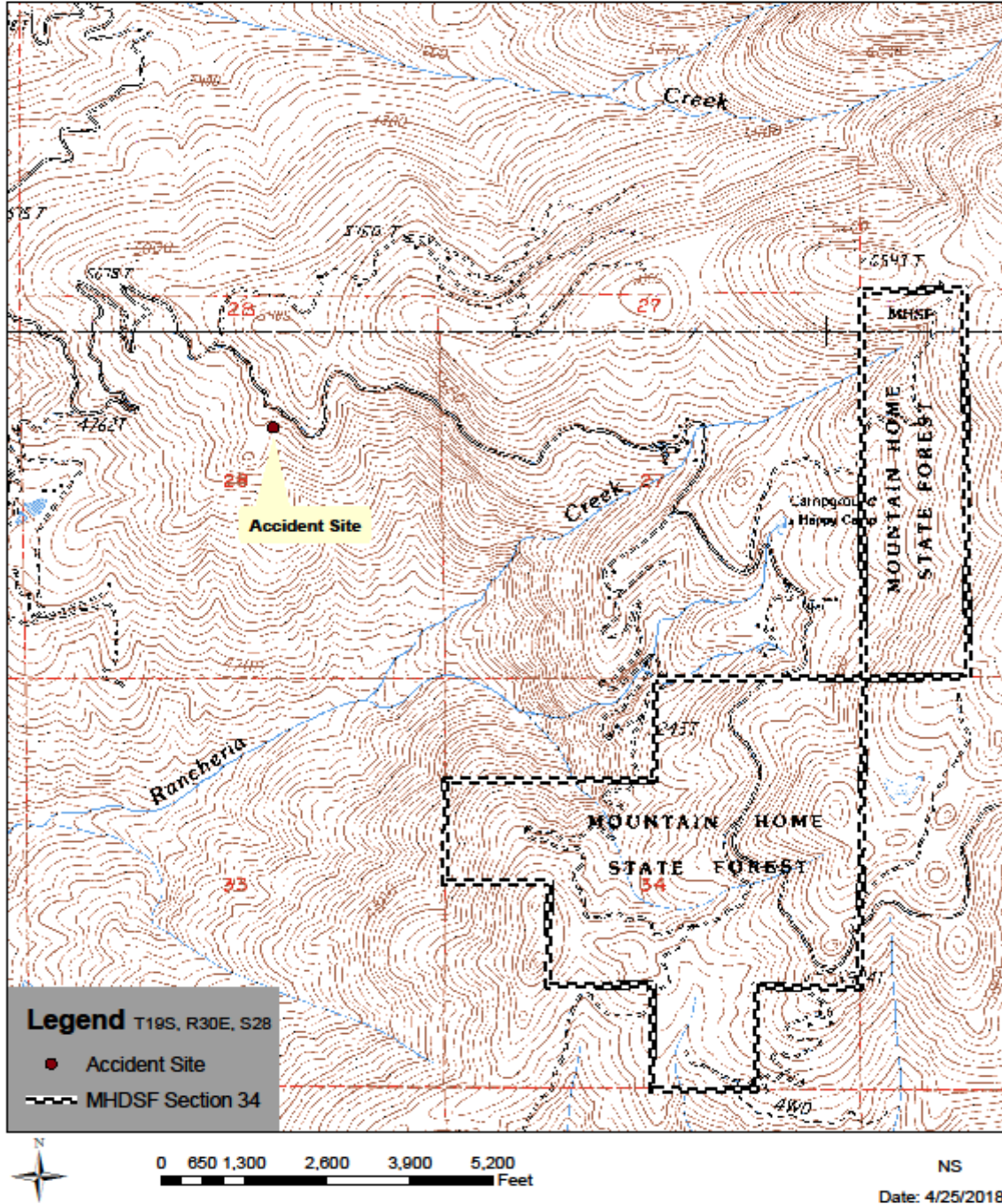


Figure 4: Topographic map of accident site.

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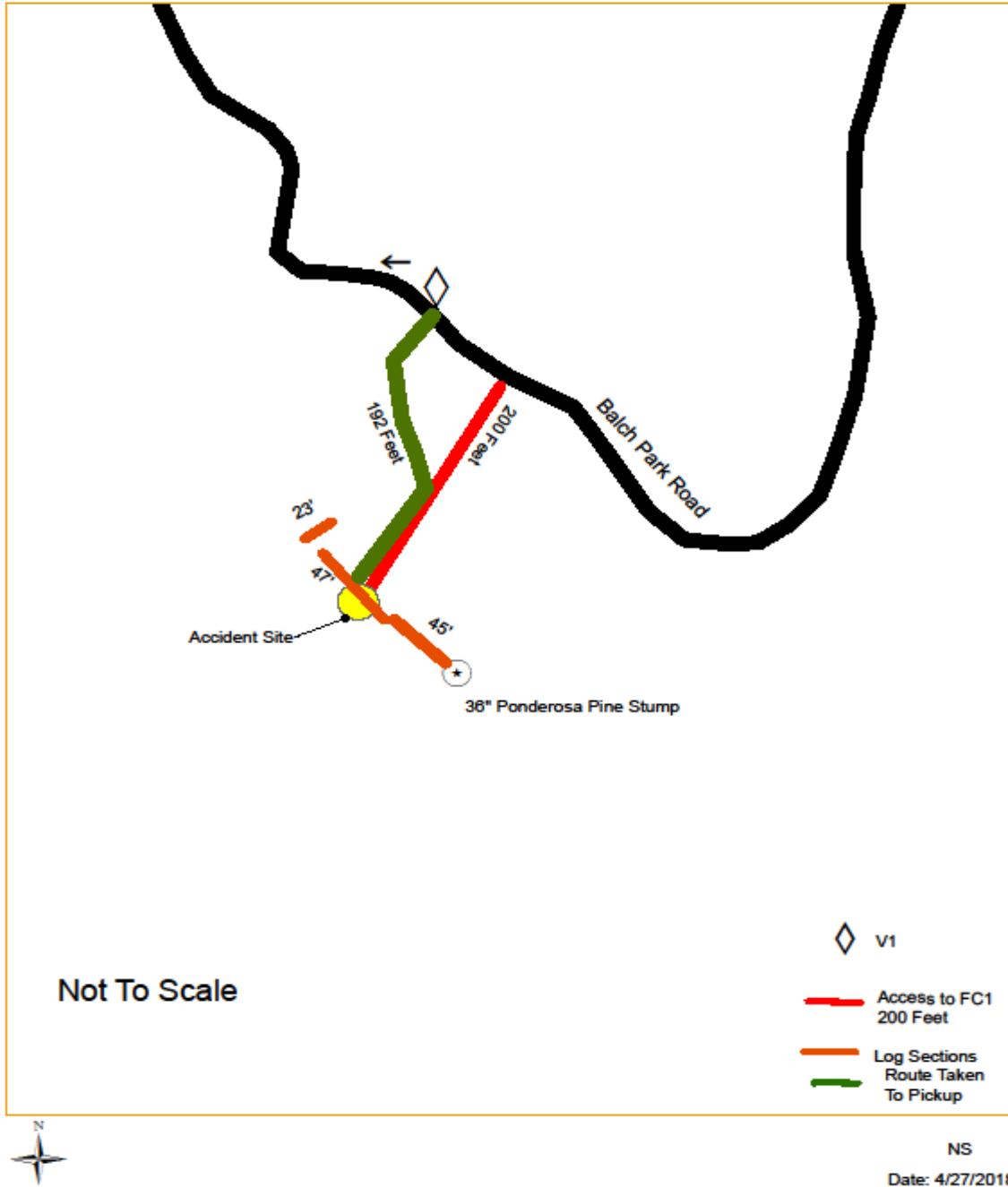


Figure 5: Diagram of accident site.