

# 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).

## CONDITIONS

### Location

The accident site is in the central portion of Mariposa County, southwest of the community of El Portal and north of the community of Jerseydale, California. The accident site is located off Hites Cove Trail, near Marble Point, above the South Fork of the Merced River.

### Fire History

The last fire to encompass the heel of the Ferguson Fire was the Motor Fire in 2011.

### Weather

The El Portal RAWS is located 5.5 miles from the accident site, 4 miles from the heel of the Ferguson Fire at an elevation of 2050 feet and is representative of the conditions at the approximate time of the accident.

Temperature: 72-75 degrees Fahrenheit

Relative Humidity: 43-55% RH

Wind: Calm with max gusts of 2 mph

Visibility: Clear, no moon

### Fuel Type

Fuel Model Timber Understory 5 (TU5) represents the vegetation in the area. The vegetation is primarily made up of oak, pine, brush and understory litter with pockets of Ponderosa Pine in Grey Phase (beetle killed trees that are still standing but have dropped their needles).

### Topography

The accident site is located in a network of steep river canyon drainages and narrow ridges.

Aspect: East

Elevation: 2495' - 2650'

Slope: Average 68% with areas over 80%

### **Geology / Soil Conditions**

Bedrock in the area consists of foliated schist to slate with interlayers of more competent chert and limestone that outcrop along local ridgelines. The orientation of the foliation is near vertical and strikes to the northwest. Overlying the bedrock is a shallow (0.5' to 2.0') layer of soil composed of a silty sand with gravel.

### **Road Conditions**

Steep, narrow (unimproved 9-10', Dozer 1 improved to 11'), Off Highway Vehicle (OHV) trail with multiple switchbacks, overhanging trees and brush. Historical records indicate the trail was originally constructed in the late 1800's to early 1900's as a mining-era road. The road crosses steep (65% to 85%) side slopes and is composed predominantly of a  $\frac{3}{4}$ -bench road prism, with the inside majority of the road excavated into bedrock and the outside edge of the road constructed out of sidecast fill. The outside fill slope inclination is steep to extremely steep and ranges from 60% to 150% in gradient. In some isolated areas, particularly where resistant bedrock is exposed within the cut bank, the outside edge of the road prism is near vertical and is supported by dry-stacked rock walls. Average road grade is 10% to 15% over 1.5 miles.

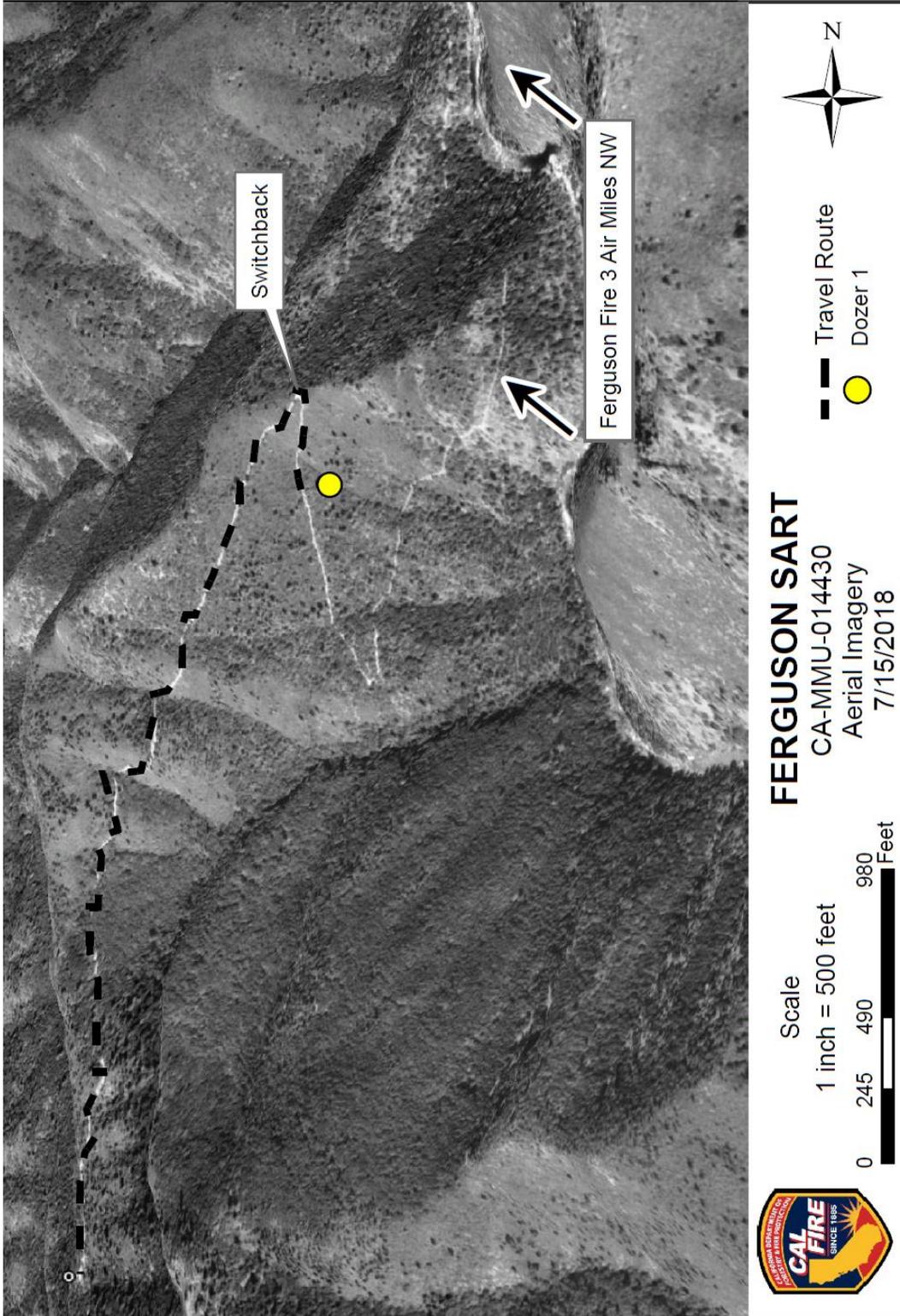
### **Fire Behavior**

No active fire occurred near Dozer 1 at the time of the accident. The fire was approximately three miles north/northwest of the accident site between Highway 140 and the South Fork of the Merced River. The fire behavior below is representative of the fire between midnight and 5:00 AM on July 14, 2018.

Head Fire	Rate of Spread 13-16 chains/hour	Flame Lengths 8-10'
Flanking Fire	Rate of Spread 2-3 chains/hour	Flame Lengths 3-5'
Backing Fire	Rate of Spread 2-0.5 chains/hour	Flame Lengths 1-2'

### **Make/Model of Equipment:**

2012 John Deere 750J Crawler Dozer Medium with winch attachment and forestry package. The bulldozer is 18' 11" long, 8' 2" track width, 10' 8" blade width and weighs approximately 42,320 pounds.



## SEQUENCE OF EVENTS

On Friday, July 13, 2018 at 8:34 PM, the Madera-Mariposa-Merced Unit (MMU) Emergency Command Center (ECC) dispatched a wildland fire, identified as the Ferguson Fire. The Ferguson Fire is located in the Federal Responsibility Area (FRA) of the Sierra National Forest (SNF), on Highway 140 between Redbud Lodge and Cedar Lodge, five and one-half miles west of El Portal. The dispatch consisted of a Battalion Chief (B1) and four engines. A Yosemite National Park (YNP) Battalion Chief (B2) arrived at approximately 8:51 PM and reported 50 acres burning with an immediate structure threat. At 8:55 PM, the CAL FIRE response was augmented to include an additional Battalion Chief, six engines and two Bulldozers (Dozer 1 and an additional dozer). Dozer 1 staffing consisted of Transport Dozer 1 with Dozer 1, staffed by HFEO 1; and Dozer Tender 1 staffed by a Fire Fighter 1 Dozer Swamper (Swamper 1). Swamper 1 was a qualified Heavy Equipment Boss. Swamper 1 contacted HFEO 2, who was off-duty, to advise of the fire and coordinate the operator swap the following morning. HFEO 1 was also advised of the plan for HFEO 2 to relieve him.

At 8:58 PM, B2 reported the fire to be approximately 100 acres, burning at a moderate rate of spread. At 9:05 PM, B1, who was not at scene, discussed with HFEO 1 a plan to scout Ferguson Ridge. At 9:20 PM, B1 arrived at scene and began to transition command with B2. B1, now the Incident Commander (IC), told the ECC this was going to be an Extended Attack Fire with the potential to become a Major Fire. Due to pre-existing technical issues, Automatic Vehicle Location (AVL) information for CAL FIRE resources was not available to the IC. At 9:27 PM, IC and HFEO 1 had another radio conversation regarding the location of the fire and which direction the fire was heading. HFEO 1 was awaiting the arrival of Swamper 1 and would then begin to scout a location in Dozer Tender 1 to offload Dozer 1 and begin line construction.

At 9:40 PM, IC re-estimated the fire to be 50 acres with a slow to moderate rate of spread, burning in brush and timber with a grass understory, having access issues, and again repeated the fire would be an Extended Attack Fire with the potential to become a Major Fire. At 9:52 PM, HFEO 1 and Swamper 1 were in Dozer Tender 1 scouting locations to access the fire. IC and HFEO 1 discussed the location of the fire and developed a plan to have the other dozers make access at Cedar Lodge and work to the top of the ridge, while Dozer 1 suggested he would try to cross the South Fork of the Merced River and tie in with them.

At 10:16 PM, Transport Dozer 1 arrived at their offloading location on Hites Cove Road approximately ½ mile east of Apperson Mine Road. At 10:38 PM, IC attempted to contact Dozer 1. Swamper 1 relayed Dozer 1 was unable to communicate, however, he could relay. IC communicated the plan to use the remaining dozers to open up Hites Cove Trail from the north. IC provided an option to HFEO 1 to come off

Hites Cove from the south, cross the river and work west or return to the Incident Command Post (ICP).

At 10:43 PM, IC communicated to Swamper 1 that Dozer 2 was working in from Cedar Lodge and Swamper 1 told IC that Dozer 1 was trying to get down through Hites Cove Trail to the river. Swamper 1 was following approximately 100 feet to 200 feet behind Dozer 1.

On Saturday, July 14, 2018 at 12:05 AM IC and Dozer 1 communicated as to their status and the plan for Dozer 2. At 12:11 AM, IC updated the ECC that the fire was approximately 75 acres, with a slow rate of spread and will be an Extended Attack Fire, with a critical need for hand crews and air support in the morning.

At 1:43 AM, IC notified ECC that a Strike Team of Dozers, consisting of a Leader (STL) and two dozers arrived at the ICP.

At approximately 2:30 AM, Dozer 1 made it from Transport Dozer 1 down Hites Cove Trail to the switchback. HFEO 1 improved the switchback and met with Swamper 1. At approximately 3:00 AM, HFEO 1 directed Swamper 1 to return to Transport Dozer 1 to obtain a replacement hydraulic line for Dozer 1 which had developed a small leak.

At 3:17 AM, IC contacted Swamper 1 for an update. Swamper 1 relayed Dozer 1 was making its way down to the river, however Swamper 1 had to return to Transport Dozer 1 to retrieve a hydraulic line. IC told Swamper 1 dozer operations on the north side had been suspended until daylight. Swamper 1 responded that Dozer 1 was continuing down to the river. Swamper 1 also reiterated HFEO 1 was not getting out on the command frequency, however Swamper 1 was relaying for HFEO 1.

At approximately 4:30 AM, Swamper 1 and HFEO 1 communicated on the tactical frequency as to the location of the keys to access the replacement hydraulic line on Transport Dozer 1. At approximately 5:00 AM, Swamper 1 arrived at Transport Dozer 1 and attempted to contact HFEO 1 to advise he was going to MMU Headquarters to pick up HFEO 2, who was HFEO 1's relief. Positive contact via radio was not made between Swamper 1 and HFEO 1. At approximately 5:30 AM, Swamper 1 departed Transport Dozer 1 to travel to MMU Headquarters and pick up HFEO 2.

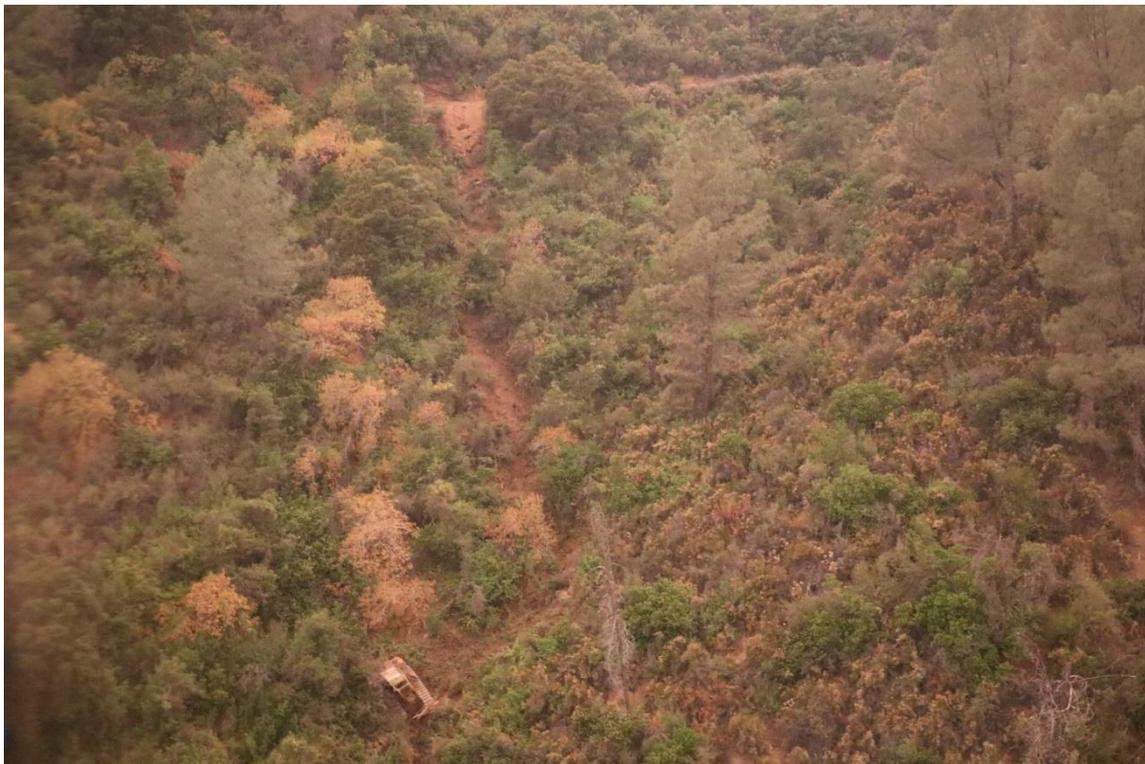
At 6:02 AM, IC updated the ECC that the fire was approximately 130 acres, 5% contained and had a high potential to become a large fire. Swamper 1 arrived at MMU Headquarters just before 7:00 AM to pick up HFEO 2. At 7:48 AM, Swamper 1 attempted to contact HFEO 1 on command with no success. At 7:49 AM, the STL contacted Swamper 1 on command and discussed the status of the dozers on the north side. Swamper 1 asked the STL to try and raise HFEO 1 on the radio and advise him Swamper 1 and HFEO 2 were at Transport Dozer 1. The STL told Swamper 1 he had previously tried to contact HFEO 1, with no success.

At 8:03 AM, HFEO 2 called the ECC via cell phone, from Darrah Road, to advise of the operator swap with HFEO 1. At 8:04 AM, IC contacted the ECC on command to make a notification the SNF was now in command of the incident and B1 was now the night IC. At 8:07 AM, HFEO 2 contacted the night IC to confirm the plan for the dozers and was directed to load up the equipment as they were going to be released. HFEO 2 told the night IC they were unable to raise Dozer 1 and it would be a while before they got out.

At 8:27 AM, the night IC was advised the shoulder of the fire on Division A was turned, however, fire activity was starting to increase.

At 8:36 AM, while on Hites Cove Trail south of the switchback, HFEO 2 contacted the night IC to request air resources to look for Dozer 1, as they couldn't contact him on the radio.

At 8:47 AM, Air Attack observed a possible dozer which had rolled over and requested a helicopter for a possible medical emergency. At 8:53 AM, the MMU ECC dispatched a medic unit to the incident for a dozer rollover. At 8:54 AM HFEO 2 and Swamper 1 were guided into the final resting location of Dozer 1 and Swamper 1 accessed Dozer 1 on foot. Dozer 1 was located approximately 575 feet south of the switchback and approximately 220 feet below the road. At approximately 9:09 AM Swamper 1 determined HFEO 1 had suffered fatal injuries.



Looking at the fall line and dozer final resting place

## POST INCIDENT ANALYSIS

A post incident analysis of the accident scene and associated OHV trail revealed Dozer 1 had been flattening a small berm along the outside edge of the trail and ultimately widened it to approximately eleven feet. There were three slip locations, spread over several hundred feet, where Dozer 1 left the trail prior to the rollover. Each of these slips would have independently qualified as a Near Miss. The first Near Miss revealed Dozer 1 had completely left the trail, before climbing back up and continuing down the trail (*See Diagram on page 18*).

The hydraulic line leak on the blade was not a factor in the accident.

## INJURIES/DAMAGES

1. During the rollover event HFEO 1 suffered fatal injuries.
2. Dozer 1 was damaged beyond repair.

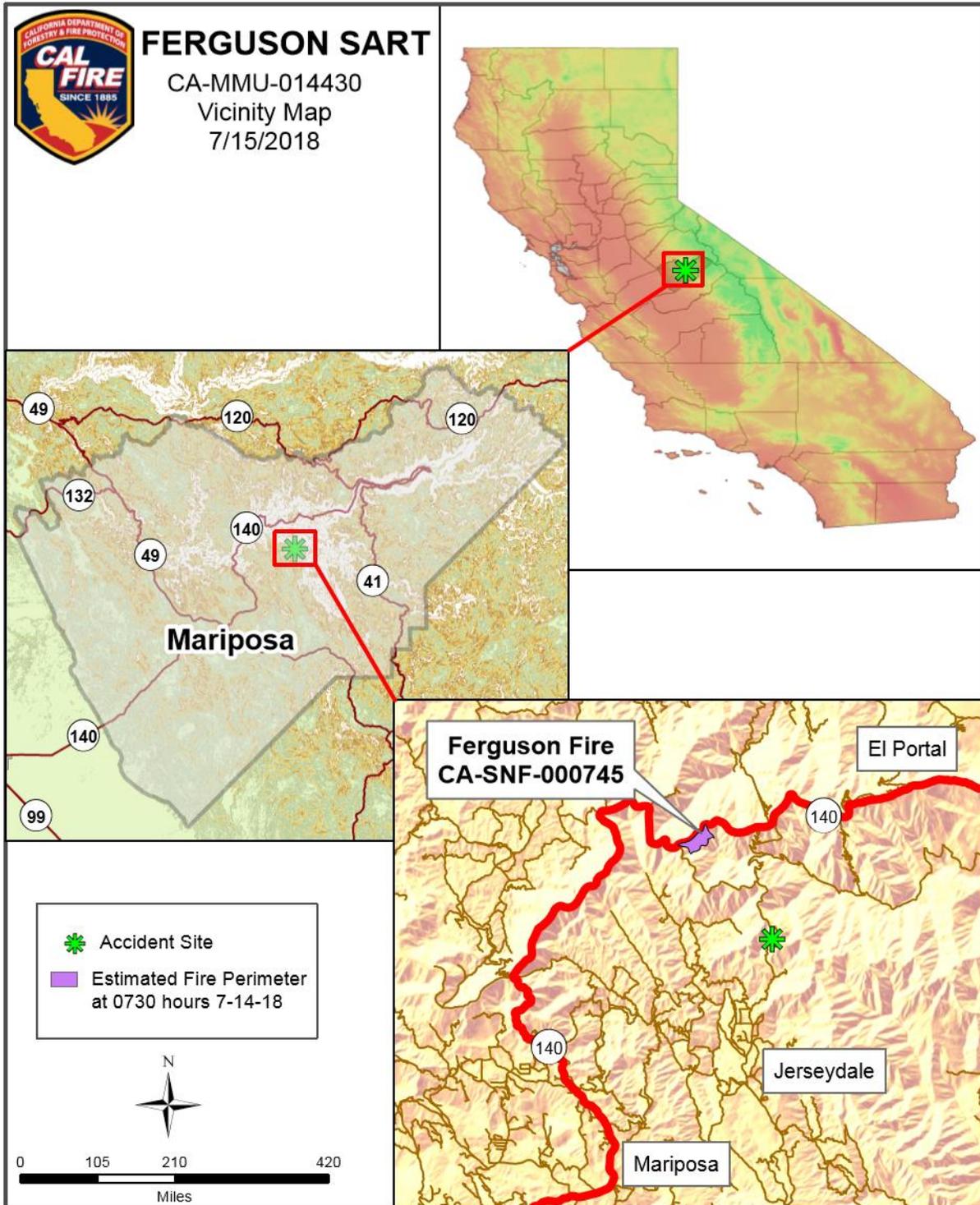
## SAFETY ISSUES FOR REVIEW

1. Risk analysis must be conducted and has to be considered prior to implementing a plan. Risks taken on the fireline must be commensurate with goals and objectives.
2. Actions taken on the fireline must have strategic or tactical value.
3. Firefighters should recognize the special hazards of working in steep terrain and diverse soil types specific to the incident they are working.
4. Fireline supervisors need to initiate and maintain communications while maintaining accountability of their assigned resources.
5. Working alone on the fireline should be an anomaly, not the rule.
6. Adjust strategy and tactics when the 10 Standard Fire Orders cannot be followed:
  - Fight fire aggressively, but provide for safety first
  - Give clear instructions to personnel and ensure they are understood
  - Post Lookouts when there is possible danger
  - Maintain prompt communications with your forces, your supervisor, and adjoining forces
  - Maintain control of your crew at all times
7. Employ risk management procedures when any one of the 18 situations that shout “watch out” are identified:
  - Working in country you have not seen in day light.
  - No communications link with crewmembers or supervisor
  - Instructions and/or assignments are not clear

## **INCIDENTAL ISSUES/LESSONS LEARNED**

1. Steep fill slopes can fail under the weight of equipment. The first three near-misses were indicators of the potential for roadway failure.
2. The LCES concept is not limited to fire suppression. LCES can be applicable during high risk activities and should be appropriately utilized.
3. Lookouts must be empowered to cease operations when unsafe activities are observed to share the observations, express concerns with the resource(s), and mitigate as appropriate.
4. Modern equipment can exceed the limits of safe fire ground operations and may cause personnel to push too far.
5. Use the IRPG Risk Management process to mitigate hazards
6. Establish decision points to disengage and reengage the incident and make them known.
7. Ensure effective communications are in place before beginning any assignment.

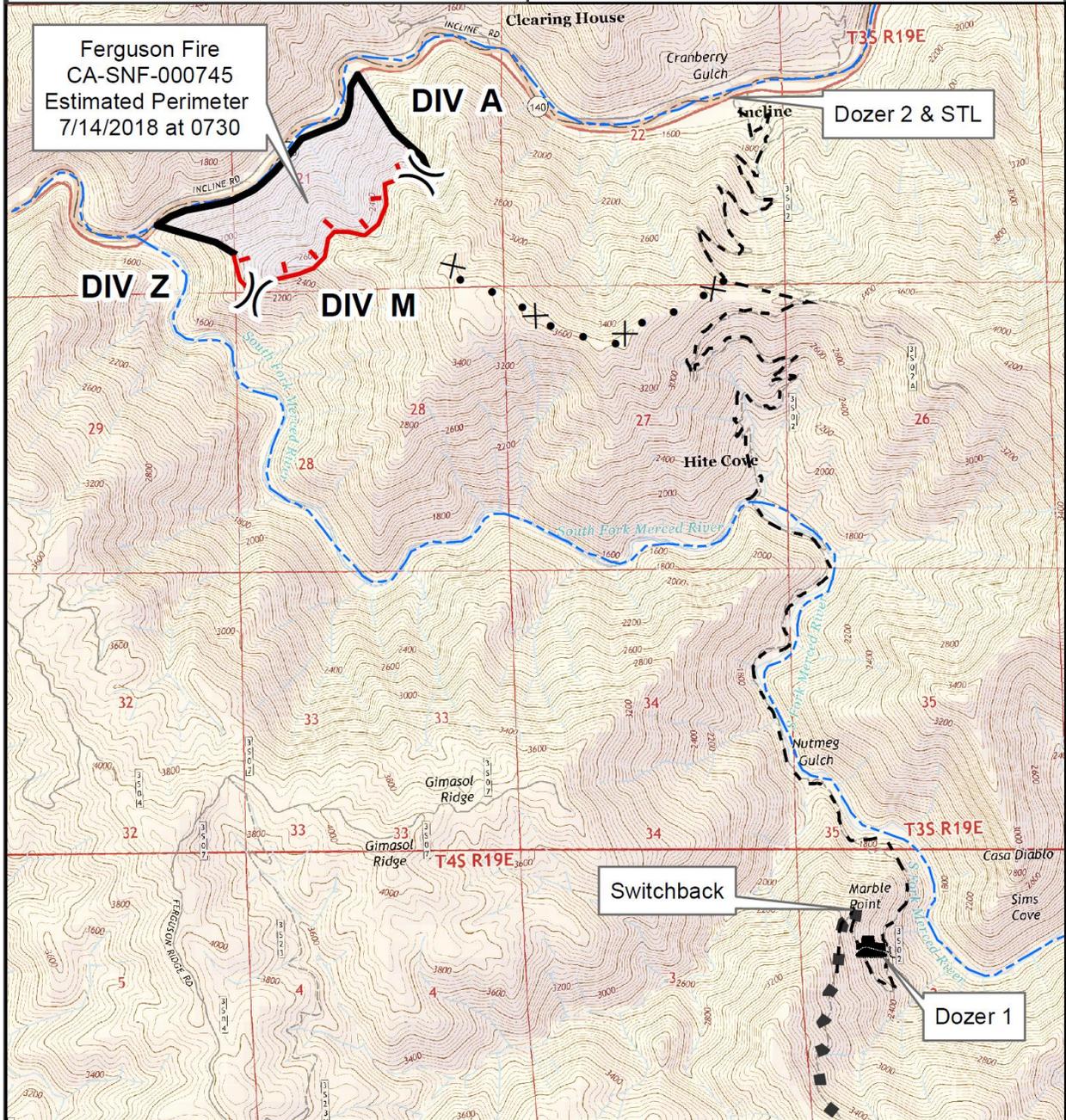
## PHOTOS/SITE DIAGRAMS/MAPS

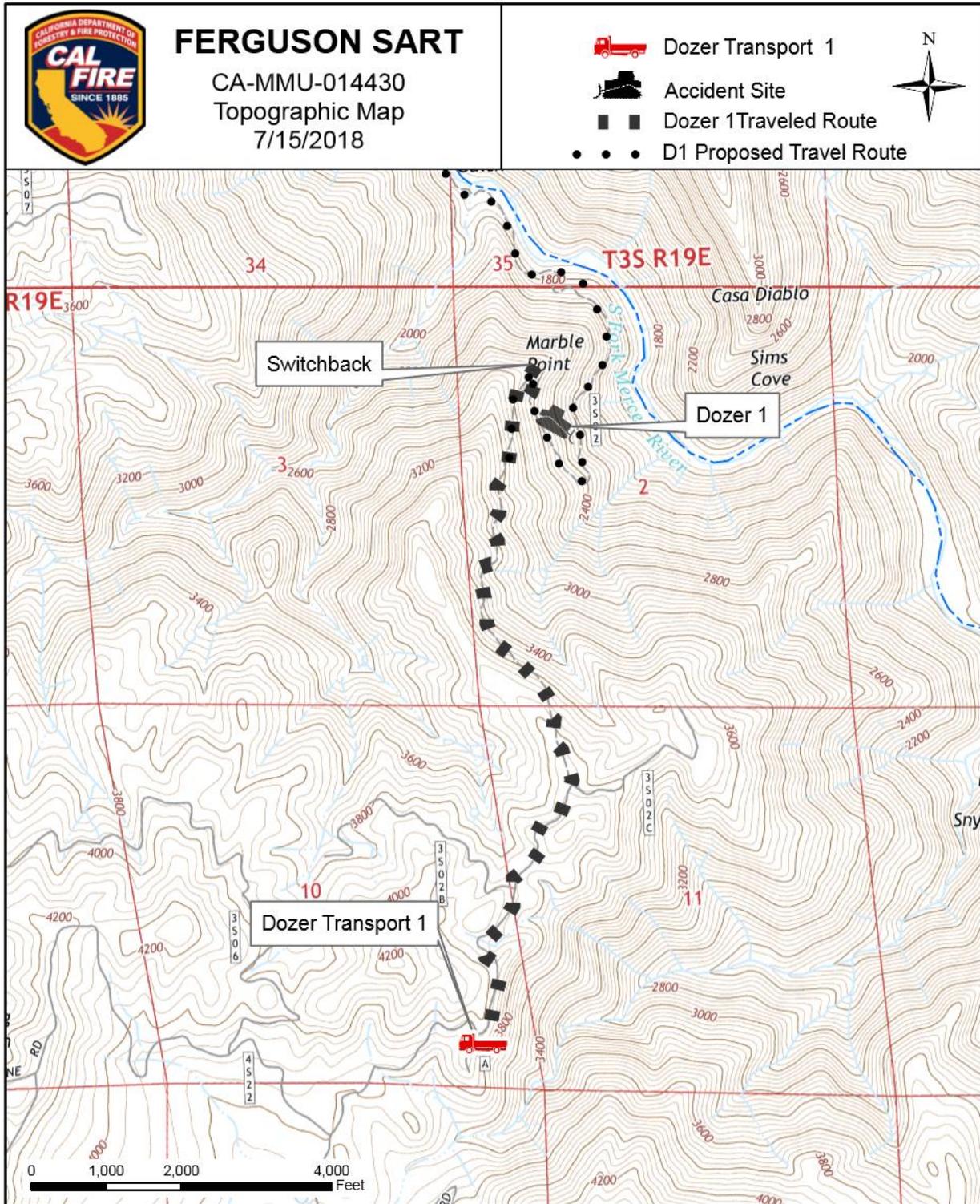


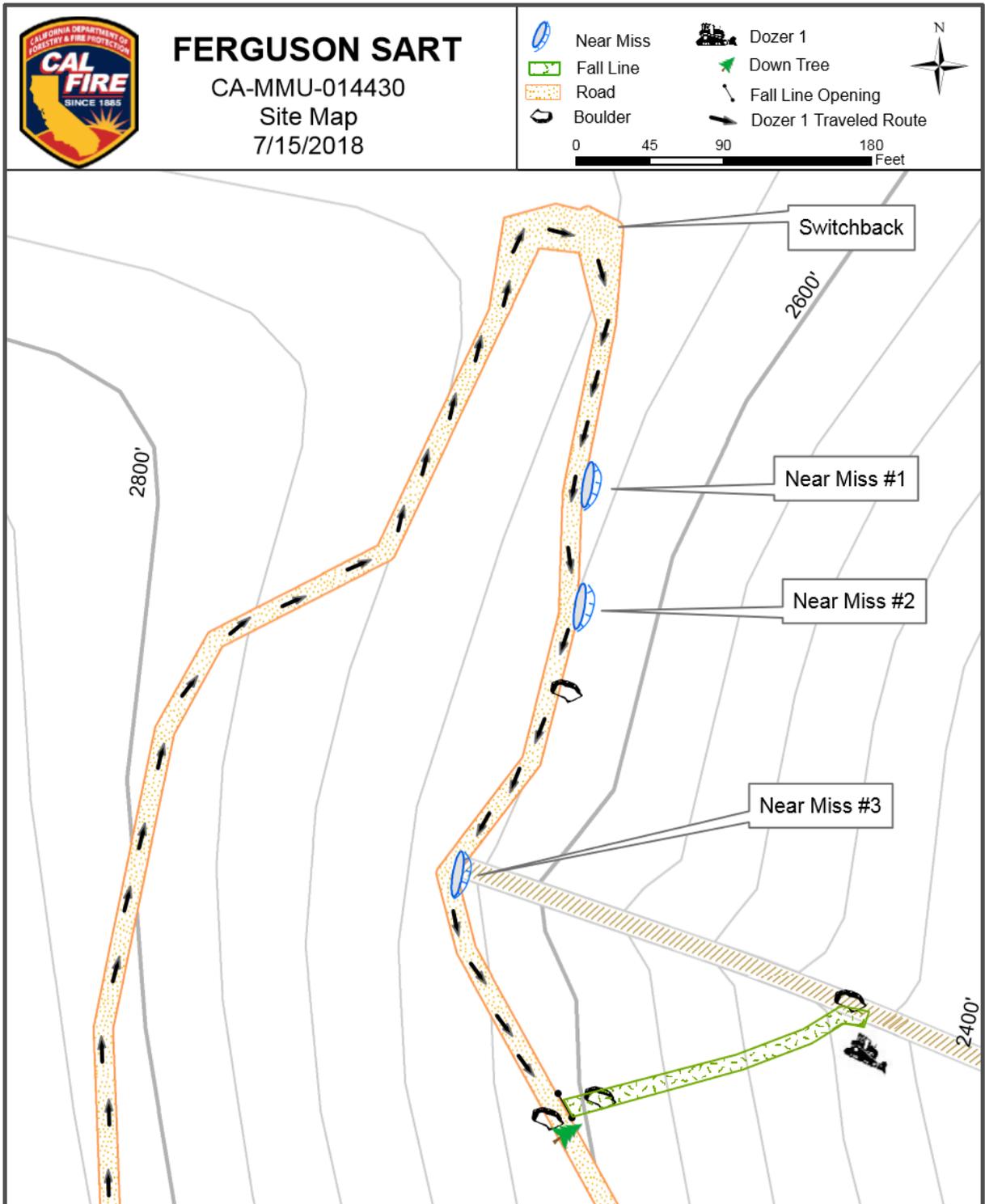


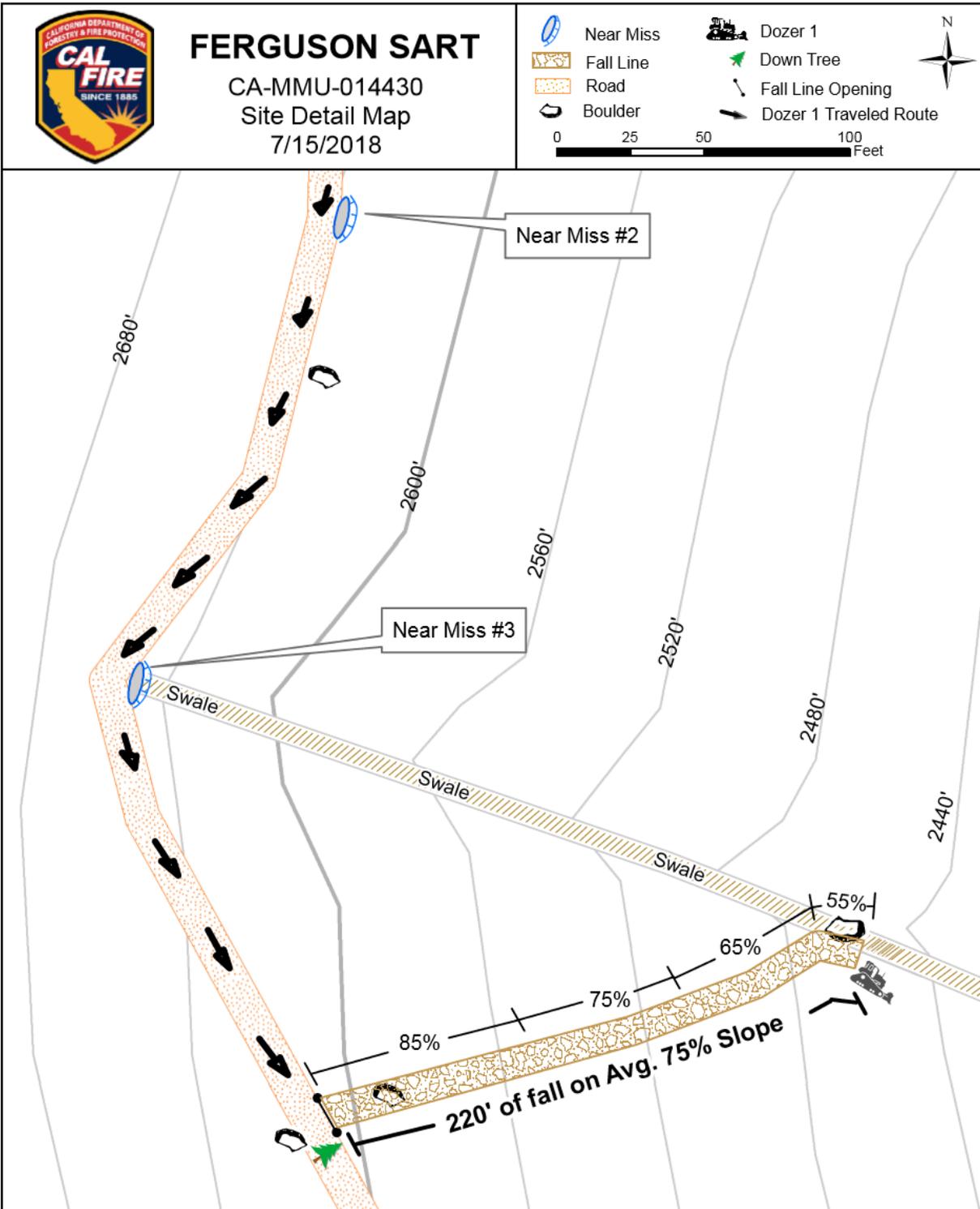
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 Transition Map  
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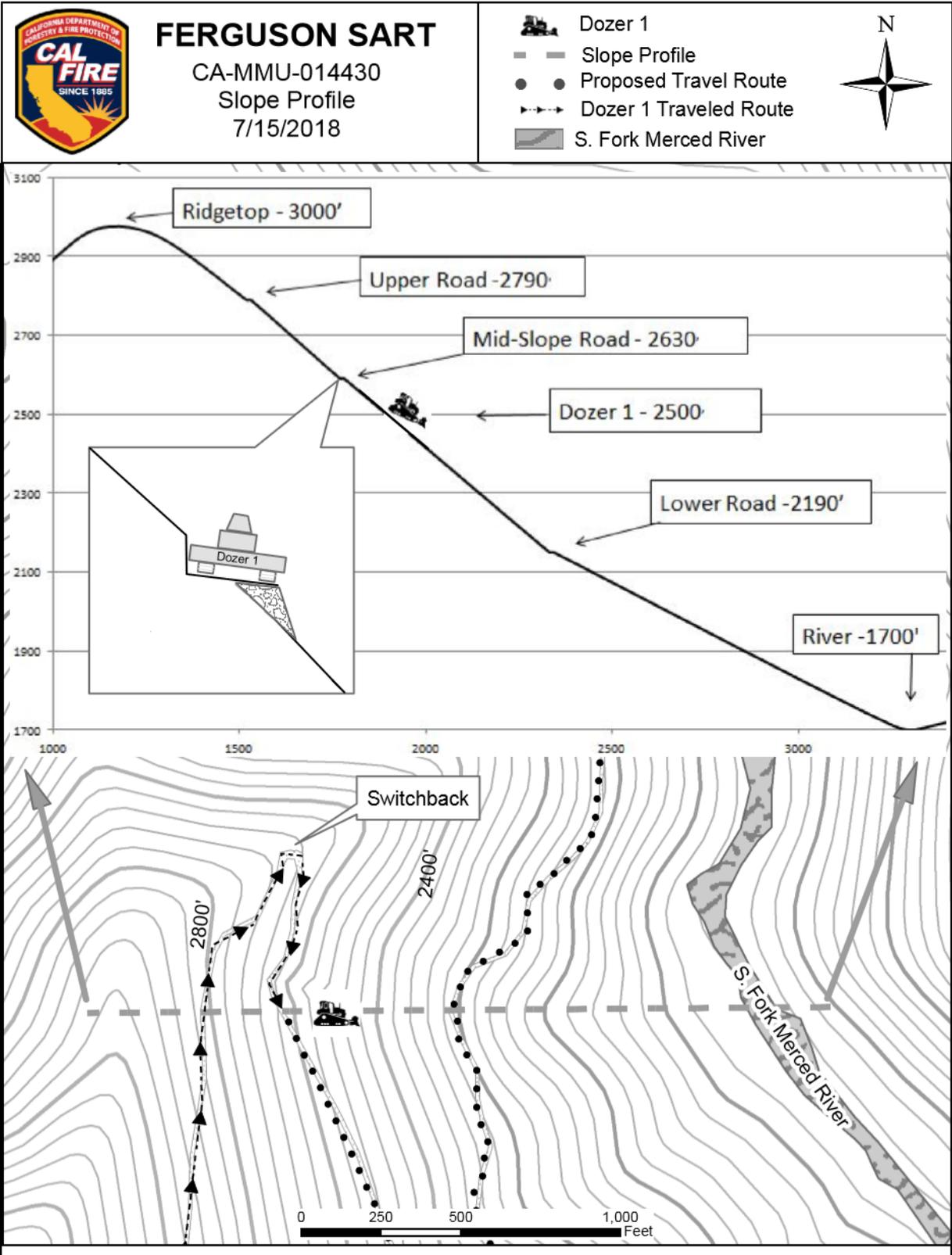
- Accident Site
- Completed Fire Line
- Uncontrolled Fire Line
- Dozer 1 Traveled Route
- Proposed Travel Route
- Proposed Dozerline

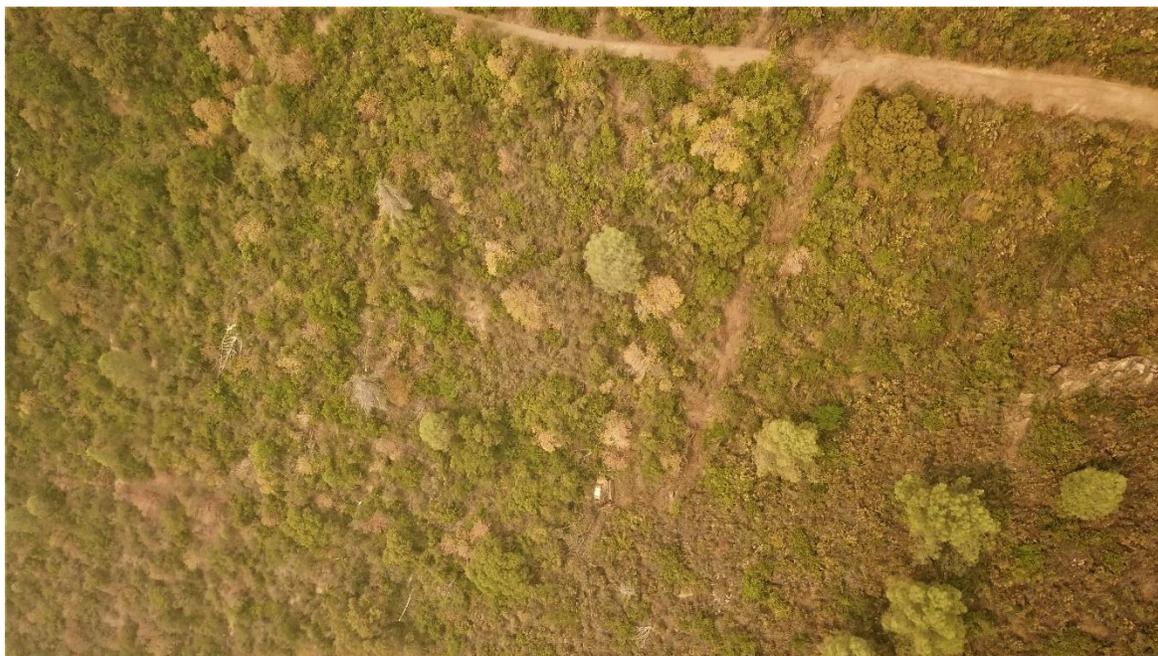












View looking at the fall line and Dozer 1 final resting place



View looking north along the trail at the fall site



Looking east at the top of the fall site



Looking down at the trail and top of the fall site



Dozer 1 final resting location



Diagram of Dozer 1 at Near Miss #1