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

CAL FIRE Academy Dozer Accident

June 3, 2015

Heavy Fire Equipment Operations Academy #41 Dozer Accident

15-CA-TCU-005534

15-CA-CDF-000243

Sacramento Headquarters

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.

Lookout **C**ommunications **E**scape Routes **S**afety Zones

SUMMARY

CAL FIRE and cooperating agency personnel assigned to CAL FIRE Heavy Fire Equipment Operator (HFEO) Academy #41 [incorrectly referenced as HFEO Academy #40 on the Blue Sheet previously issued] were participating in a field training exercise in the Tuolumne Calaveras Unit (TCU). During this exercise, a dozer rolled over one and one quarter times coming to rest on the dozer's side.

On June 3, 2015, an HFEO academy was being held in conjunction with a Vegetation Management Program (VMP) treatment in TCU. At approximately 1800 hours, a CAL FIRE bull dozer (D3140) operated by a cooperating agency employee was constructing a dozer line downhill. Measurements taken using a clinometer indicate slopes of 20 and 45 percent along the dozer line. The dozer operator was the second in line of two dozers, improving a dozer line under the supervision of an adjunct instructor. During this operation, D3140 became unstable while stuck on a rock. The dozer rolled one and one quarter times downhill and came to rest on D3140's right side. The operator suffered a small contusion above the right brow and a laceration on the right forearm requiring nine sutures. The operator didn't suffer any loss of consciousness.

The academy instructors and students immediately responded to D3140 to assist and treat the operator. A CAL FIRE light utility vehicle was used to transport the operator to the Sonora Regional Medical Center. The operator was treated and released the same evening.

CONDITIONS

Location: Whittle Vegetation Management Plan (VMP No. Rx-CSR-052-TCU), Fowler Peak, Calaveras County near the town of Angels Camp, South and East of State Highway 4, North and West of New Melones Reservoir.

Specific site where D3140 came to rest as recorded with a Garmin GPS device: latitude and longitude coordinates, WGS 84: N 38°01.400', W 120°33.970'.

Topography and Soils: As described in the project description contained in the Whittle Vegetation Management Plan (Rx-CSR-052-TCU, 2012), topography is moderately steep to steep, heavily dissected, rocky terrain. D3140's rollover occurred on an approximately 60 foot (slope distance) section of dozer line with an average slope of 45 percent as measured by clinometer. Slopes in the area of the rollover generally vary between 20 and 45 percent. The prevailing soil type is the Loafercreek Series, a mix of clay and rock fragments formed from metavolcanic rock (mainly greenschist) that is moderately deep and well-drained. Soil conditions at the rollover site match this description well.

Fuel Type: Dense understory of chamise, manzanita, ceanothus, and poison oak, mixed with an overstory of gray pine, ponderosa pine, black oak, blue oak, and scrub oak.

Recorded Weather Observations[1]: 1800 hours, June 3, 2015

Temperature: 73°Fahrenheit
Relative Humidity: 42%
Dew Point: 48.5°Fahrenheit
Winds: West Northwest 4 mph

Equipment Type: D3140 is a Caterpillar D5H provided for the HFEO Academies by the CAL FIRE Riverside Unit.

SEQUENCE OF EVENTS

On June 3, 2015, CAL FIRE Academy students enrolled in HFEO Academy Class #41 were conducting field training exercises on a portion of an approved Vegetation Management Plan (VMP) in the Tuolumne Calaveras Unit (TCU).

At approximately 1730 hours, Adjunct Instructor #1 (Instructor1) was supervising a downhill dozer line construction scenario when Adjunct Instructor #2 (Instructor2), serving as a Division Group Supervisor, radioed to request the assignment of a second dozer to widen the dozer line being supervised by Instructor1. Instructor1 responded to the request and assigned CAL FIRE D3140, operated by an HFEO academy student (HFEO1) from a cooperating agency. A second HFEO academy student (HFEO2), serving in the role of a Heavy Equipment Boss, was also assigned by Instructor1 to accompany D3140.

At approximately 1800 hours, HFEO1 was following the pioneered line of a lead dozer with instructions to improve the existing dozer line to one and one-half blade widths. During this operation, HFEO1 encountered a large, boulder-sized, float rock in the middle of the existing dozer line. HFEO1 adjusted D3140's route to avoid the rock. In maneuvering around the first rock, the right side track of D3140 made contact with a second buried rock below the larger rock. This smaller rock measured approximately 4 feet, 11 inches long and 4 feet wide at its greatest points of length and width, and a height of approximately 2 feet, 3 inches on the downhill side. When D3140 made contact with the smaller rock, the grousers of the right side track lost traction and slid downhill. The orientation of D3140 at the moment the slide began was approximately 45 degrees to the fall line of the hillslope. After the grousers of the right side track slid across the rock, the center rear of the belly pan became momentarily high-centered on the rock. The orientation of D3140 was approximately 90 degrees to the fall line of the hillslope. D3140 was completely perpendicular to, rather than parallel, with the slop. This positioning resulted in the right side of the dozer facing downhill. D3140 became unstable while balanced on the rock and immediately began a slow roll on to D3140's right side. D3140 rolled one and one quarter times downslope for a total distance of approximately 60 feet (slope distance). D3140 came to rest on its right side. Both adjunct instructors and HFEO2 witnessed the rollover from their locations on the dozer line. Instructor2 immediately contacted HFEO1 by radio at the conclusion of the roll. Instructor2 inquired if HFEO1 was okay, and directed HFEO1 to shut off D3140. HFEO1

[1] Weather data obtained from recorded observations at Camanche RAWS (aka "Campo Seco" RAWS) for the period immediately preceding the incident.

responded by radio to Instructor2, and shut D3140 off. HFEO1 was then assisted out of D3140's cab by the adjunct instructors and HFEO2 who initiated medical evaluation of HFEO1. HFEO1 suffered a contusion to the right side of the head as well as a laceration to the right arm. The adjunct instructors provided medical aid and walked HFEO1 up the dozer line to the access road to await transport to a medical facility pursuant to the Incident Action Plan (IAP) for this training location.

An on-duty Battalion Chief from TCU (BC1) with responsibility for the VMP made notification to the San Andreas Emergency Command Center and TCU Duty Chief advising that a dozer rollover accident had occurred. At approximately 1825 hours, an academy adjunct instructor at the TCU training site made positive contact with academy personnel responsible for oversight of the HFEO Academy Program. Concurrent notifications were also made to the Academy Duty Chief, Academy Administrator, and Staff Chief for Training, Safety, and EMS. Following a phone call between BC1 and academy personnel in route to the accident site, the decision was made to transport HFEO1 to Sonora Regional Medical Center for evaluation and treatment.

At approximately 1930 hours, four academy personnel arrived at the TCU training site to review the accident site and meet with academy instructors and students. Shortly after arrival, academy personnel notified the student's supervisor of the accident and medical condition. Academy personnel on scene also contacted personnel at the Academy and provided a report on conditions.

Academy personnel proceeded to Sonora Regional Medical Center to relieve the TCU Battalion Chief, and serve as liaison between HFEO1 and the hospital. The academy liaison remained with HFEO1 until completion of treatment and release from the hospital later the same evening. The liaison then transported HFEO1 to the HFEO academy offsite lodging location in Angels Camp and left HFEO1 in the care of HFEO academy instructors and students. A follow-up medical evaluation of HFEO1 and release to full duty occurred the following week.

INJURIES/DAMAGES

HFEO1 suffered a small contusion above the right brow and a laceration to the right forearm requiring nine sutures. HFEO1 was placed on modified duty for three days following the accident and released to full duty thereafter.

D3140 sustained visible damage to the right side, including but not limited to bowing of the right front sweep, and compression of the right side cockpit window screens also resulting in broken windows. D3140 was transported to a Caterpillar tractor repair facility and underwent a full evaluation of its mechanical and safety components, including but not limited to the Roll Over Protection System (ROPS). The ROPS was found to be undamaged. The repair of D3140's sweeps, window screens, and windows are underway.

SAFETY ISSUES FOR REVIEW

- All personnel should review emergency medical procedures as outlined in the ICS 206, Medical Plan.
- All personnel should scout and size up the area they are working in for special hazards, especially when working in steep terrain and on or around heavy equipment.
- The presence of large rock in the soil types exposed during line construction should be considered a **WATCH OUT SITUATION** for Heavy Fire Equipment Operators.
- Ensure **SITUATIONAL AWARENESS** at all times.

INCIDENTAL ISSUES/LESSONS LEARNED (For Near Serious Accidents)

- The exposure and presence of large rocks during dozer line construction calls for careful review of proposed dozer routes and pre-planning of contingency actions to avoid slips and slides on rock surfaces.
- Smaller, and partially buried rock boulders, can be deceptively hazardous to heavy fire equipment operation.
- Maintaining dozer orientation parallel rather than perpendicular to the hillslope is important particularly when working in rocky soil types.

PHOTOS/SITE DIAGRAMS/MAPS

View of D3140 looking downslope on partially constructed dozer line at resting location following rollover accident. Notice rock in center foreground upon which D3140 appears to have initiated slide and rollover.

View of D3140 perpendicular to the hillslope at resting location following rollover.

View of D3140 looking downslope on the partially constructed dozer line. Prevailing slopes in this location measured by clinometer at 40%.

View of rock upon which D3140 initiated slide and rollover looking upslope on the partially constructed dozer line.

SCHEMATIC OF ROLLOVER ACCIDENT INDICATING APPROXIMATE POSITIONS OF PERSONNEL, EQUIPMENT, AND FEATURES