GREEN SHEET

California Department of Forestry and Fire Protection (CAL FIRE)

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

Multiple Firefighter Heat Related Injuries

July 21, 2012

Forest

12-CA-LNU-005495
12-CA-CDF-000553

California Northern Region

A Board of Review has not approved this 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 **C**ommunications **E**scape Routes **S**afety Zones

SUMMARY

On Saturday, July 21, 2012 at approximately 10:11 A.M., CAL FIRE units were dispatched to a vegetation fire near the community of Guinda in northwestern Yolo County. During the initial attack operations, five firefighters showed signs of a heat related illness. All five firefighters were engaged in firefighting operations on the Forest Incident.

Two hours after initial dispatch, two firefighters experienced a heat related illness. Approximately two hours later, a third firefighter experienced signs and symptoms of a heat related illness. By 8:00 P.M., a total of five firefighters were treated for heat related illnesses. Two of the firefighters were transported to local hospitals via air ambulance, one by ground, and the remainder treated and released at scene.

CONDITIONS

Weather
At scene weather conditions during the time of the injuries:

- Temperature: 94 – 108 F
- Relative Humidity: 8%
- Wind: Up canyon (generally southwest with the orientation of major drainages) varying 0 to 5 mph

Terrain
The fire was located in the Rose Canyon and the Hamilton Canyon drainages. These drainages run west to east respectively. The aspect was predominately north/northeast 38%, east/southeast 39% and south 14%.

Fuels
There were two predominant fuel types; low to moderate dry climate grass/shrub (GR2,GS2) and moderate to very high load dry climate shrub (SH2, SH7). The grass fuels from the origin to approximately the 800’ elevation were 12” to 18” high. The shrub fuels, comprised of chemise and manzanita, continued from approximately 800’ elevation to the ridge tops. The shrub load was dense with heights of 10’ to 15’.

Fire Behavior
The fire exhibited active burning during initial stages. It consumed all light grassy fuels with short range spotting. Suppression efforts with hand tools were ineffective to control fire spread. As the fire became established in the watershed, slope driven runs and single tree torching provided sufficient embers and convection to provide medium range spotting into receptive fuel beds. As the sun set and direct heating of the fuels subsided, relative humidity increased reducing fire intensity and behavior.

SEQUENCE OF EVENTS

On July 21, 2012 at approximately 10:11 A.M., a vegetation fire was reported near the community of Guinda, Yolo County. The fire was reported to be burning on private lands within the State Responsibility Area (SRA). The St. Helena Emergency Command Center (ECC) initiated an augmented medium dispatch which consisted of one air attack, two tankers, one helicopter, one battalion chief, four engines, two crews, and two bulldozers.

The first CAL FIRE resource, a Helicopter, arrived at scene at approximately 10:51 A.M. They reported 10-15 acres involved with some spotting.

Firefighter #1 (FF #1)

FF #1 was on duty for two days prior to the incident. FF #1 reported being well rested prior to the incident. FF #1 had 3.5 months firefighting experience. FF #1 consumed a bowl of cereal and two slices of fruit for breakfast at approximately 7:00 A.M. FF #1 participated in a moderately arduous physical training (PT) hike with the crew. FF #1 worked on a station project in the apparatus bay at the time of dispatch.

FF #1's engine arrived at approximately 11:00 A.M. FF #1 was directed by the Company Officer to get a back pump. They began fire suppression on the left flank of the fire with back pumps and hand tools.

The engine crew was unable to control the fire with back pumps and hand tools in the grassy fuels. After several attempts to control the same portion of line, the Company Officer re-directed the crew to return to the engine and re-engage the fire with a progressive hoselay.

Approximately 400 ft. into the crew's progressive hose lay, FF #1 sweated profusely and ran out of drinking water. Shortly thereafter, FF #1 felt weak and unable to continue. FF #1 walked to a nearby engine for shade and drank some chilled water. After evaluating FF #1's condition, the Company Officer decided to seek additional medical attention for FF #1. FF #1 was transported off the line in a utility vehicle to a nearby ambulance. Paramedics administered intravenous (IV) fluids and cooling measures. FF #1 was transported to Woodland Memorial Hospital.

The Personal Protection Equipment (PPE) assigned to FF #1 was inspected and found to be in serviceable condition.

Firefighter #2 (FF #2)

FF #2 was on duty for three days prior to the incident and was well rested. FF #2 had approximately 35 months firefighting experience with CAL FIRE. FF #2 ate a bowl of cereal with a protein supplement and fruit juice for breakfast. FF #2 participated in an extremely arduous PT hike with the crew that started at approximately 8:45 A.M. The hike was approximately three miles long and rose approximately 1500 feet in elevation. FF #2 completed the hike in approximately 53 minutes. FF #2 estimated the hike typically takes 90 minutes. As FF #2 returned to the engine, the engine was dispatched to the fire. FF #2 jogged approximately one mile back to the engine. FF #2 responded directly to the incident from the hike.

FF #2's engine arrived at approximately 11:06 A.M. They were assigned to Division H. FF #2's Company Officer directed the crew to tool up with hand tools and back pumps and hold the line in the division. The crews from two engines combined. The Company Officer from FF #2's engine was assigned as the Division/Group Supervisor for Division H. FF #2 made at least two return trips to the engine to resupply with drinking water and suppression water. At approximately 4:30 P.M., FF #2 returned to the bottom of the hill after repositioning the hose lay for the dozer to widen and improve the line. Upon returning to the air conditioned cab of the engine, FF #2 began to cramp. A Fire Apparatus Engineer (FAE) at the engine initiated cooling measures and removed FF #2's Nomex jacket. FF #2 continued to experience cramps throughout the body. FF #2 did not experience any dizziness, blurred vision, or headache. Care was transferred to an ALS ambulance at the staging area. Paramedics administered IV fluids to FF #2 who continued to drink Gatorade. FF #2 was not transported but released.

The PPE assigned to FF #2 was inspected and found to be in serviceable condition.

Crew Captain #1 (CC #1)

CC #1 was on duty for fifteen days, assigned to other fires, prior to the incident. CC #1 reported sleeping for 12 hours prior to the incident. CC #1 had seventeen seasons firefighting experience with CAL FIRE. CC #1 ate two pieces of string cheese, a bagel with peanut butter and a doughnut for breakfast. At the time of dispatch, CC #1 was in quarters restoring the crew bus after being cancelled from a previous fire dispatch.

The crew arrived at scene at approximately 12:08 P.M. They were assigned on Division H to hold the dozer line. While they held the line, CC #1 patrolled the line where the crew was distributed. During this time, there were several spot fires and slop-overs that required control. CC #1 hiked a 1200 foot section of line that changed in elevation approximately 280 vertical feet several times. CC #1 stopped frequently in the shade and hydrated. Over the course of the afternoon, the fire made several runs at the line. During this time, CC #1 consumed approximately five and one-half quarts of water. At approximately 5:30 P.M., CC #1 experienced cramps. CC #1 hiked approximately 700 feet to a spot fire and experienced full body cramps. The cramps originated in the calves and extended up to the neck. The cramps caused CC #1 to fall to the ground. CC #1 initiated self-cooling measures and notified adjacent firefighters. Notification of the medical emergency was transmitted to the Incident Commander who ordered a helicopter for medi-vac. CC #1 was placed in the cab of an air conditioned dozer for approximately 20 minutes and drank Gatorade and water. CC #1 was extracted to the helispot by bulldozer. At approximately 8:00 P.M., CC #1 was treated at the helispot and airlifted to UC Davis Medical Center.

The PPE assigned to CC #1 was inspected and found to be in serviceable condition.

Fire Apparatus Engineer (FAE) #1

FAE #1 was on duty for one day prior to the incident and reported being well rested. FAE #1 had approximately seven months firefighting experience in the current classification and approximately eight years total with CAL FIRE. FAE #1 ate a bowl of fruit for breakfast. FAE #1 participated in a light PT program with the crew at approximately 8:00 A.M. FAE #1 participated in a static water patient packaging training when the fire was dispatched. They returned to the station to prepare for a potential augmentation assignment to the fire.

At approximately 12:11 P.M., FAE #1's engine arrived at scene and was assigned to Division H. The crew's assignment was to follow in behind the dozers and hold the line. FAE #1 interfaced with a crew captain assigned to the same section of line and decided to intersperse the engine's crew with the inmate crew to prevent the fire from spotting over the line. For several hours, the two crews suppressed several spot fires and slop-overs.

FAE #1 hiked up the ridge approximately 1900 feet to a point midway on Division H along a ridgeline. The elevation change was approximately 436 feet vertical. FAE #1 noted the crew was low on water. FAE #1 gave one-half of a bottle of water being carried to another firefighter. While at this location, FAE #1 and the crew suppressed several slop-overs. FAE #1 rested for approximately 15 minutes and drank the remainder of water being carried. FAE #1 then hiked down the hill to meet with the Division H to obtain drinking water for his crew and the hand crew.

While talking with Division H, the fire slopped over the line again. FAE #1 and crew suppressed the slop-over with assistance from a dozer. FAE #1 sent two firefighters down the line for drinking water at the Division A/H break. After a rest of approximately 5 minutes, FAE #1 hiked up the hill and experienced lower back cramps. FAE #1 declined water offered by another firefighter. FAE #1 continued to hike to the top of the ridge. The cramps continued to increase during the climb.

When the drinking water arrived at the top of the ridge, FAE #1 consumed five bottles of water, one bottle of Gatorade and replenished water carried on the web gear. FAE #1 removed the radio chest pack and partially unzipped the Nomex jacket to cool down. FAE #1 shared one-half of a Cliff bar with another firefighter.

As fire activity increased, FAE #1 walked 20 feet and experienced more leg cramps. FAE #1 drank more water and rested for 15 minutes in the shade. When FAE #1 tried to walk again, the cramps radiated to different areas of the body. FAE #1 called the crew over and directed them to notify Division H of a firefighter down. FAE #1 was airlifted to UC Davis Medical Center and admitted for treatment.

The PPE assigned to FAE #1 was inspected and found to be in serviceable condition.

Crew Captain #2 (CC #2)

CC #2 was on duty for one day prior to the incident and reported being well rested. CC #2 had approximately seventeen seasons firefighting experience with CAL FIRE. CC #2 ate a bowl of oatmeal with raisins and two bananas for breakfast. CC #2 participated in an extremely arduous PT program which consisted of a 5.5 mile run prior to dispatch.

CC #2's crew arrived at scene at approximately 11:14 A.M. and was assigned to Division Z. The crew super-crewed with another hand crew and cut hand line for approximately one hour. The crews completed approximately 1600 feet of line construction before they assisted an engine with a hose lay. At approximately 5:15 P.M., CC #2 experienced cramps and a headache while working on the fireline on a 35-40% slope. CC #2 took cooling measures and drank two Squenchers™ with water. Approximately 15 minutes later, CC #2 experienced cramps in the abdominal area. The Branch Director directed personnel to transport CC #2 to a nearby ALS-equipped engine for further evaluation. At approximately 6:30 PM, CC #2, accompanied with the Paramedic from the ALS engine, was transported to an ambulance located in the Staging Area. CC #2 was evaluated by paramedics at approximately 8:00 P.M. CC #2 received IV fluids, refused further treatment and transport, and returned to the crew at approximately 9:00 P.M.

The PPE assigned to CC #2 was inspected and found to be in serviceable condition.

INJURIES/DAMAGES

FF #1 sweated profusely and experienced foggy vision, weakness, and fatigue. FF #1 was treated and released from a local hospital.

FF #2 experienced cramps in the hands which eventually radiated throughout the entire body. FF #2 was treated with IV fluids at the incident and released.

CC #1 experienced cramps which radiated throughout the entire body. CC #1 was airlifted and received treatment at a local hospital for approximately one and a half days.

FAE #1 experienced cramps which radiated throughout the entire body. FAE #1 was airlifted and received treatment at a local hospital for approximately two and a half days.

CC #2 complained of heat exhaustion, vomiting, leg cramps and right flank abdominal cramps. CC #2 was treated with IV fluids and returned to the crew.

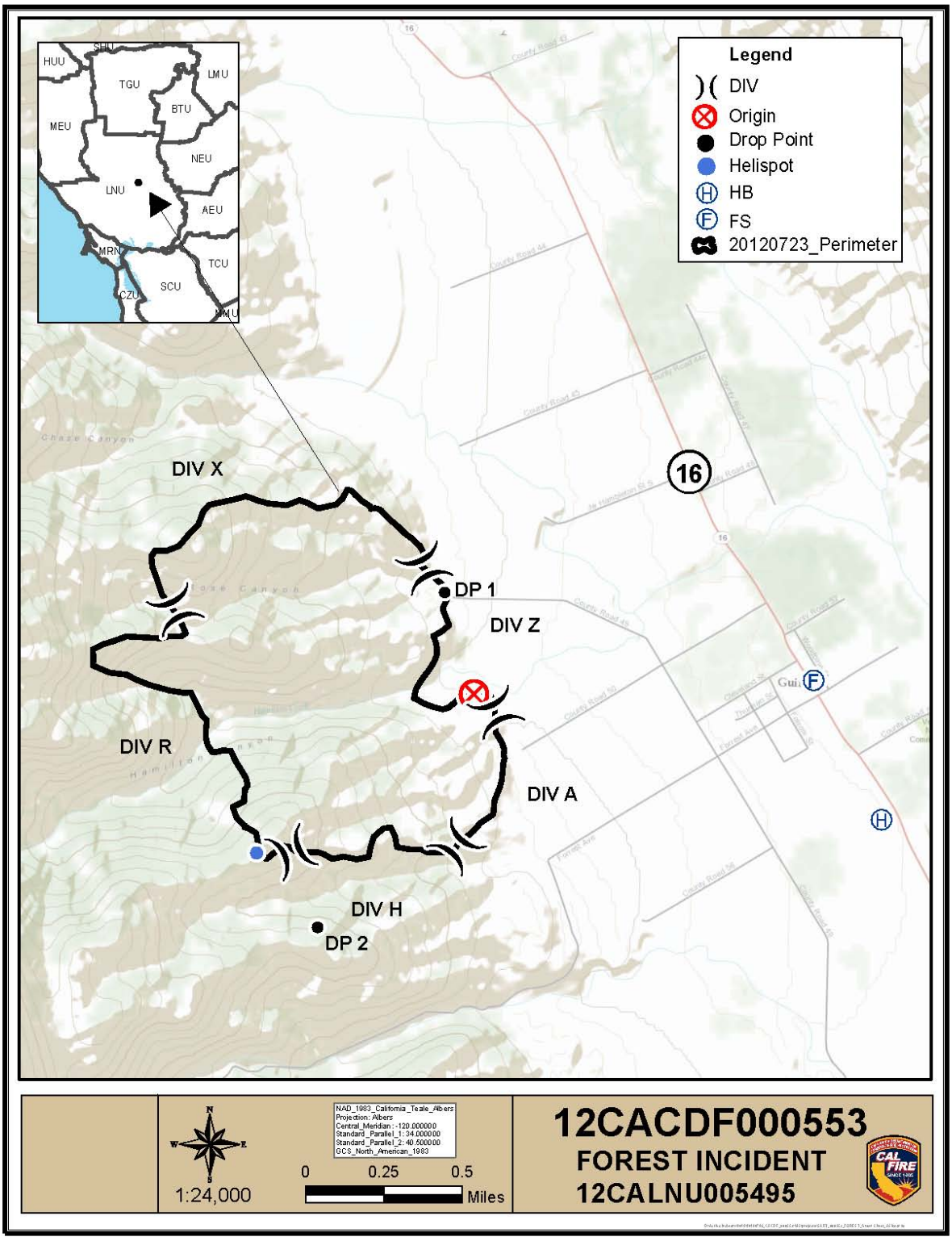
SAFETY ISSUES FOR REVIEW

- All personnel should familiarize themselves with the Department Heat Illness Prevention Policy HB Section 1855- http://calfireweb/pubs/issuance/1800/1855.pdf

- All personnel should familiarize themselves with the Department Heat Illness Prevention Plan http://calfireweb/organization/fireprotection/safety/

- Control heat stress by ensuring:
    - Nutritional requirements are maintained
        - http://www.fs.fed.us/t-d/pubs/pdfpubs/pdf07512803/pdf07512803dpi72.pdf
    - Appropriate hydration (1800 Health and Fitness Handbook, Section 1855.5.3)
        - Maintain appropriate hydration levels balancing electrolyte intake with water
        - http://www.wemjournal.org/article/S1080-6032%2811%2900046-9/fulltext
    - Recognition of environmental factors that contribute to heat illnesses
        - Understand the relationship between temperature and humidity
        - http://wildfirelessons.net/documents/Heat_Illness_Basics_For_Wildland_Firefighters.pdf
    - Maintenance of personal monitoring (1800 Health and Fitness Handbook, Section 1855.5.5)
        - Watch yourself and each other
        - Recognize the signs and symptoms of heat illness
        - http://gacc.nifc.gov/swcc/management_admin/safety/safety_snippits/documents/Heat_Illness_Links.pdf
    - Firefighters exhibiting the signs and symptoms of heat stress should notify their supervisor.
        - 2010 IRPG Page 45 Heat-related Injuries
        - 2010 IRPG Page 41 Medical Response Procedures
    - Work/rest cycles are compatible with the assignment. (1800 Health and Fitness Handbook, Section 1855.5.4)
        - Supervisors maintain appropriate work/rest for the entire crew
        - http://www.fs.fed.us/t-d/pubs/pdfpubs/pdf97512814/pdf97512814pt01.pdf
    - Firefighters are acclimatized to their work environment (1800 Health and Fitness Handbook, Section 1855.5.2)

- Heat illness is a very serious and potentially fatal condition
    - http://www.cdc.gov/niosh/fire/pdfs/face201117.pdf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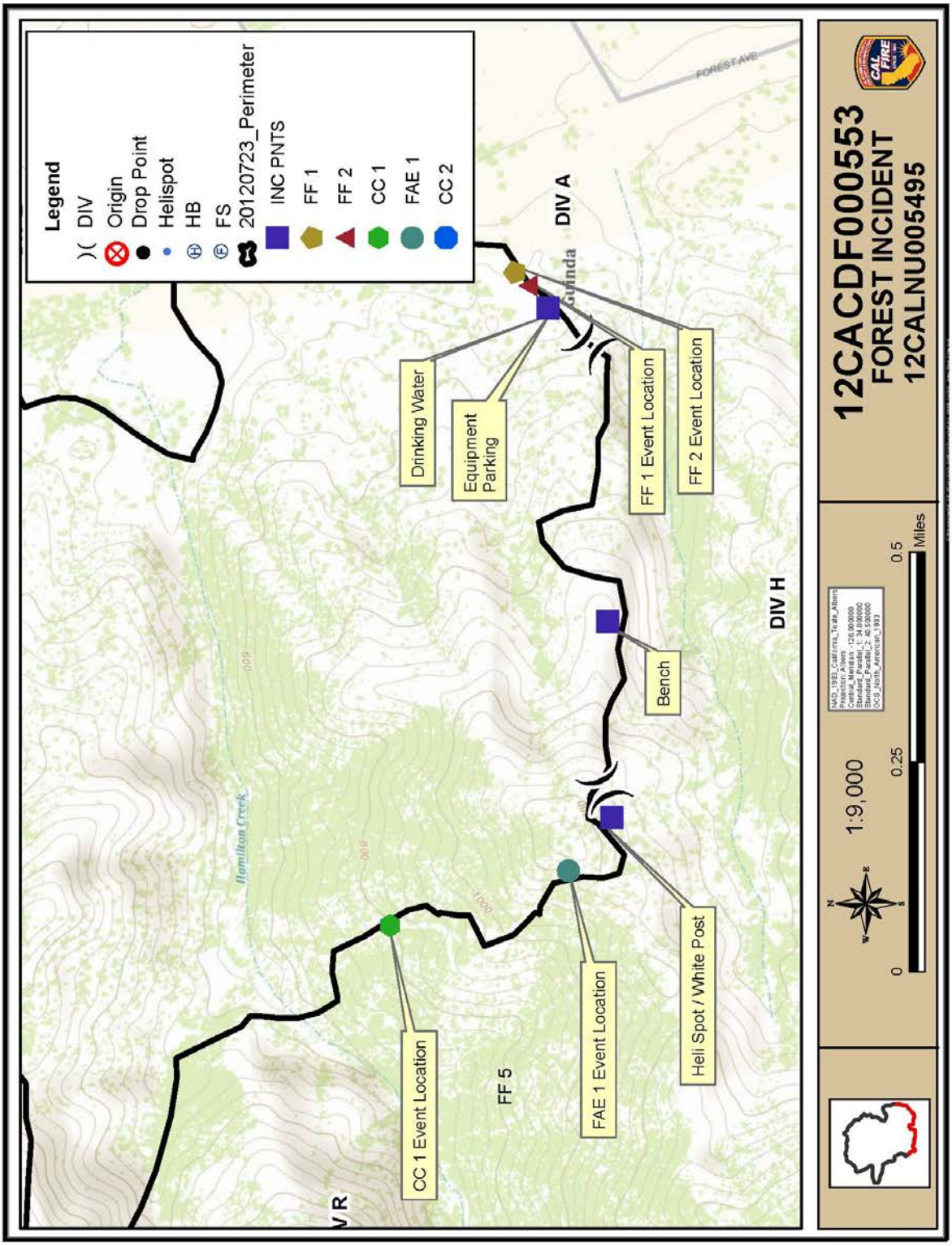
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FF 2
CC 1
FAE 1
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DIV H
FF 5
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Equipment Parking
FF 1 Event Location
FF 2 Event Location
Bench
Heli Spot / White Post
FAE 1 Event Location
CC 1 Event Location
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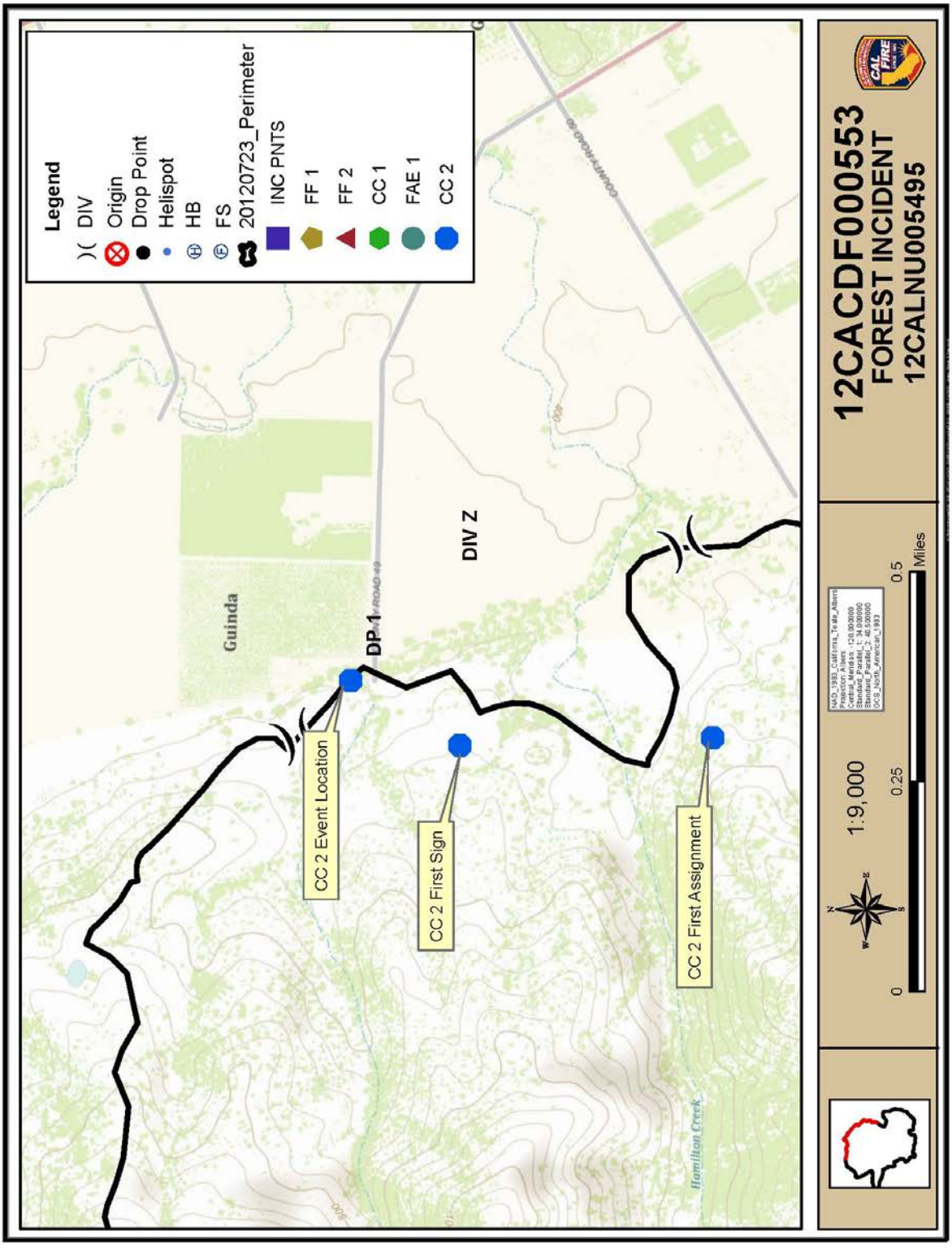
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