

**Accident Investigation  
Factual Report**

**FOR OFFICIAL USE ONLY**

**Engine 3144 Rollover  
Bakersfield Field Office  
September 19, 2007**



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**ACCIDENT INVESTIGATION FACTUAL REPORT**

**Accident:** Engine 3144 Rollover

**Location:** Approximately 8.1 miles from Highway 178,  
Bakersfield Field Office  
Kern County, CA

**Date:** September 19, 2007

**Accident Investigation Team**

**Team Leader:**

Name: Stanley J Adams

Title: Interagency Safety and Occupational Health Manager

  
Signature \_\_\_\_\_ Date 11-30-07

**Team Safety Officer:**

Name: Tom Sherman

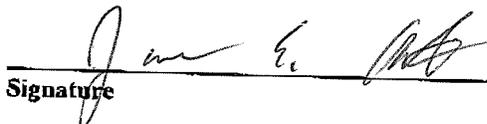
Title: regional Fire Operation Specialist, California Desert District, BLM

  
Signature \_\_\_\_\_ Date 11/30/07

**Technical Specialist:**

Name: Jane E. Arteaga

Title: Fire Mitigation and Education Specialist, California State Office, BLM

  
Signature \_\_\_\_\_ Date 11/30/07

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## **Executive Summary**

On September 19, 2007 at 1545 hours (PST), two BLM fire employees from the Bakersfield Field Office were responding (self dispatched) to a Wildland Fire. At Long Valley Road they switched drivers. They were traveling southbound on Canebreak Road, 8.1 miles from HWY 178 and lost control of the BLM Light Engine 3144. While negotiating a right turn in the road, the back dual tires came upon a soft portion of road bed, causing the vehicle to swerve to the left. Taking evasive action, the driver first pulled right and then to the left again. The rear wheels then dropped into the uphill side sandy ditch and forced the vehicle to swerve off the road and over the right side of the embankment. Through the use of computerized accident reconstruction program of the incident the speed of Engine 3144 was approximately 45 mph. The skid marks left from the accident was approximately 100', the vehicle rolled twice side over side before coming to rest approximately 62 feet below the embankment right side up.

## **Narrative**

Approximately at 1530 the BLM engine crew heard the dispatch from Kern County and determined the Tuttle Fire was on BLM Land. With previous instructions from Chief 3106 crew self dispatch themselves to the Tuttle Fire. Captain 3143 responded in the utility vehicle. Engine Operator and Firefighter responded in Engine 3144, Fire fighter was the driver upon leaving the Station. Engine 3144 stops and locks gate at Station.

Shortly after they pass Chimney Peak Campground, Captain 3143 radios back to Engine 3144 and informs them that there are structures threaten so "don't lollygag". At the Long Valley Road junction they switched drivers because the Engine Operator felt he had more experience and assumed he knew the road better and could travel faster.

Approximately 1545 Engine 3144 roles over the embankment. After the Engine comes to rest the Engine Operator radios the Captain 3143 to return to his location. Captain 3143 returns and determines there are no injuries.

Captain 3143 notifies Chief 3106 via Cell phone, Chief 3106 notifies Portville Dispatch via cell phone.

## **Timeline of Events for Canebreak Rollover, Engine 3144**

(All times are approximate)

<b><u>Date:</u></b>	<b><u>Time:</u></b>	<b><u>Event/Location:</u></b>
9/19	0930	Crew reported for work at Chimney Peak Fire Station, Crew completed Engine Maintenance check and Station check.
	0930-1530	Crew worked on fuels projects around the Fire Station
	1530	Crew heard the dispatch from Kern County and determined the Tuttle Fire was on BLM Land.
	1530	Crew self dispatches to the Tuttle Fire. Captain 3143 responded in utility vehicle. Engine Operator and Firefighter responded in Engine 3144, firefighter was the driver upon leaving the Station. Engine 3144 stops and locks gate at Station.
	1530-1540	The Following events occurred in chronological order:  Engine passes Chimney Peak Campground, when Captain 3143 radios back to Engine 3144 and informs them that there are structures threaten so “don’t lollygag.”  Fire Engine Operator instructed Firefighter to pull over to change drivers.  Firefighter pulls over at intersection of Canebreak Rd and Long Valley Loop Rd. (also know as the “Y”) and they switch drivers.
	1545	Engine 3144 roles over the embankment.
	1549	Engine 3144 calls on command net to Captain 3143: “Hey I need you to bump back to my location”  Captain 3143 returns to find Engine 3144 and determine there are no injuries.
	1602	Captain 3143 calls Porterville dispatch:

“Units 3143 and 3144 are responding, but I do need 3106 to respond towards South Fork and I’ll give him a land line as soon as I make it to South Fork”

1610 Captain 3143 continues down the road until he reaches cell site. (Calling Chief 3106 on command, but Chief 3106 was unable to copy). Captain 3143 contacts Chief 3106 via cell phone.

1612 Chief 3106 report to dispatch 3144 Engine rollover, on Canebreak RD. Incident #3367

Further timelines can be followed by referring to Wildcard Incident Card for Incident #3367.

## **Investigation Process**

The accident was reported to the California State Office on September 19<sup>th</sup>, 2007 and a BLM Accident Investigation Team was mobilized. The team consisted of a:

- Team Leader
- Safety Officer
- Technical Specialist

The team convened at the Bakersfield BLM Field Office on September 20, 2007. With Safety Officer acting as interim team lead until the arrival of team lead on September 25<sup>th</sup>. The team in briefed with the Field Office Manager and staff. On the afternoon of the 20<sup>th</sup> began the process of collecting evidence and information related to the accident.

The process of information evidence gathering consisted of:

- Evaluating all human, material, and environmental factors that may have contributed to this accident.
- Visiting the area where the accident occurred.
- Establishing the pattern of actions of the individuals and the chronology of the accident.
- Reviewing operational guidelines, policies and position descriptions.
- Gathering written statements of personnel which were involved in the incident.
- Interviewing supervisors, coworkers, law enforcement and dispatch personnel, who were associated with the incident.

Focus was given to operational policies, procedures, and direction associated with engine operation at the Field Office. These included duties, training, and expectations associated with day to day actions.

## **Findings**

### **Finding 1:**

The Driver had attended all required training: Supplemental Driver Training, Department of Interior Engine Academy, and NSC Defensive Driving II. All of the drivers Red Card Qualifications were up to date: Engine Operator Task Book was completed and approved.

### **Finding 2:**

Daily records and documentation of performing “6 Minutes for safety” briefings and the general training program documentation was not maintained.

### **Finding 3:**

Maintenance records of Engine 3144 met agency standards and no mechanical deficiencies were attributed to the incident.

### **Finding 4:**

There was no evidence of visual or physical impairment that was caused by environmental factors.

### **Finding 5:**

Engine 3144 had advice dispatched of in service at Chimney Peak Fire Station during morning line-up. Engine 3144 self dispatched to the “Tuttle” incident and did not inform dispatch that they were responding.

### **Finding 6:**

There was no qualified Engine Boss in the Engine while responding to the “Tuttle” incident, as required in the Minimum Standards for Type 6 NWCG Engines (On Unit). Incident Qualification Red-Card Committees, CA Supplemental Qualifications Standards. IM: CA-2007-020.

### **Finding 7:**

Captain was using call sign 3143 (which was an out of service engine, due to a vehicle accident the prior year) although the engine he was assigned to was 3144.

### **Finding 8:**

Speed of Engine was 45 MPH, with a error factor of 5 MPH. The maximum negotiable speed of the corner for a standard size vehicle is 44 MPH and the maximum negotiable speed of the corner for Engine 3144 was 42 MPH. Refer to appendix A for full report.

## **Finding 9:**

Evidence indicates Engine 3144 had been sliding on previous curves.

### **Causes**

#### **Cause 1: Loss of control of vehicle.**

Reckless driving resulting in the loss of control of the Engine 3144 resulted the roll over of the vehicle.

#### **Cause 2: Vehicle Speed.**

The Engine was traveling at an excessive rate of speed for safe operations of the Engine for road conditions. Reflected in photo points 1-8.

### **Contributing Factors**

#### **Contributing Factor 1: Judgment and Risk Decision.**

Driver accepted and performed unnecessary risk/hazards, by operating the Vehicle beyond it's capabilities for road conditions.

Driver had excessive motivation with pressure to perform from external forces: i.e. memories of past incident and outside personnel influence and Captain 3143 encouragement to increase speed which resulted in reckless behavior.

#### **Contributing Factor 2: Supervisory and Organizational**

Failure of management, in establishing adequate standards when responding to incidents.

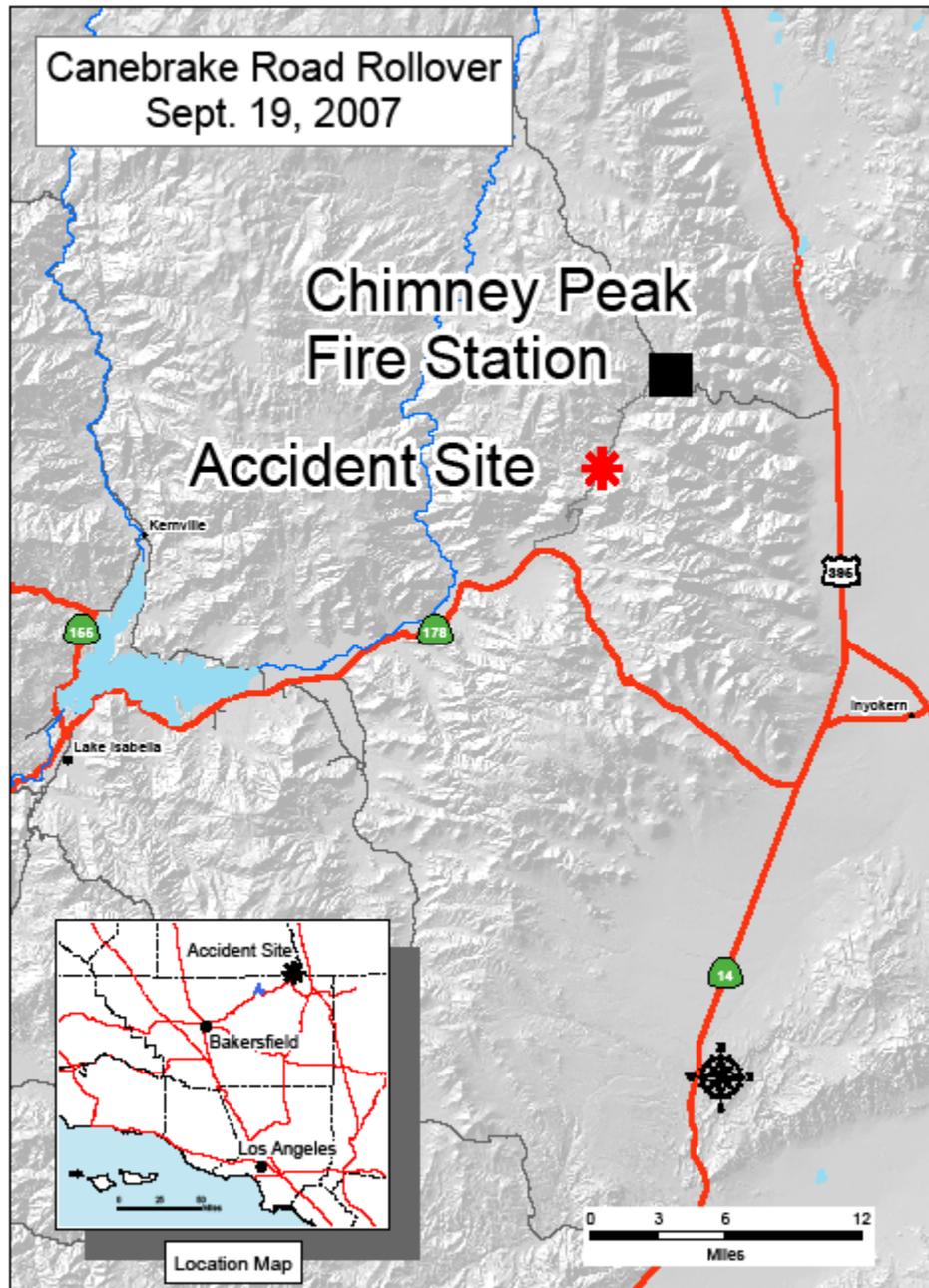
Failure of supervisor (Captain) to monitor personnel, and identify risk and hazards therefore, leading to inadequate lack of control.

Captain 3143 requesting unsafe actions of the driver by encouraging the driver to increase his speed, which resulted in reckless behavior. This action led to the assumption that it was okay to speed while deploying to a fire.

#### **Contributing Factor 3: External Force**

The influence of the kinetic energy of the water in the tank reduced the ability to regain the control of the vehicle, while increasing the potential of the vehicle to roll.

Maps, Illustrations, and Photographs





## ACCIDENT PHOTOGRAPHIC LOG

Incident Identification: Canebreak rollover Evidence Custodian: Jane E. Arteaga

Film Roll Number Established by Chief Investigator: Number 1 Film Speed: 1600 X 1200

Type of Film or Video Tape (Check One):  Black/White  Color  
 Slide  Digital  Video Tape

### (Reference Map for Location of Photos)

Photo Date	Photo ID Number	Name of Photographer	Description of Photograph
9/23/2007	1	Tom Sherman	Tire Tracks, 50 yards north of site
9/23/2007	2	Tom Sherman	Tire Tracks, 100 yards north of site
9/23/2007	3	Tom Sherman	Tire Tracks, north of site
9/23/2007	4	Tom Sherman	Tire Tracks edge of road
9/23/2007	5	Tom Sherman	Tire Tracks edge of road
9/23/2007	6	Tom Sherman	Tire Tracks edge of road
9/23/2007	7	Tom Sherman	Tire Tracks, south side of the road

**ACCIDENT PHOTOGRAPHIC LOG  
(Continuation Page)**

<b>Photo Date</b>	<b>Photo ID Number</b>	<b>Name of Photographer</b>	<b>Description of Photograph</b>
9/23/2007	8	Tom Sherman	Tire Tracks edge of road
9/23/2007	9	Tom Sherman	Tire Tracks edge of road
9/23/2007	10	Tom Sherman	Showing Skid mark on rock dislodged
9/23/2007	11	Tom Sherman	Showing Skid mark on rock dislodged
9/23/2007	12	Tom Sherman	Long range view of rocks
9/23/2007	13	Tom Sherman	Showing Skid mark on rock dislodged
9/23/2007	14	Tom Sherman	Showing Skid mark on rock dislodged
9/23/2007	15	Tom Sherman	Tire Tracks edge of road. Sandy Ditch
9/23/2007	16	Tom Sherman	Large Rock at roll over site,

**Picture 1**



**Picture 2**



**Picture 3**



**Picture 4**



**Picture 5**



**Picture 6**



**Picture 7**



**Picture 8**



**Picture 9**



**Picture 10**



**Picture 11**



**Picture 12**



**Picture 13**



**Picture 14**



**Picture 15**



**Picture 16**



## APPENDIX

### APPENDIX A

#### COMPUTORIZED ACCIDENT RECONSTRUCTION REPORT

##### Data from investigation:

Skid marks of vehicle = 100 feet  
Grade +2%  
Vehicle weight = 17090  
300 gallons of water  
Weight of water 8.3 lb/gal = 2490  
Distance off road to vehicle = 62 feet  
Slope 130%  
Radius of curve 209.69  
Friction factor of road = .65  
Mass = 38"  
Kinetic energy of water = 155152  
Kinetic energy of vehicle = 943842

##### Values used:

- 04. Skid marks to speed = 44
- 15. Combination of different values of speed and distance = 45
- 16. Calculation of radius of curve = 170' cord, 18' middle ordinate; skid/roll speed for curve with average vehicle 44mph.
- 21. Vault (speed to vault) = 14 mph
- 33. Kinetic energy of the water tuned to mph = 17
- 36. Roll (speed with object) = 6 mph

Assumption: Figuring in the kinetic energy of the water at 155152 ft-lbs and the kinetic energy of the truck at 943842 ft-lbs, total kinetic energy would be 1098994 ft-lbs with center of mass at 38 inches. However, the kinetic energy of the water above the center of Mass would force the vehicle in the direction of the force of the water. The water tank has a baffle to restrict the water movement.

##### Conclusion:

Vehicle was moving at the rate of 45 miles per hour. These calculations have an error of 5 miles per hour. The maximum negotiable speed for the curve with engine 3106 is 42 miles per hour.

## ***APPENDIX B***

### **Human and Mechanical Factors**

#### **Human Factors:**

1. Distractions:
  - a. Radio Traffic
2. Lack of Communications
  - a. Dispatch
  - b. Management
3. Crew Dynamics
  - a. Pressure to Perform
  - b. Lack of Supervision
  - c. Crew Protocol
    - a. Captain in chase vehicle
    - b. Self Dispatch
4. Situational Awareness
  - a. Over Confident
  - b. Complacency
  - c. Fatigue (Long Term)
  - d. Driving trend

#### **Mechanical Factors:**

1. Cab Space/ Size (MER)
2. Engine: (Contributing Factors to Conclusion of Accident)
  - a. High Mass
  - b. Water above mass
  - c. Kinetic Energy of water

#### **Environmental:**

1. Road
  - a. Blind Curves
  - b. Road Surface – Rock & Hard Surface Layer