

TO: Director, National Institute for Occupational Safety and Health

FROM: California Fatality Assessment and Control Evaluation (CA/FACE) Program

SUBJECT: A Heavy Equipment Mechanic Died When a Scraper Tire Exploded.

SUMMARY
California FACE Report #06CA004

A 45-year-old heavy equipment mechanic died when the heavy equipment tire that was attached to a wheel, drum, and brake assembly of a scraper exploded. The victim and a co-worker had used acetylene torches to heat and cut the brake assembly that was attached to the drum and wheel of the inflated tire, but were not able to remove the brake assembly. The victim and the coworker decided to stop work for the day, and as the victim was picking up his tools, the tire exploded. The tire was not deflated prior to the work on the brake assembly. The CA/FACE investigator determined that in order to prevent future occurrences, employers, as part of their Injury and Illness Prevention Program (IIPP), should:

- Ensure that all heavy equipment tires are deflated and the valve stem removed prior to any work being performed on the tires or attached components.

INTRODUCTION

On April 20, 2006, at approximately 2:30 p.m., a 45-year-old heavy equipment mechanic died when an equipment tire exploded. The CA/FACE investigator learned of this incident on May 17, 2006, through the legal office of the Division of Occupational Safety and Health (Cal/OSHA). Contact with the victim's employer was made on June 5, 2006. On June 29, 2006, the CA/FACE investigator traveled to the company that employed the victim and interviewed the company's safety engineer. The equipment tire involved in the incident was photographed and examined. The employer of the victim was a general engineering contractor specializing in agricultural construction, earth moving, and landfill. The company had been in business for 18 years and had 200 employees. The company had been at the construction site where the incident took place for approximately 12 months.

The victim had worked for the company for eight years. His first two years were spent as a janitor before being promoted to a heavy equipment mechanic-in-training, where he participated in on-the-job training (OJT) under the guidance of the company's senior heavy equipment mechanics for five years. He was determined to be a qualified mechanic and had driven his own truck for the past year and a half.

The company had a written IIPP. The program had all of the elements required by state law. Safety meetings were held weekly at the shop and construction sites, and were documented. The last calendar year showed 14 documented tailgate safety meetings

on tire safety. The company had a training program that provided regular safety training to employees. Specific training was also provided to all employees on job sites with respect to hazards specific to each employee's job assignment. The training program was primarily on-the-job training. Training was measured by supervisor's observation of job performance. The company stressed using the equipment manuals for safety guidance when performing repairs or doing maintenance on heavy equipment.

INVESTIGATION

The site of the incident was a construction site where earth moving and grading were being performed. The heavy equipment involved in the incident was a scraper tire assembly which included the tire, wheel, hub, drum, and brake assembly. On the day of the incident, the victim started work at 6 a.m. He was assigned to replace the worn out brake system on the scrapers at the construction site. He had completed one job and started working on the second brake system on the scraper. To access the brakes, the tire, wheel, and drum were removed from the scraper as one unit by using wire rope slings attached to the hook of the crane mounted on the back of the victim's truck.

After the assembly was removed from the scraper, the victim attempted to remove the brakes from the hub but they would not come off. The victim retrieved a cutting torch from the truck, heated the brake assembly, and cut the drum into three sections. The brakes and drum did not come loose even after several attempts of heating and hammering. The victim decided to quit for the day and was picking up his tools and cleaning the work area when the tire suddenly exploded without warning. The victim was not working on the tire but was near it when the explosion occurred. The explosion was so great that the tire and entire wheel, hub, and brake assembly shot approximately 15 feet into the air and landed in the back of the scraper (Exhibit 3).

Other employees at the scene heard the explosion and called 911. The County Sheriff responded, and they dispatched the fire department and paramedics who determined the victim was dead. The coroner was contacted to take possession of the body and make an official determination of the cause of death.

CAUSE OF DEATH

The cause of death, according to the death certificate, was blunt force trauma.

RECOMMENDATIONS / DISCUSSION

Recommendation #1: Ensure that all heavy equipment tires are deflated and the valve stem removed prior to any work being performed on the tire or attached components.

Discussion: In this particular case, the victim did not deflate the tire before working on the brake and drum system. According to other heavy equipment mechanics at the job site, they had never deflated the tires in the past when working on the brake systems and never had an incident like this one before. The use of the torch to cut the brake drum most likely transferred sufficient heat to ignite material within the tire, generating combustible vapors and increasing pressure. Heat from the burning material could

have ignited the combustible vapors within the tire causing it to explode. A similar incident occurred in 1998 (<http://www.msha.gov/FATALS/1998/FTL98M16.HTM>). In that incident, the victim was struck by pieces of a tire which exploded after heat was applied to a wheel hub/brake assembly.

It was concluded that the use of a torch to cut the brake drum ignited the tire material which then generated combustible vapors, leading to the explosion. Removing the valve stem from the tire valve and keeping it out while work is being performed on the tire or tire components will prevent any pressure buildup in the tire and prevent another incident like this one.

References:

California Code of Regulations, Vol. 9, Title 8, Sections 3314 (a) (f), 3999(b), 4002

<http://www.msha.gov/FATALS/1998/FTL98M16.HTM>

EXHIBITS:



Exhibit1. A picture of the tire that exploded.



Exhibit 2. A picture of the tire and wheel assembly after the explosion.



Exhibit 3. A picture of the tire after it exploded and landed inside the scraper.



Exhibit 4. A picture of the incident scene.

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Public Health, in cooperation with the Public Health Institute and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations of work-related fatalities. The goal of this program, known as the California Fatality Assessment and Control Evaluation (CA/FACE), is to prevent fatal work injuries in the future. CA/FACE aims to achieve this goal by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. NIOSH-funded, State-based FACE programs include: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington.

Additional information regarding the CA/FACE program is available from:

**California FACE Program
California Department of Public Health
Occupational Health Branch
850 Marina Bay Parkway, Building P, Third Floor**