

TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: Plant Manager dies when he falls from the top of a boiler in California

SUMMARY
California FACE Report # 99CA004

A 59-year old male Plant Manager (decedent) died when he fell from the top of a boiler. The decedent had climbed a fixed ladder to gain access to a platform built on top of the boiler. A valve in the steam line needed to be opened to release pressure. In order to turn the valve wheel that was 6 feet, 1 inch above the platform floor, the decedent climbed onto the guardrail surrounding the platform. He was using a 3-foot long pipe wrench to open the 16-inch valve wheel when the decedent slipped or the pipe wrench slipped causing the decedent to topple over the guardrail. The decedent landed on the concrete floor below. The employer did not have an Injury and Illness Prevention Program (IIPP) or a code of safe practices. The decedent, who was substituting for the boilermaker, was not trained in the task he undertook. The employer did not have a person on site to which safety responsibilities were assigned. No recent safety inspection had been performed. The CA/FACE investigator determined that, in order to prevent future occurrences, employers should as part of their Injury and Illness Prevention Program (IIPP):

- ensure employees do not stand on guardrailing to gain access to a work area.
- ensure employees do not perform tasks for which they are not trained.
- make work areas safely accessible to employees.
- supply proper tools that are commercially available for tasks employees must perform.
- develop and implement a formal, written Injury and Illness Prevention Plan to include a code of safe practices.
- assign a qualified safety person to fully carry out safety responsibilities.

INTRODUCTION

On April 12, 1999 at 5:45 p.m. a 59-year-old male plant manager was fatally injured when he fell from the top of a boiler to a concrete floor. The decedent was attempting to turn a valve wheel in a steam line by standing on the guardrail surrounding the area. The decedent slipped or the pipe wrench he was using slipped, causing the decedent to topple over the guardrail and fall to the floor. The CA/FACE investigator learned of this incident on April 15, 1999 from a newspaper article. On April 21, 1999 the CA/FACE investigator traveled to the incident site where he interviewed the company sales manager. The CA/FACE investigator took photographs of the site.

The employer, a noodle manufacturer, had been in business for 20 years at the time of the incident. The total number of employees in the company is 28. There were 2 employees working at the site at the time of the incident. The decedent had worked for the company for 19 years and 5 months, all of which was at the incident site.

The company did not have a written Injury and Illness Prevention Program (IIPP) or a code of safe practices. A document dated September 23, 1980 was produced that indicated that a safety program should be developed and implemented to meet safety regulations. According to the sales manager, it had never been implemented. The last safety inspection was dated March 21, 1996. No training documentation was available. No regularly scheduled safety meetings were held. The designated safety coordinator, whose regular position was a boilermaker, was absent from his job at the time of the incident. He was not replaced with an alternate safety coordinator.

INVESTIGATION

The site of the incident is a large building housing a noodle manufacturing company. Most of the equipment is automated, requiring few employees to operate. The building contains a number of noodle manufacturing lines, product storage and shipping areas, and a boiler room. The boiler feeds steam to the automated noodle production line for several of the production steps.

Prior to the date of the incident, the boilermaker, who also acted as the company safety coordinator, had to be absent from his job. The company treasurer (decedent), an accountant who also acted as plant manager, assumed some of the boilermaker's duties. One such duty was to open a valve in a steam line to ensure the boiler did not over-pressurize. This task is performed after the manufacturing lines shut down at the end of the day.

The valve involved in this incident is a steam valve having a 16-inch valve wheel. It is located on top of the boiler, above a platform. The platform is partially enclosed by a guardrail. The east side and the access opening on the west side are unguarded. The top guardrail is 42 1/2 inches and the midrail, 25 inches, above the platform floor. The valve wheel is located 6 feet, 1 inch above the floor of the platform. It is also located outside the guardrail that partially surrounds the platform (**exhibit 1**).

It is impossible to turn the valve wheel while standing on the platform floor. The valve wheel is too high off the platform floor and is located outside the guardrail system. In order to turn the valve wheel, it is necessary for employees to stand on something. Physical evidence (worn away paint and footprints) indicates that employees have often stood on the midrail to

raise themselves enough to turn the valve wheel (**exhibit 2**).

A valve of this size is difficult to turn by hand. A spanner wrench is normally used to add leverage to assist in the turning action. The decedent used a 3-foot long pipe wrench to perform the task. A shop-made spanner wrench constructed of round metal bar was normally used to turn the valve wheel (**exhibit 3**). Upon testing by the CA/FACE investigator, the shop-made spanner slipped off the valve wheel.

The decedent, on the evening of the incident, climbed a wide, fixed ladder to gain access to the platform. Just before reaching the platform, climbers have to duck under a steam pipe that runs across the ladder (**exhibit 4**). When he reached the platform, the decedent climbed onto the guardrail, placing his feet on the midrail. As he was turning the valve wheel with the pipe wrench, either the decedent slipped or the pipe wrench slipped. The decedent fell over the top guardrail onto the concrete floor 13 feet, 1 inch below the midrail.

Only one other employee was in the facility at the time of the incident. He found the decedent down on the floor and went to call 911. He provided no first aid.

The paramedics were dispatched at 5:47 p.m. and arrived at 5:52 p.m. The employee was found unconscious with irregular breathing. He was transported by air ambulance to a local trauma center where he was pronounced dead on April 14, 1999 at 3:26 p.m.

CAUSE OF DEATH

The certificate of death stated the cause of death to be blunt head trauma due to a fall from height.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure employees do not stand on guardrailing to gain access to a work area.

Discussion: Guardrails are installed to prevent falls. By standing on the guardrail constructed around three sides of the boiler platform, the decedent defeated its purpose. When he stood on the midrail, the center of gravity of his body was placed above the top rail making a fall very likely in the case of a loss of balance. If the decedent had not stood on the guardrail, this incident may not have happened.

Recommendation #2: Employers should ensure employees do not perform tasks for which they are not trained.

Discussion: The decedent in this incident was substituting for a co-employee, a boilermaker. The decedent was not trained in the duties that he assumed. The duties of a boilermaker are very specific and dangerous. The decedent should have been fully trained in the duties of the boilermaker before undertaking his job. This includes climbing, fall protection and the proper method of operating valves. If the decedent had been properly trained and operated within the training guidelines, this incident may not have happened.

Recommendation #3: Employers should make work areas safely accessible to employees.

Discussion: In this incident, the work area on top of the boiler was not only dangerous to

reach and but also presented a danger when performing regular tasks. Climbing the ladder to reach the platform at the top of the boiler meant one would have to duck under a steam pipe while climbing near the top of the ladder. Once standing on the platform floor, the valve that regularly needs to be turned on and off could not be operated. In order to get enough leverage to operate the valve, workers would have to elevate themselves. In many instances this was done by standing on the guardrail's midrail as evidenced by worn away paint and footprints on a small section of the midrail. Safe ladder access must be provided. In addition, the steam valve should be located within the guardrails and lowered so it can be operated while standing normally on the platform floor. An alternative is to raise the guardrails to provide proper protection and construct a platform that allows workers to reach the valve wheel at its present height. Another alternative is to replace the steam valve with a motor-operated valve that could be operated remotely from the floor of the building. If the work area was safely accessible to employees, this incident may not have happened.

Recommendation #4: Employers should supply proper tools that are commercially available for tasks employees must perform.

Discussion: The employee involved in this incident used a pipe wrench to turn the valve wheel. This is an inappropriate tool for that task. A pipe wrench has flexible jaws that can slip. In addition, the jaws of a pipe wrench are not made to properly engage a valve wheel. The proper tool is a spanner wrench. They are commercially available in many sizes to fit different size valve wheels. A shop-made spanner wrench was available to the decedent but it was worn, had a poor design, and proved slippery when tested. Commercially available spanners do not work in the same manner as this shop-made spanner and seldom, even over long periods, wear and become unsafe. Ideally, shop-made tools should not be used if their failure can cause injury or death unless their design is approved by a registered engineer or tested and approved for use by a qualified laboratory. If the decedent had not used an inappropriate tool or had a proper tool available to him, he may not have slipped and this incident may not have happened.

Recommendation #5: Employers should develop and implement a formal, written Injury and Illness Prevention Plan to include a code of safe practices.

Discussion: The employer in this incident did not have a formal, written Injury and Illness Prevention Program (IIPP). A document produced, dated September 23, 1980, was a copy of the safety regulations of the time. To ensure that all employees receive the same safety information and training, it is important to have the IIPP organized into one document. Once a formal IIPP has been established, it must be implemented properly to be effective. This includes having a code of safe practices that are specific to the workplace. All employees must be trained to know and understand its applicable parts. Important in this case are identifying and correcting hazards, and ensuring that employees comply with the safe and healthy work practices. Training for specific tasks, especially if an employee is assigned new responsibilities, is of paramount importance. A formal, written training program detailing the tasks and the hazards of each job is essential to ensuring all employees get the same, safe training.

Recommendation #6: Employers should assign a qualified safety person to fully carry out safety responsibilities.

Discussion: In this company, some safety responsibilities were assigned to the boilermaker who had been absent from his job for two weeks prior to the incident. The two safety responsibilities identified were safety inspections and completing accident forms. Safety inspections were carried out in an infrequent manner. The last safety inspection was over three years old. Filling out an accident form was done as accidents occurred, the last prior to this incident being April 15, 1998. An employer must assign all safety responsibilities to a person or persons, unless contracted for, so that the complete safety program (IIPP) is fully implemented. To be included is safety training, regularly held safety meetings, hazard identification and correction, periodic safety inspections, and thorough accident investigation. If a qualified safety person had carried out these duties, the danger of turning the valve may have been noted and corrected, and this incident may not have happened.

References:

Barclays Official California Code of Regulations, Vol. 9, Title 8, Industrial Relations, South San Francisco, 1998

Richard W. Tibben, CSP
FACE Investigator

Robert Harrison, MD, MPH
FACE Project Officer

Laura Styles, MPH
Research Scientist

August 27, 1999

FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Health Services, in cooperation with the California Public Health

Institute, and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations on 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: Alaska, California, Iowa, Kentucky, Maryland, Massachusetts, Maryland, Minnesota, Missouri, Nebraska, New Jersey, Ohio, Oklahoma, Texas, Washington, West Virginia, and Wisconsin.

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

**California FACE Program
California Department of Health Services
Occupational Health Branch
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804**