TO:Director, Occupational Health Surveillance Program,
Massachusetts Department of Public Health

FROM:Massachusetts Fatality Assessment and Control
Evaluation (MA FACE) Project

SUBJECT:Massachusetts Carpenter Dies When Crushed Beneath Prefabricated Modular Roof Panels - 93-MA-011

DATE:April 11, 1994

SUMMARY

On June 30, 1993, a 24 year old male carpenter was fatally crushed beneath the weight of two prefabricated roof panels on a modular home construction site. The victim was working beneath the panels, on the roof of a single family home. He was attempting to align and nail the panels together when the collapse occurred. Once emergency responders freed the victim from under the weight of the panels, he was lowered to the floor in the home's bathroom area. The emergency responders were able to maintain vital signs prior to and during transport to the regional hospital, but the victim was officially pronounced dead from his injuries approximately fifty minutes following the incident. The MA FACE Project concluded that to prevent similar future occurrences employers and modular home erectors should:

- ensure that no one is permitted to work beneath materials of unsecured dead weight
- ensure that all personnel employed in specialty construction are supervised, trained and have firsthand knowledge of specialty construction processes.
- develop, implement, and enforce a comprehensive safety program that includes, but is not limited to, worker training in the recognition and avoidance of unsafe conditions.
- consider and address worker safety in the planning phase of construction projects and do so on a daily basis if necessary.

INTRODUCTION

On July 1, 1993, a municipal police sergeant reported to the 24 Hour MA FACE Project Fatality Hotline the crushing death of a 24 year old male carpenter that had occurred the previous day on a modular home construction site. An investigation was immediately initiated.

On July 15, 1993, the MA FACE Field Investigator travelled to the incident scene and interviewed

the municipal police chief and officer who responded to the incident. At that time it was not possible to locate and interview the employer, who was also the victim's brother. However, he later cooperated with MA FACE through his attorney.

The police report, death certificate, employer's business certificate, OSHA information relating to the incident, assorted newspaper clippings and photographs were obtained during the course of the investigation.

The employer was a small custom framing contractor in business for approximately seven years. He employed a total of four persons all of whom were carpenters. The company did not employ a designated safety person or have any written comprehensive safety and health policies in place at the time of the incident.

The victim was employed by his brother on an as needed basis. His training was primarily on the job.

INVESTIGATION

At approximately 7:00 a.m. on June 30, 1993, two representatives of a modular home manufacturing company arrived on a home construction site. With the assistance of a small custom framing construction crew, the modular home representatives began to assemble a modular home on the site. It was later revealed that the representative who claimed to be the modular home site supervisor, in charge of directing the installation of building units and roof assembly, was in actuality a company truck driver.

The home consisted of three floors, a basement, main floor and an attic, and it was built on a hillside. The house had a main section and two wings, each of which had separate roof structures.

The bulk of the day was spent readying the site for the arrival of the crane operator, who was to assist in the placement of the prefabricated roof panels. The roof panels for each wing measured nine feet in width and thirty eight feet in length. Each was fully studded at sixteen inches on center, sheathed and shingled, and each weighed over 1,000 pounds. Two panels were placed together to construct the roof of each wing.

By late afternoon, the crane operator had arrived, and had placed the prefabricated west side roof panels against the east side panel at the roof's ridge on one wing of the house. The crane was then disconnected from the newly placed panels, and moved elsewhere on site to set another section of the roof. At that time, the victim was aiding in the alignment of the ridge from beneath the panels. He was working on a flat, studded and insulated portion of the modular home that would later become the attic. To support the panels, the victim had placed four or five 2" x 4s" to act as panel supports. He was using this method to support the panels because the modular home manufacturer had not provided any other means, such as knee braces. Knee braces are frames built of 2" x 4s" which extend the full length of the roof panels and which are installed beneath the panels in order to

provide support. One of the modular home employees later reported that roof panels are normally aligned and fastened together from above.

As the victim moved along the underside of the panels, aligning them at the ridge with the aid of his claw hammer and nails, he removed the 2" x 4" supports one at a time. The company owner was working above the panels, and noted a three to four inch gap between them. He told his brother to stop what he was doing.

Suddenly, with the support of only one 2" x 4", both panels collapsed onto the victim. The force of the roof panels pushed the victim between two joists and through the dwelling's sheetrock finished bathroom ceiling. The victim's neck was caught between a ceiling joist and a roof panel joist, and he hung, suspended from the bathroom ceiling, until he could be freed.

It took several minutes to reattach the crane, lift the roof panels, and lower the victim to the bathroom floor. By this time, two municipal police officials responded and successfully initiated CPR throughout ambulatory transport to the regional hospital. The victim was pronounced dead there approximately fifty minutes following the incident.

CAUSE OF DEATH

The medical examiner listed the cause of death as compression of the neck.

RECOMMENDATIONS/DISCUSSION

Recommendation #1:Employers and modular home erectors should ensure that no one is permitted to work beneath materials of unsecured dead weight.

Discussion: Employees should never, under any circumstances, work beneath unsecured loads. If the only way to perform a job is to work from underneath a load, then the load must be blocked, or secured, to prevent it from crushing the worker. In this case, the roof panels could have been aligned and fastened from above, which was actually the routine procedure. Furthermore, knee braces should have been used to support the roof panels and prevent them from collapsing. If the victim had not been working underneath the precariously secured roof panels, he would not have been killed.

Recommendation #2:Employers and modular home erectors should ensure that all personnel employed in specialty construction are supervised, trained and have firsthand knowledge of specialty construction processes.

Discussion: The usual modular home supervisor was not on site the day of the incident, and the building crew did not receive proper guidance on the roof assembly. Moreover, the knee braces, critical for supporting the roof panels during alignment and connection, were not provided. As a result, makeshift measures were employed which proved ineffective and unsafe. Employers and modular home erectors should ensure that at least one authorized individual, knowledgeable in

modular home construction methods, is always on site, and that only tested and safe methods of construction are employed. This incident could have been prevented if a trained and authorized modular home representative had been on site to direct the safe construction of the home.

Recommendation #3:Employers should develop, implement, and enforce a comprehensive safety program that includes, but is not limited to, worker training in the recognition and avoidance of unsafe conditions.

Discussion: The employer did not have a written safety program, training program or a designated safety officer. Comprehensive safety programs should include, but not be limited to, routine job site hazard surveys, the use of appropriate protective equipment, and, as required by OSHA Standard 29 CFR 1926.21(b)(2), worker training on the recognition and avoidance of hazards. Employers should further appoint an individual with safety knowledge, and the authorization to take corrective measures to eliminate hazards, to be the designated safety officer, or competent person, on site. Currently most OSHA construction standards (29 CFR 1926) require the involvement of a "competent person" in the implementation of safety provisions.

Recommendation #4:Employers should consider and address worker safety in the planning phase of construction projects and do so on a daily basis if necessary.

Discussion: Prior to project engagement and prior to each phase thereafter, the employer and/or project foreman should identify and review the potential hazards with the employees, and discuss how to control the hazards and how the work can be safely performed. These discussions should include information about hazards in the immediate work area as well as information about the overall site that could create additional hazards for workers. Regular safety meetings are constant reminders to employees of the dangers associated with their job, and the actions they can take to protect themselves.

LIST OF REFERENCES

29 Code of Federal Regulations 1926.21(b)(2)