The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

# Worker Killed by Trench Cave-In in Pennsylvania

FACE-8520

## Introduction

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), is currently conducting the Fatal Accident Circumstances and Epidemiology (FACE) Project, which is focusing primarily upon selected electrically-related and confined space fatalities. By scientifically collecting data from a sample of fatal accidents, it will be possible to identify and rank factors that influence the risk of fatal injuries for selected employees.

On May 3, 1985, a 33 year old foreman and a 26 year old laborer were installing 6" x 12' long drainage pipe sections in a vertical walled trench. One side of the unsloped, unshored trench collapsed, completely covering the foreman and covering the laborer to the mid-chest level. The trench was approximately 1 1/2' wide and 6-1/2' deep. A section of material approximately 3' wide by 10' long (approximately 100 cubic feet total) collapsed onto the employees. The emergency squad, located only one block away, responded within 3-4 minutes after the accident. Although the foreman's head was uncovered within 1-2 minutes and his shoulders were uncovered before the ambulance arrived, the emergency squad was unable to resuscitate him. He was pronounced dead on arrival at the local hospital.

## Contacts/Activities

Researchers from the Division of Safety Research read about this incident in local papers on May 5, 1985. Contact with Federal OSHA officials in Pennsylvania led to NIOSH being requested to provide technical assistance in evaluating this fatality. A DSR research team consisting of a safety engineer and an occupational health nurse gathered information by interviewing a vice-president of the company and two employees. Information was collected about the company, the fatal accident, and two comparison employees on May 16, 1985. The site was visited and pictures were taken. Since the trench had been backfilled, it could not be evaluated for depth, width, soil type, etc.

## Synopsis of Events

The employer is a small, family operated lumber company and general contractor, specializing in the construction of fabricated buildings.

The employer does not have a formal safety program. Employees are provided a set of work rules–some of which are safety related. The employer depends upon the field supervisor's experience and employees' common sense for injury prevention measures.

The employer had constructed a new metal building and was in the process of completing installation of the exterior sewer and drainage lines. The building's exterior sewer lines had been excavated, connected, and backfilled the day before the accident. The property owner wanted a water runoff drainage line installed between an existing building and the now building. The employees were installing this drain line at the time of the accident. The crew was digging a trench using a backhoe with an 18" wide bucket. The backhoe was working about 20 feet in front of the crew, excavating the trench for another section. (The trench was being backfilled as each section of pipe was laid and connected.) At the time of the incident the foreman and one laborer were in the trench laying and connecting the plastic drainage pipe. The foreman was standing on the pipe they had just finished connecting, while talking to a second laborer. This laborer was standing on ground level about 1-1/2 feet from the edge of the trench when the ground beneath him moved down and into the trench. As it did, it completely covered the foreman. The first laborer, who was in the trench ahead of the foreman, was covered to the mid-chest level.

The circumstances evaluation revealed that the material excavated from the trench had been placed on the ground opposite the cave-in side. The material was a mix of soil, gravel, and slag that had been used (approximately 30 years ago) to construct a railroad track bed. The trench was excavated with vertical walls and shoring systems were not used. The excavated material would be considered as hard, intact gravel, Type A soil.[1]

The emergency squad was notified approximately 1 minute after the collapse. They arrived on the scene within 3-4 minutes. (Coincidentally, medical personnel were having a softball game at a field across the street from the accident. Several doctors and nurses from the team responded prior to the arrival of the emergency squad.) The victim's head and shoulders were uncovered by the time the ambulance arrived. Despite the quick response of the medical personnel, efforts to resuscitate the victim were unsuccessful and he was pronounced dead on arrival at the local hospital.

## Recommendations/Discussion

Recommendation #1:

**Safety programs should be developed that minimally include a written safety policy, assign safety responsibilities to all levels of supervision and hold supervisory personnel accountable for these safety responsibilities, employee safety training in recognition and avoidance of work hazards, accident investigation procedures, and emergency planning.**

Discussion:

Each employee received a one-page list of work rules–some of which were safety related. The company supported safety measures, if the workers requested them; however, no single person was responsible for ensuring the safety of the workers. The field supervisor stated that safety is "common sense" and encourages the workers to use "common sense" in their work procedures. Implementation of basic elements of a safety program should control occupational accidents.

Recommendation #2:

**Any excavation (other than in stable rock) that is greater than 5 feet in depth, should be shored, shielded, and/or sloped in accordance with the NIOSH/NBS recommended draft construction safety standards for excavations. Excavations at depths of less than 5 feet may require shielding, shoring, or sloping "when examination of the ground by a competent person indicates that hazardous ground movement may occur."[1]**

Discussion:

According to the NIOSH/NBS recommended soil classification system, the compacted soil, gravel, and slag involved in this fatal accident would be considered Type A soil. Due to the potential instability of Type A soil, NIOSH/NBS has recommended that the walls of excavations in Type A soil be either braced with shoring/trench shields/trench boxes or be sloped back to protect workers in the "zone of exposure" from mass movement of rock or soil. In this particular case, the vertical walls of the excavation (6 1/2') should have been sloped at an angle of 3/4:1 (horizontal:vertical) ratio. Given the depth of the excavation, adequate safeguards were not utilized.

## Reference:

Yokel, F. Y. ; Stanevich, R. L. Development of Draft Construction Safety Standards for Excavations, Vol. I. An NBS/NIOSH Publication. NBSIR 83-2693, DHHS(NIOSH) Publication No. 83-103. Washington, D.C.: May 1983.

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