The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research NIOSH

Worker Killed in Cave-In at Ohio Excavation Site

FACE 8545

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 electrical-related and confined space-related 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 August 8, 1985, a 62 year-old laborer was killed when a cave-in occurred in the 11-12 foot deep lateral trench in which he was working. The two man crew was using a backhoe to cut a lateral trench off of an eight inch sewer main when the fatality occurred. Laterals are sewer system extensions that permit homeowner service and run perpendicular to the main.

Contacts/Activities

During the week of September 2. 1985, officials of the Industrial Commission for the State of Ohio notified DSR concerning this fatality. This case has been included in the FACE Project. The research team (a safety engineer and a safety specialist) visited the facility and met with officials of the company.

Overview of Employer's Safety Program

The company was contracted to install an extension to the main sewer line and necessary laterals as an addition to the existing sewer system for the city. The contracted company had been under current management for approximately 13 months and had experienced no accidents during that time. The company employed eight hourly and five salaried employees. All eight of the hourly employees and two of the salaried employees had worked for this company or its predecessor for the past 13 years. The company had no formal safety program; however, each morning before the employees were dispatched to their work sites, all personnel would meet to discuss work assignments and the methods/precautions to be implemented at each site. The employer's job safety program was indirectly influenced by the content of the contract. The contract plans and specifications required trench widths not to exceed 30 inches. The city had estimated the costs of the contract on this dimension and required that the costs of overruns associated with the excavation and/or backfill be borne by the contractor. This specification requirement discouraged bidders from submitting cost estimates that reflected the additional costs of sloping the side walls. Sloping would have required a contractor to remove and replace twice the quantity of material as that required for vertical trench walls. Therefore, such construction methods would not be competitive in the bidding process. Furthermore, the contract did not identify use of shoring systems as a bid item. This further discouraged implementation of safe work practices within the trenches.

Synopsis of events

On August 8, 1985, at 8:00 a.m. a seven man crew was dispatched to continue excavation and installation of the main sewer line. This portion of the sewer line was to be installed parallel with and directly beneath a city dirt and gravel road. This crew would excavate the sewer line trench, lay the eight inch plastic pipe, make the lateral connectors onto the eight inch line, pressure test the line, and backfill the open trench. By 1:30 p.m. approximately 70 feet of sewer line had been laid, one lateral connection made, pressure testing conducted, and 50 feet of line backfilled (from the day's starting point up to the lateral connection).

The lateral installation crew, a laborer (the victim) and a backhoe operator, arrived at the site to begin excavation of the lateral trench. At approximately 1:30 p.m. the backhoe operator began excavating the trench, while the laborer stood in the trench "eyeballing" the bottom trench grade assuring that the necessary slope was being maintained. The backhoe operator was cutting the remainder of the lateral trench approximately 12-15 feet south of the victim when a cave-in of the west wall of the trench occurred, completely covering the victim (see Figure).

The backhoe operator called for help to the crewmen who were still installing the main line. An ambulance was immediately summoned while the crew started to dig for the victim. (It could not be determined if the backhoe was used during this emergency digging operation.) The victim' s body was uncovered from beneath three feet of gravel and dirt approximately thirty minutes after the cave-in occurred.

Cause of Death

The coroner determined the cause of death to be asphyxiation due to compression of the chest and obstruction of airways.

Recommendations

Recommendation #1: The employer should assure that employees working in excavations that are not in stable rock and are greater than five feet In depth are protected through sloping, the use of shoring systems, or the use of a trench box/shields.

Discussion: The excavated trench was in a hard clay material, exceeded five feet in depth (11-12 feet), and was not sloped to a safe angle of repose. Additionally, surface ground loads and vibrations were imposed by the excavated material and the operating backhoe, respectively. These factors require that employees, who are exposed to mass movements of soil, be protected either by shoring, sloping, or use of a trench box/shields.

Recommendation #2: The employer should develop a documented safety program pertinent to the work performed by the company.

Discussion: Although safety issues were discussed before work began each day, no written safety program, safety rules, safe work procedures, or safety policies existed within the company. In this particular work activity, the contractor depended on the experience and judgment of the backhoe operators to determine if a trench needed to be protected. The concerns listed in Recommendation #1 should be identified as risk factors demanding unquestionable use of shoring, sloping, or use of a trench box/shield and should be identified as such in written policies and procedures.

Recommendation #3: Estimated design and engineering costs should reflect expenses of trench protection as a reimbursable cost item, especially in trench depths exceeding five feet that are not in stable rock.

Discussion: The cost estimate for the contracted work did not include costs for trench protection and the contract itself did not allow for adequate sloping (the width of the trench could not exceed 30 inches). Design plans and specifications should encourage safe job performance and should not be detrimental to safe job procedures. Contracts should be closely evaluated to assure that job safety is not compromised (i.e., for the sake of cost savings).

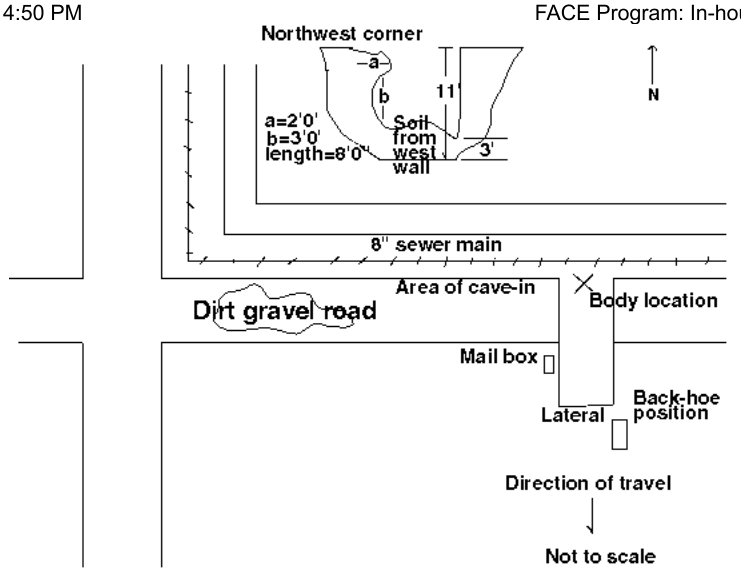

Figure.

Return to In-house FACE reports

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Yes Partly No