TO: Director, National Institute for Occupational Safety and Health

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

SUBJECT: Laborer dies in trench cave-in in California

SUMMARY
California FACE Report #96CA007

A 27-year old male laborer (victim) died after being trapped in soil over his head as a result of a trench that caved-in. The victim was digging out the bottom of the trench in order to expose an existing drain pipe. On one side of the trench was a retaining wall and the other side was a dirt wall which was part of a hillside. He and another laborer were piling the dirt on the hillside above the east wall of the trench. Later the other laborer pulled up buckets filled by the decedent with the spoils placing them on the hillside above the trench wall as well as on the south side of the excavation. The trench wall that collapsed was not shored or otherwise protected from earth movement. The soil had been previously disturbed in the area of the trench. There was no competent person to check the soil and excavation at the site and no initial hazard assessment was performed. The victim received no training from the company for whom he worked. The CA/FACE investigator concluded that, in order to prevent future occurrences, employers should:

- Assure that the sides of all excavations are shored, laid back to a stable slope, or provided with other equivalent protection where employees may be exposed to moving ground or cave-ins.
- Have a competent person frequently inspect excavations in which the soil was previously disturbed, or where there is loading due to stored materials.
- Train employees, including periodic refresher training, to be aware of and understand the hazards of the job.
- Perform an initial hazard assessment of the job prior to beginning work and when there is a situation change that presents different hazards.

INTRODUCTION

On April 11, 1996, at 2:15 p.m., a 27-year old male laborer was buried in a trench cave-in at a construction site and was declared dead at 2:52 p.m. The victim was buried in soil over his head. The CA/FACE investigator learned of the incident on April 11, 1996 through a television

news program. The company's attorney did not initially agree to requests for site inspection and interviews by the FACE investigator. The CA/FACE investigator**,** independent of the company's attorney, traveled to the site of the incident on April 23, 1996 where he had a chance meeting with the owner of the home being remodeled. On June 18, 1996, the CA/FACE investigator met with the company owner and his attorney. A copy of the police report, the fire/paramedic report, the coroner's report, the death certificate, the Cal/OSHA report and the CAL/OSHA form 36 were obtained by the CA/FACE investigator.

The construction company has been in business for 16 years. It had been working at the site where the fatality occurred for approximately one and one-half years. The victim had been working for this construction company for 3 months and on this job site since April 9, 1996. He had also worked previously at this site for the same construction company about one month prior to the incident. The company employs 7 people**,** 2 of whom were working at the site at the time of the fatality. The employer did not provide the victim with specific or general training with regard to excavations. The company also did not have an Injury and Illness Prevention Program (IIPP) in place at the time of the incident.

INVESTIGATION

The site of the incident was a private residence that was being repaired due to earthquake damage. A trench had been dug at the rear of a detached garage, the rear wall of which was a retaining wall for the hillside that led up to the house. The garage was accessed from the street in front of the residence and the home above was built into the hillside. The trench had been dug to expose a sub-drain line for inspection purposes.

Approximately one and one-half years prior to the incident, the garage was constructed to replace the one damaged in the earthquake. The sub-drain line was placed in a trench which was dug just behind the new, rear garage wall. The original trench was said to be about 5 feet deep. The ends of the trench had originally been dug deeper to expose each end of the drain line for inspection. The original plan indicated that it was to be sloped at a one to one (one foot cut back horizontally for each foot of vertical height). As repair was taking place, the owner of the residence decided to add a second story to the existing house. This included a stairway which was to be built from the lowest part of the hillside at the rear of the garage to a terrace in the front of the house, a space of approximately 12 feet.

Fill dirt had been added to the area between the rear garage wall and the house which formed a hill approximately fifteen feet high. Two months before the incident, the city inspector discovered that a stairway was to be added and he insisted that the fill dirt be compacted and the sub-drain line be uncovered for inspection prior to compaction. The previous sub-drain line inspection, which had been approved, could not be found. The owner of the construction company, through a supervisor's phone call the previous evening, sent two of his laborers to the site to dig a trench to uncover the entire sub-drain line for the inspector. The decedent picked up his co-worker on the morning of the incident and drove him to the site. The prior trench was still open and partially covered with an old door and a few pieces of plywood. It was now about 3 feet deep, being partially refilled due to runoff from spring rains. The decedent and his coworker began to dig the trench deeper since the subdrain line was about 9 or 10 feet down at the base of the rear garage wall.

On the day of the incident, the decedent and his coworker were shoveling the soil from the trench and throwing it on the hillside above. Their supervisor arrived about 11:30 a.m. and observed that the trench was now about 5 feet deep. He left shortly thereafter subsequent to an argument with the decedent about pay and improper performance on a previous job. When the laborers could no longer throw the dirt above them with the shovel, the decedent remained in the trench shoveling soil into a 5-gallon bucket. The other laborer was pulling up each full bucket and dumping it. Originally at least some of the spoils were placed on the south side of the excavation. Some of the spoils were dumped above the east wall of the trench. The company owner stated that the laborers dumped the buckets on the hillside above the east wall of the trench. The laborers had dug the trench about 20 feet long on the rear side of the garage wall. When the trench was near the base of the garage, with about half of the sub-drain line exposed, the hillside collapsed and buried the decedent over his head. The coworker brushed the dirt away from the decedent's face and attempted to dig him out but the soil kept sliding down. The coworker then ran to the door of the home where he was working to try and summon help. No one was home. He tried several other homes, but was not able to raise anyone. He then ran into the street to flag down traffic. One driver used his cellular phone to call 911. A gas company employee came, looked at the site, but was unwilling to help. The paramedics were dispatched at 2:23 p.m. and arrived at 2:26 p.m. Although they found no pulse or spontaneous respirations**,** they administered oxygen to the decedent while the fire department attempted to shore the trench for the rescue effort. However, the decedent could not be rescued in time and the paramedics pronounced him dead at 2:52 p.m. Because of the danger of the sliding hillside, the body was extricated by breaking out the rear garage wall from inside the garage.

CAUSE OF DEATH

The coroner's report stated the cause of death to be asphyxia.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should assure that the sides of all excavations are shored, laid back to a stable slope, or provided with other equivalent protection where employees may be exposed to moving ground or cave-ins.

Discussion: The classification of soil in which the excavation was made should have been Type C. The excavation was previously disturbed because it had been opened for the same job on a prior occasion about one month earlier. Also, the soil, which appeared to be a silty clay, was loose and uncompacted. The hillside which abutted the east side of the excavation would have been considered a slope. The CA/FACE investigator was not able to measure the slope due to the fact that the entire hillside had slid down toward and into the trench. The hillside, especially with the addition of the spoils, did add additional surcharge pressure to an already tenuous excavation. Additionally, the trench was more that 5 feet deep. Although the depth could not be measured, according to interviews and other evidence, it was most likely 9 to 10 feet on the east side with the hill rising above. Trenches more that 5 feet deep with type C soil must be shored or appropriately sloped. Section 1541.1(a)(1) of Title 8 of the California Code of Regulations (CCR's) states: "Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with Section 1541.1(b)." Many safety precautions were ignored in this case. The trench was much deeper than shoring safety

regulations allowed. No soil testing was performed by the employer. Both a visual and manual test are required by regulation. Since the soil was loose and uncompacted and since the soil had been previously disturbed, assumptions regarding the soil's classification should not be made. Proper soil testing, the condition of the previously disturbed soil, and the depth of the trench should be considered as factors in excavations and the provision of proper shoring or equivalent protection. Had proper protection been afforded, this incident may not have happened.

Recommendation #2: Employers should have a competent person frequently inspect excavations in which the soil was previously disturbed, or where there is loading due to stored materials.

Discussion: There were a number of physical factors that may have affected the safety of the excavation. The soil had been previously disturbed, there was a 15-foot hillside immediately adjacent to the east wall, the spoils were placed on the uphill side of the trench, and the soil was loose and uncompacted. The many hazard-increasing conditions required that a competent person frequently inspect the excavation. Each of these conditions alone could be considered serious or potentially serious, but as a group, necessitated the removal of employees until the excavation was made safe. Section 1541.1(k)(2) of Title 8 of the California Code of Regulations (CCR's) states: "Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety." Had there been more frequent inspections, proper review of the hazards, and the provision of appropriate protection, this incident may not have happened.

Recommendation #3: Employers should train employees, including periodic refresher training, to be aware of and understand the hazards of the job.

Discussion: The decedent did not receive any training from the company for whom he worked. He did not receive specific training for the job which he was performing. Regulations require that when workers are first employed they shall be given instructions regarding the hazards and safety precautions applicable to the type of work in question. Additionally, employees who are subject to known job site hazards, such as unprotected excavations shall be instructed in the recognition of the hazard, in the procedures for protecting themselves from injury, and in the first aid procedures in the event of injury. Had the decedent received specific training concerning protective systems for excavations, the recognition of the hazards of excavations, and his right to refuse to work in unsafe working conditions, this incident most likely would not have occurred.

Recommendation #4: Employers should perform an initial hazard assessment of the job prior to beginning work and when there is a situation change that presents different hazard.

Discussion: No initial hazard assessment of the specific worksite was performed. Normally, the contractor would go over the hazards of the site with the employees and the site specific addendum to their Injury and Illness Prevention Program (IIPP). This was not done. On the night before the incident, the job was laid out by phone for the laborers, both of whom had

performed this specific task at the site on a the prior occasion. However, the situation had changed because the soil had been previously disturbed, the spoils were placed above the east trench wall and the trench had been dug much deeper. Regulations indicate that prior to the presence of its employees, the employer shall make a thorough survey of the conditions of the site to determine, so far as practicable, the predictable hazards to employees and the kind and extent of safeguards necessary to prosecute the work in a safe. Ongoing hazard assessment and appropriate follow-up would have decreased the likelihood of an event such as this from occurring.

References

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Construction Safety Manual, State Compensation Insurance Fund, 1990

Excavating and Trenching Operations, (OSHA 2226) U.S. Department of Labor, Occupational Safety and Health Administration, 1985

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September 11, 1996

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Health Services, 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: Alaska, California, Iowa, Kentucky, Massachusetts, Michigan, Minnesota, Nebraska, New Jersey, New York, Oklahoma, Oregon, Washington, West Virginia, and Wisconsin.

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

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