

**FACE AK-93-11**

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Occupational Injury Prevention Program**

**SUBJECT: Independent Contractor Dies in Sewer Line Excavation Engulfment  
-- Alaska**

#### **SUMMARY**

On April 12, 1993, a 34-year-old, male independent contractor (victim) was killed as a result of traumatic head and neck injuries during a sewer line excavation cave-in. The victim was repairing a sewer line at a private residence and had excavated a 12-foot deep, 15-foot long trench with 90 degree sidewalls to access the existing sewer line. The victim then called another contracting service to remove ground water/sewage that had accumulated in the trench. After this operation was completed, the victim entered the unshored trench via a ladder for another inspection. At this time the walls of the trench collapsed, and concrete slabs (from a sidewalk leading to the private residence) fell into the trench. These slabs struck the victim on the head and neck, and caused him to fall from the ladder. He was subsequently buried by the incoming soil from the trench walls. Rescuers responded to the scene, but could not locate the victim. Because of the elapsed time and the high probability that the victim was dead, a decision was made to not further endanger the lives of EMS and Fire Department personnel. The trench walls were widened and sloped to safer angles. The body of the victim was recovered approximately two and one-half hours after the cave-in.

Based on the findings of the epidemiologic investigation, to prevent similar occurrences:

- independent contractors should be aware of the potential dangers of trenching or other excavation operations and be knowledgeable about proper techniques of sloping and shoring.
- independent contractors should be aware of the increased potential for excavation collapse due to adverse environmental factors, such as elevated levels of ground water.
- independent contractors should be knowledgeable about job safety and always conduct a general hazard assessment prior to beginning any job or work task.

## Face Investigation

- emergency medical services and fire rescue personnel should be knowledgeable about proper rescue techniques involving excavation sites and ensure that adequate shoring equipment is on hand at all times.

## **INTRODUCTION**

On April 12, 1993, a 34-year-old male independent contractor died after being struck by concrete blocks from a sidewalk and becoming engulfed in a sewer line trench. The worker had been attempting to perform a sewer line repair at a private residence. The Alaska Division of Public Health, Section of Epidemiology was notified via the news media on April 12, 1993. An investigation involving an Injury Prevention Specialist from the Alaska Department of Health and Social Services, Division of Public Health, Section of Epidemiology ensued on April 13, 1993. The incident was reviewed with the Alaska Department of Labor officials (AKDOL), witnesses, and municipality fire/rescue officials. The site was visited, measurements were made, and photographs of the fatality site were obtained. Although the Department of Labor did not perform a full-scale investigation, compliance officers collected basic information and visited the site because of their interest in safety issues related to trenching and shoring operations. The worker was a self-employed contractor, so no company officials were interviewed. Since the site was significantly damaged during the victim recovery operation, photographs were not as informative as in most fatalities, and only rough dimensions of the trench could be obtained. Appropriate documents (AKDOL reports, etc.) were obtained during the investigation.

The employee was a local independent contractor who specialized in "home improvements." He operated primarily as a "jack of all trades", and had completed jobs in carpentry, electrical installation, and other building trades. He had been in business for five years, and worked, primarily, on rental properties. He was a vocational school graduate and had served in the military. However, little is known about his specific training in trenching and shoring. Most training he received appears to have been "on-the-job" training.

## **INVESTIGATION**

A local independent contractor was repairing a sewer line at a local residence. This procedure was called a frost-jacked sewer clean-out and excavation. The sewer pipe leading to the home had parted, causing effluent to build up around the point of the break. Sewage was also backing up into the home's garage. The owners of the home contracted with the victim to perform the above procedure. The victim rented a back hoe/front-end loader from a local company to perform the trenching operation. Excavation site and soil conditions on the day of the incident were as follows:

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- 1) Approximately two inches of blacktop (driveway)
- 2) Three and one-half feet of partially frozen, sandy/silty gravel
- 3) Water-saturated sandy/silty gravel below the semi-frozen gravel

The victim dug a trench approximately 12 feet deep, 4 feet wide, and 15 feet long. The trench had 90 degree side walls and the victim made no attempt to shore the walls. The Alaska Department of Labor indicated that the back hoe/front-end loader chosen to perform this operation was inadequate to properly slope the side walls of the trench. This was due to the machine's short swing radius.

As the victim dug deeper, free ground water began to accumulate in the bottom of the excavation. Because the ground water obscured the sewer line, the victim called a local pumping service to pump out the trench. Other than the assistance from the pumping service, the victim had been working throughout the day alone. At about 3:05 PM the victim entered the trench via a ladder for a final inspection prior to beginning the repair job. A neighbor, who was observing the operation, stated that he noticed the walls of the trench sloughing off soil; he then backed away because he believed the trench to be dangerous. Following this, the north wall (next to the residence) of the trench collapsed and a concrete slab, which formed a sidewalk leading to the home, fell onto the victim. He was knocked off the ladder and subsequently buried by about six feet of incoming soil. Two slabs fell into the excavation during the collapse and forced the victim deeper into the trench. The concrete slabs were approximately 6 cubic feet in volume (3 feet X 4 feet X 6 inches).

Witnesses called 911 and fire-rescue personnel responded at 3:09 PM. They arrived on scene at 3:14 PM and began to attempt a rescue. The rescuers stood on the "fill" in the trench near the ladder where they began digging with shovels in an attempt to locate the victim. Because of the instability of the trench (rescuers had to abandon the trench on several occasions due to collapsing soil), fire-rescue personnel began looking for shoring materials. An attempt was made to shore the walls with 3/8th inch plywood, but this proved to be unsuccessful. Because of the elapsed time and the imminent and immediate danger to rescue personnel at the site, Department of Labor officials requested that the rescue attempt be abandoned and the trench be widened and sloped to a safer "angle of repose." The victim's body was located under the concrete slabs at 6:18 PM (approximately three hours after the trench collapse).

## **CAUSE OF DEATH**

The autopsy report attributed the victim's death to "crush injuries to the head and neck."

## **RECOMMENDATIONS/DISCUSSION**

Recommendation #1:Independent contractors should be aware of the potential dangers of trenching or other excavation operations and be knowledgeable about proper techniques of sloping and shoring.

Discussion: The victim failed to use any method of trenching appropriate for the excavation operation. He was apparently either unaware of the dangers associated with collapsing trenches, or failed to correctly evaluate the hazards of his work task. Although independent contractors are not covered by Alaska Department of Labor or Occupational Safety and Health Administration (OSHA) standards, free materials are available from these agencies that provide excellent guidance to independent contractors engaged in hazardous trenching and excavating activities. Specifically, the Alaska Department of Labor's Construction Code covers trenching and shoring in parts 05.160-05.162 and Appendices A-F. Useful information is contained in these sections on proper sloping and shoring, protection from hazards associated with water accumulation, stability of adjacent structures, protection of employees from loose rock and soil, protective systems, "benching," and soil classification. In addition periodic safety classes on the topic of trenching and shoring are offered through the State's University system. Consideration should be given to developing a "certification" course for independent contractors and others which covers the safety aspects of trenching and shoring operations in Alaska.

No attempt should be made to conduct a trenching and shoring operation by "on-the-job" training. Independent contractors must recognize their knowledge limitations and seek advice, assistance, consultation, and specific training as necessary.

Recommendation #2:Independent contractors should be aware of the increased potential for excavation collapse due to adverse environmental factors, such as elevated levels of ground water.

Discussion: The incident described above occurred during the spring "break-up" when large quantities of ice and snow rapidly melts. This phenomenon adds considerable amounts of free water to soil throughout areas of similar geographic and climatic conditions. Soils containing high percentages of silt and gravel can hold significant amounts of ground water. Independent contractors must be aware of the increased hazard of excavation during seasonal periods of higher ground water levels. Careful observation of water accumulation in trenches and sloughing off of soil are strong indicators of an imminent and immediate danger.

Additional information on reducing the hazards of water accumulation can be found in the Department of Labor's Construction Code ("Protection from Hazards Associated with Water Accumulation").

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Recommendation #3:Independent contractors should be knowledgeable about job safety and always conduct a general hazard assessment prior to beginning any job or work task.

Discussion: The victim failed to conduct an adequate hazard assessment of the attempted sewer line repair. This is evidenced by the lack of any shoring method and the construction of a trench with 90 degree side walls. An untrained witness had observed that the trench seemed unsafe because of soil sloughing from the side walls. All independent contractors must obtain adequate safety training and learn how to conduct adequate hazard assessments. Materials are available from the Alaska Department of Labor and OSHA, as well as a number of independent safety specialists in the state. The State University system also offers a number of health and safety-related courses. Consultation on techniques of conducting worksite hazard assessments are also available from the above agencies and organizations.

Recommendation #4:Emergency medical services and fire-rescue personnel should be knowledgeable about proper rescue techniques involving excavation sites and ensure that adequate shoring equipment is on hand at all times.

Discussion: Fire-rescue personnel made a number of attempts to rescue the victim, but were impeded by their lack of adequate shoring materials. The 3/8th inch plywood used proved to be insufficient for the task. Fire-rescue services should ensure that adequate trenching material is on hand at each station where rescue personnel are housed. Also, emergency shoring devices (e.g., "Quick Shore") are possible solutions for fire-rescue stations. These lightweight, narrow devices can be carried by one rescuer, and provide fast, adequate shoring in emergency situations.

Rescue attempts should be discontinued when personnel are placed in imminent and immediately dangerous situations until proper shoring of excavations can be accomplished. Hazardous rescue attempts should also be discontinued when there is no likelihood that a victim could be successfully rescued.

## References

1. Occupational Safety and Health Standards, Construction Code, Volume II. Sections 5.160-5.162 and Appendices A-F. Alaska Department of Labor, Division of Labor Standards and Safety, 1992.