



The National Institute for Occupational Safety and Health (NIOSH)

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through safety and health research



# Two Sanitation Employees Die in Confined Space in Kentucky

FACE 8544

## 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-related fatalities. By scientifically collecting data from a sample of fatal accidents, the FACE will identify and rank factors that increase the risk of fatal injuries for selected employees.

On August 24, 1985, two workers died in a sludge distribution chamber at a wastewater treatment plant. Since there were no witnesses, it is presumed they were attempting to remove pieces of a broken Plexiglas cover which had fallen into the sludge at the bottom of the chamber. They were discovered at approximately 4:35 p.m. by a co-worker. The emergency squad was summoned, and both victims were removed and transferred to local hospitals where they were pronounced dead by attending physicians.

## Contacts/Activities:

Officials of the Occupational Safety and Health Program for the Commonwealth of Kentucky notified the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), of these fatalities and requested technical assistance. On September 4, 1985, the DSR research team, which consisted of the project director, a safety specialist, and a writer-editor, visited and photographed the site of the accident, met with the employer and representatives of the Kentucky Division of Compliance (OSH), and conducted comparison worker interviews.

## Overview of the Employer's Safety Program:

Training at the facility is primarily on-the-job instruction. Employees are provided with a safety manual that they are expected to read. Monthly training sessions are conducted, but are not held regularly during the summer, due to vacation schedules.

## Synopsis of Events:

Both victims had been employed by the wastewater treatment plant for approximately seven years. The 25 year-old shift foreman and the 32-year-old operator reported to work on the day of the accident at 3:30 p.m. (the second shift). The operator was to take a sludge sample from the distribution chamber, a routine task performed at the beginning of each shift. The chamber is approximately 8 feet wide, 9 feet long, and 9 feet deep and is used to distribute primary sludge to different holding tanks. The sludge level in the chamber typically is 12 inches deep. The procedure for taking this sample was to remove the clear, Plexiglas cover from the 29 X 30 inch opening located on top of the chamber and use a sample cup attached to a rod that would reach the bottom of the chamber, without requiring the operator to enter the chamber. The Plexiglas cover was to protect the lens of a closed-circuit TV camera that was used to monitor this chamber from the plant control room.

After the sample was taken, the Plexiglas cover was to be replaced; however, the cover, which was reportedly cracked, broke upon replacement and the pieces fell into the chamber. The operator notified a co-worker of the problem and the co-worker suggested that the shift foreman be notified. The operator then notified the shift foreman that the cover had broken and fallen into the chamber. A decision was made to enter the chamber by using an extension ladder, lowered through the opening to retrieve the cover. Since there were no witnesses, it is assumed that the monitoring camera had to be moved aside to make room for the ladder. Therefore, the control room operator could not observe what was going on in the chamber. A co-worker in the area noticed the unattended ladder protruding from the chamber opening, and approached to investigate. He saw both workers face down in the sludge at the bottom of the chamber and immediately notified the control operator, who notified the emergency squad.

The emergency squad from a local volunteer fire company arrived, and with the use of SCBA retrieved the victims from the chamber. On September 3, State officials performed atmospheric tests for hydrogen sulfide and flammability levels within the chamber. At the time of the sampling, hydrogen sulfide was in excess of 500 parts per million and the flammability readings were less than 10% of the lower flammability limit (LFL).

Cause of Death: Coroner's report not available at this time.

## Recommendations/Discussion:

### **Recommendation #1: Employers should develop comprehensive policies and procedures for confined space entry.**

Discussion: Prior to confined space entry, all procedures should be documented. All types of emergencies and potentially hazardous conditions should be addressed. Confined space entry procedures should minimally provide for the following:

1. Air quality testing to ensure adequate oxygen supply, adequate ventilation, and the absence of all toxic air contaminants;
2. Site specific confined space entry and work procedures, emergency access and egress plans, and emergency rescue procedures;
3. Availability of properly stored and maintained respiratory protective devices, protective clothing, and emergency rescue equipment;
4. Thorough supervisor and employee training in the entry and working procedures, atmospheric testing methods and test equipment, selection and use of respirators and protective clothing, and emergency rescue procedures.

Although the employer provided each employee with a general safety manual, and written procedures for confined space entry were available, a minimum level of caution was not achieved prior to the fatal entry. The air quality was not determined before the workers entered the sludge distribution chamber, and no means for ventilating the space were in place. Gas detection meters and self-contained breathing apparatus were available at the facility, but were not used. The control room operator was not notified in accordance with standard policy that the workers were going to enter the confined area within the chamber.

**Recommendation #2: Employers should train supervisors and employees in the application of confined space entry procedures. In particular, this should include training in recognition of confined spaces and potential confined space hazards throughout the wastewater treatment facility.**

Discussion: Although the employees of the wastewater treatment facility had received training recently in confined space hazards, the victims apparently did not recognize the potential hazards within the sludge distribution chamber. The workers must have believed that they could enter the chamber safely, since neither respiratory protective equipment nor protective clothing were worn. A lack of adequate training in hazard recognition resulted in two employees failing to follow existing confined space entry procedures. The lethal consequences of this unnecessary entry might have been avoided had a level of precaution and planning been employed that was commensurate with the level of hazard that could be anticipated within such a confined area.

**Recommendation #3: Employers should affix Caution/Warning signs at or near points of access to potentially hazardous areas.**

Discussion: Employers should identify potentially hazardous areas within their facilities, and provide Caution/Warning signs to be affixed at or near points of access to the hazardous areas (e.g., at or near the opening to a confined space). Such warning signs should be easily visible to anyone approaching the area; should contain specific information on procedures, notifications, and/or authorizations required in the event entry becomes necessary; and should be periodically inspected on a routine basis.

**Recommendation #4: The employer should design and install an improved opening cover (i.e. non-breakable) for sludge distribution chambers.**

Discussion: Although the presence of the pieces of the Plexiglas cover within the chamber did not constitute an emergency situation (the cover was not actually removed from the chamber until several days after the fatalities occurred), it may have been perceived as such. Therefore, the use of a breakable, Plexiglas cover contributed to the accidental deaths. The employer should, as a result, design a cover made from a sturdy, non-breakable material with limited access openings to allow for the sampling cup to be inserted and removed without disturbing the cover. A wrought iron grid or similar cover might allow both routine sampling and video monitoring while, at the same time, inhibiting nonessential cover removal. An alternative means of protecting the lens of the video camera should be concurrently developed.

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