TO:Director, Occupational Health Surveillance Program,
Massachusetts Department of Public Health

FROM:Massachusetts Fatality Assessment and Control
Evaluation (MA FACE) Program Field Investigator

SUBJECT:Massachusetts Swimming Pool Company President
Drowns During Routine Service Call - 93-MA-005-01

DATE:October 5, 1993

SUMMARY

On May 11, 1993, a 38 year old male swimming pool service and supply company owner drowned in 12 feet of water during the course of a routine annual service call at a Massachusetts Country Club. Donned in full scuba gear and diving alone at the time of the incident, the victim was readying the swimming pool for its' annual Memorial Day Weekend opening when he was discovered apparently lifeless at the bottom of the pool by the country club activities director. Following repeated attempts by nearby construction company laborers to extricate the victim in several ways, a municipal police official took charge and rallied a number of individuals who succeeded in removing the victim from the pool. The municipal police official and emergency medical services administered emergency CPR until the ambulance arrived and transported the victim to a regional hospital. The victim was officially pronounced dead approximately one and one-half hours following his discovery at the bottom of the pool. The Massachusetts FACE Investigator concluded that, in order to prevent future similar occurrences, employers should:

○ ensure that divers do not dive alone;

○implement and enforce strict compliance with all requirements that ensure underwater safety.

INTRODUCTION

On May 11, 1993, the state medical examiner's office notified the Massachusetts FACE Program through its 24 hour fatality hotline that a 38 year old male had drowned earlier in the day while performing routine swimming pool maintenance.

On May 14, 1993, the MA FACE Field Investigator first travelled to the town police station to interview the police chief and incident responding police detective. The incident scene was then reviewed where the general manager and activities director were interviewed.

The police report, death certificate, medical examiner information, corporate organization papers, and multiple photographs were obtained during the course of the investigation. Several experts in engineering and pulmonary medicine were also consulted during the course of the investigation.

The victim was a certified diver and president of the swimming pool service and supply company. The company also had a treasurer and clerk who were the victims' corporate partners. The three partners were sole employees of the corporation, which had been in business for 4 years and 9 months. The corporation did not employ a designated safety officer, nor did it have any written safety policies or procedures in effect at the time of the incident.

INVESTIGATION

On May 11, 1993, a 38 year old swimming pool service and supply company president drowned in 12 feet of water while performing routine annual maintenance in a Massachusetts country club swimming pool. The swimming pool measured 252 feet in length by 25 feet in width, was 3-12 feet in depth and held a fresh water capacity of 349,200 gallons. At one time it was the largest swimming pool in the United States.

The country club contracted with the victim to perform annual spring maintenance. The pool's annual maintenance protocol included filling of the pool to full capacity prior to the application of a sealant to repair pool floor stress fractures which occurred over the colder winter months. These stress fractures can be caused by subtle soil movement(s) beneath the pool and/or by the movement of accumulated ice in the pool as a consequence of thawing and freezing rain and snow.

At the time of the incident the victim, in full SCUBA gear, was performing an underwater post check of the stress fractures on which he had previously applied sealant.

According to nearby construction company laborers, the victim surfaced from underwater between 9:30 and 9:45 a.m. and requested that they activate the pool filtration system from inside the nearby pump house. Following system activation, the victim checked nearby surface skimmers and went back under water as the laborers returned to work.

Approximately 45 minutes to one hour later, or between 10:30 and 10:45 a.m., the country club activities director was curious to see how the pool maintenance was progressing. As she neared the edge of the pool and looked in, she immediately noticed the absence of surfacing air bubbles and ran to the adjacent pool house for an underwater mask. Returning to pool's edge, she looked into the water with the mask and witnessed the victim lying motionless on the bottom.

The activities director immediately summoned the assistance of the nearby construction company laborers. One of them dove into the pool but was unable to lift the victim from the bottom. He and a co-worker then attempted to extricate the victim from above with a shepards crook without success. Another laborer jumped into the pool and tied a rope to the victim. When pulled upon, the rope broke.

Within four minutes of the call, a municipal police department detective arrived on the scene. Immediately upon arrival, the detective learned from bystanders that multiple attempts had been made to remove the victim without success. Thinking that the victim was held down by suction from the center pool drain, he ordered the system shut down. He removed his shirt, weapon and shoes and entered the pool. Those already in the pool at this time were instructed to accompany the

detective to the bottom of the pool, grab the victim and pull him free. This time the victim was successfully freed, brought to the surface, and placed poolside.

At this time, the detective and a responding EMT noted that the victim's face was blue and his condition unresponsive and pulseless. Following quick removal of the victim's SCUBA gear, CPR and ambu bag treatment were administered and maintained through transport to the local hospital. He was officially pronounced dead at the hospital approximately one and one-half hours following discovery at the bottom of the pool.

Post incident investigation revealed that a significant amount of air remained in the victim's tank. Equipment testing revealed that the diving equipment was functioning properly and the air quality was good.

When the victim's wet suit was removed at poolside, the police detective noticed a grid-like pattern impression on his upper chest which suggested possible entrapment against the pool floor drainage grid. The FACE program consulted several experts to explore this possibility. Given the overall dimensions of the swimming pool, its water capacity, plumbing lay-out, filtration capacity, etc., it was calculated that a net pressure acted downward on the victim equal to approximately an 864 pound force. This is consistent with the fact that the body of the victim was apparently unable to be lifted from the pool floor until the pump was shut off. Consequently, the conclusion of the FACE Program was that the victim was most likely entrapped.

Consultation with experts in pulmonary physiology and hyperbaric medicine suggested that the pressure, while substantial, was unlikely to interfere with the victim's breathing capacity. It was suggested that panic many have played a role in the victim's inability to breath.

CAUSE OF DEATH

The medical examiner certified the cause of death as asphyxia due to drowning.

RECOMMENDATIONS/DISCUSSION

Recommendation #1:Employers should ensure that divers do not dive alone.

Discussion: OSHA Standard 29 CFR 1910.424 for SCUBA diving requires a standby diver be available while a diver is in the water, that the diver be line-tended from the surface **OR** be accompanied by another diver in the water who is in continuous visual contact during the diving operation, and that a reserve breathing gas supply be readily available. These measures are crucial in the prevention of diving related deaths.

Recommendation #2:Employers should implement and enforce strict compliance with all requirements that ensure underwater safety.

Discussion: OSHA Standards 29 CFR 1910.410, and 29 CFR 1910.420-22 outline dive team qualifications, requirements for a safe practices manual, pre-dive procedures and underwater

procedures for commercial diving. Employers should determine, assess, and consider beforehand, the actual and/or potential hazards associated with the performance of underwater projects. The planning phase should include specific emergency response and rescue measures in the event of an unforseen incident.

LIST OF REFERENCES

Office of the Federal Register: Code of Federal Regulations,
Labor, Title 29, Parts1910.410 (July 01, 1992)
1910.420 (July 01, 1992)
1910.421 (July 01, 1992)
1910.422 (July 01, 1992)
1910.424 (July 01, 1992)