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

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

SUBJECT: **Massachusetts Plater Dies Following Hydrofluoric Acid Spill Exposure During Transfer Process - MA 92-19**

DATE: **April 2, 1993**

SUMMARY

A 37 year-old male Massachusetts plater (victim) died of complications following exposure to hydrofluoric acid. The victim was employed by a manufacturer of production control instruments for the oil and chemical industry. The victim and a co-worker were manually transferring the acid from a fifty-five gallon drum to a three gallon pail when the incident occurred. The workers were wearing only safety goggles and elbow-length rubber gloves for protection. During the transfer process, the three gallon pail was knocked from a makeshift table to the floor. Consequently, the acid splashed the victim's torso/arms region. Following emergency on-site showering and medical treatment, the victim was transported first to a community hospital and then to a regional medical center where he died several hours later.

The Massachusetts FACE Investigator concluded that to prevent similar occurrences in the future, employers should:

- provide training for employees in hazard recognition and avoidance, and safe work practices including task-specific procedures

- implement policies and procedures to ensure safe transfer of hazardous materials in a manner that eliminates or minimizes potential exposure

- ensure that containers to and from which hazardous liquids are conveyed be as fully enclosed as possible to prevent or minimize unintentional escape if dropped or tipped over

- investigate use of alternative less corrosive or non-corrosive materials

- ensure that all appropriate personal protective equipment is provided and used during hazardous material handling operations

INTRODUCTION

On September 22, 1992, the Massachusetts FACE Investigator was notified by the Massachusetts Department of Public Health that on September 10, 1992, a 37 year-old male plater died from exposure to hydrofluoric acid. The Massachusetts Department of Public Health had been notified of the fatal injury by a physician reporting under state public health law.

On September 29, 1992, the Massachusetts FACE Investigator traveled to the incident site and interviewed an employee representative. The death certificate, a witness statement, material safety data sheets (MSDS), corporate chemical abstracts, information from the Occupational Safety and Health Administration, and supplemental data were obtained during the course of the investigation.

The employer manufactured production control instruments for the oil and chemical industry. The company was in business for 84 years and employed 5,500 workers worldwide. Of these, 3,500 workers were employed in the United States, 3,000 in Massachusetts.

The Personnel Programs Administrator served as the safety officer who devoted approximately 75% of his time to safety. The company had comprehensive written safety rules, procedures and a safety committee in place at the time of the incident. Safety procedures for the specific task of transferring corrosives were not part of the program. Also, according to OSHA, employees were not provided with specific training about the hazards of hydrofluoric acid.

At the time of the injury, the victim was one of three Plater IIs. He had been employed by the company for 20 years and 5 months. Except for the first 15 months of his employment, when he worked as a utility person, the victim served in numerous plating-related occupations.

INVESTIGATION

On September 10, 1992, the victim and a co-worker had been scheduled to transfer hydrofluoric acid solution between containers. The solution being transferred was 70% hydrofluoric acid. The company used this solution as part of its plating and cleaning processes. The company normally procured hydrofluoric acid in a drum size of 30-35 gallons and utilized an associated syphon/pump system to transfer the solution between containers. However, this particular drum was 55 gallons in size. Because the intake of the syphon/pump normally used for the smaller drums would not reach the bottom of the 55 gallon drum, approximately 3 gallons of solution remained in the drum after pumping. The two workers decided to manually lift the drum and pour some of the remaining solution by inverting it over an open pail.

The workers placed a three gallon polypropylene pail on a makeshift table which they had constructed by stacking three wooden crates one on top of the other near a ventilation system. As the workers lifted and tipped over the 55 gallon drum to pour the hydrofluoric acid into the polypropylene pail, the drum struck the pail, knocking it from the makeshift table to the floor. The force of the pail landing flat on its base splashed the acid upon both workers. The victim's torso and arms region were extensively covered by the splash. Several drops of the solution were splashed on the co-worker's clothing.

The co-worker immediately doused the victim under a nearby safety shower and removed the victim's rubber gloves, shirt and safety goggles. The victim remained in the shower for 5-6 minutes. Following the emergency shower, the victim was assisted under his own power to the facility medical department. Community emergency medical services were summoned as the company nurse administered first aid which included application of a corrosive barrier cream antidote. The emergency medical services personnel arrived and transported the victim to a community hospital and then to a regional medical center where he died from his injuries approximately four hours later.

CAUSE OF DEATH

The medical examiner listed the cause of death as exposure to hydrofluoric acid.

RECOMMENDATIONS/DISCUSSION

Recommendation #1:Employers should provide training for employees in hazard recognition and avoidance and safe work practices including task-specific procedures.

Discussion: An important measure to prevent hydrofluoric acid exposures is worker education. Employers should train employees in the hazards of hydrofluoric acid and in work practices that will minimize their risk of exposure. OSHA Standard 29 CFR 1910.1200 requires that the hazards of all chemicals produced or imported be evaluated and that information concerning their hazards be transmitted to employees. This information can be transmitted by means of comprehensive hazard communication programs including employee training, material safety data sheets, container labelling and other forms of warning.

Recommendation #2:Employers should implement policies and procedures to ensure safe transfer of hazardous materials in a manner that eliminates or minimizes potential exposure.

Discussion: Since the company apparently lacked syphoning/pumping equipment for the 55 gallon drum of hydrofluoric acid, an alternative process was employed to transfer the solution. The workers manually inverted a cumbersome drum over a wide-mouthed receiving pail which had been placed on a stack of wooden crates. This process by which the workers dispensed an extremely corrosive material exposed them to chemical hazards. When suitable hazardous liquid transfer equipment is not readily available and/or environmental factors prevent safe transfer, further transfer should not take place until appropriate equipment is obtained.

Recommendation #3:Employers should ensure that containers to and from which hazardous liquids are conveyed be as fully enclosed as possible to prevent or minimize unintentional escape if dropped or tipped over.

Discussion: Hazardous liquid transfer operations should be designed to eliminate or minimize the chance of spills. The transfer of hydrofluoric acid into a small-mouth or self-closing receptacle may have eliminated or minimized the splashback when the pail fell to the floor.

Recommendation #4:Employers should investigate the use of less corrosive or non-corrosive materials.

Discussion: If safer and more suitable product substitutes are available in the marketplace, they should be utilized whenever possible. Within days of this fatal injury, the employer replaced the hydrofluoric acid solution with a less hazardous solution.

Recommendation #5:Employers should ensure that all personal protective equipment is provided and used during hazardous materials handling operations.

Discussion: OSHA Standard 29 CFR 1910.132 (a) requires that personal protective equipment for eyes, face, head and extremities, protective clothing, respiratory devices and protective shields and barriers be provided, used and maintained in a sanitary and reliable condition when employees are exposed to hazardous processes or chemical hazards capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact. Had the victim been provided with and worn respiratory protective equipment with face shield and acid resistant suit, this fatality may have been prevented.

REFERENCES

1. Office of the Federal Register: Code of Federal Regulations, Labor 29, July 01, 1991, Part: 1910.1200, 1910.132 (a).