G99 Confined Space Asphyxia: An Unrecognized Hazard in a Plasma Fractionation Tank

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After attending this presentation, attendees will understand how to recognize potential oxygen-deficient atmospheres in the workplace and the hazards they pose to rescuers as well as workers.

This presentation will impact the forensic science community by increasing awareness of potentially hazardous workplace situations that can lead to rapidly fatal deaths. This awareness, in turn, will allow for correct assessment of at-scene conditions by death investigators and aid the medical examiner in diagnosing the correct cause of death.

Confined spaces are often unrecognized as potentially lethal workplace hazards. Confined spaces are defined by the National Institute for Occupational Safety and Health (NIOSH) as spaces not designed for continuous occupancy by workers but large enough to allow persons to enter, and which have limited means of access; they also often have unfavorable natural ventilation. The Occupational Safety and Health Administration (OSHA) defines a "permit-required confined space" (permit space) as a confined space that has one or more of the following characteristics: contains or has the potential to contain a hazardous atmosphere; contains material that could engulf someone who enters; has inwardly converging walls or sloping floors that taper into a smaller area that could trap the entrant; or contains any other recognized safety or health hazard. Examples include tanks, tanker trucks, silos, pits, sewers, and underground vaults.

Confined spaces may not outwardly appear hazardous and may have been entered at other times without incident. They may contain flammable, toxic, or oxygen-deficient internal atmospheres. Oxygen-deficient atmospheres, i.e., those that contain less than 19.5% oxygen, can pose an immediate danger to life and should not be entered without NIOSH-approved self-contained or supplied-air breathing apparatus. In particular, atmospheres with less than 10% oxygen may cause extremely rapid loss of consciousness and death to those who enter them. Oxygen-deficient atmospheres can be caused by consumption of oxygen or its displacement by another gas.

The leading cause of death in cases involving confined spaces is asphyxia, usually from exposure to oxygen-deficient atmospheres. The victim often had not been properly trained and did not recognize or understand the hazards involved. More than half of workers who die in confined spaces were trying to rescue other workers.

A case history involving a worker at a pharmaceutical company who died inside a plasma fractionation tank after entering it inappropriately and without protective apparatus is presented. Two workers who attempted to rescue him were also injured, one severely. Death and injuries were felt to be due to an oxygen-deficient atmosphere of which the workers were most likely not aware. The case will serve as an illustration of the potential hazards of confined spaces to both workers and their rescuers. It will also assist forensic investigators and forensic pathologists in recognizing and correctly assessing such hazards during scene visits and death investigation.

Asphyxia, Oxygen-Deficient, Tanks

 ** Presenting Author*