

It is strange how our jobs in fire protection often come full circle. This happened to me when I reread the paper by P. Lagus and R. Grot titled “An Investigation into the Migration of Propane in Confined Spaces” and Dr. Lagus’ response to my original Letter to the Editor concerning this article.

In the original article, the authors made the statement that “CO₂ is non-toxic” and I questioned that contention. Dr. Lagus kindly responded quoting from Matheson Gas Data Book, Sixth Edition that “Carbon dioxide is generally regarded as a simple asphyxiant.” Dr. Lagus further wrote, “An asphyxiant can be hazardous to human health and not be a toxic substance.” Upon rereading this recently I again think that Dr. Lagus’ response is just as misleading as the original statement in the article.

Even as just a simple fire protection engineer, I know that death is death. Really, does it make a difference if you die from a “toxic substance” (pertaining to poison, poisonous) or an “asphyxiant” (asphyxia – a condition characterized by loss of consciousness, caused by too little oxygen and too much carbon dioxide in the blood, generally as a result of suffocation)? If proper precautions are not taken when using the suggested test method, you could end up dead.

Further, Dr. Lagus conveniently quoted from the sixth edition of Matheson and not the fourth edition which states under toxicity “In high concentration, CO₂ can paralyze the respiratory center. Because of this it is considered an industrial hazard.” Both the fourth and sixth editions also go on to state: “Ten percent CO₂ in air can be endured for only a few minutes. Twelve to fifteen percent soon causes unconsciousness. Twenty-five percent may cause death after several hours of exposure.”

Finally, per the United States Environmental Protection Agency, document EPA430-R-00—2, February 2000; “Carbon Dioxide as a Fire Suppressant: Examining the Risks” it states “The health effects associated with exposure to carbon dioxide are paradoxical. At the minimum design concentrations (34%) for its use as a total flooding fire suppressant, carbon dioxide is lethal. But because carbon dioxide is a physiologically active gas and is a normal component of blood gases at low concentrations, its effects at lower concentrations (under 4%) may be beneficial under certain exposure conditions.” The EPA document goes on to say that at

concentrations greater than 17% loss of controlled and purposeful activity, unconsciousness, convulsions, coma, and death occur within 1 min of initial inhalation.

I think my point in revisiting this issue is that CO₂ is a complex gas that should be utilized with extreme caution. While, I stand corrected that it is not toxic, it can quickly affect humans resulting in loss of consciousness and respiratory paralysis, resulting in death.

Sincerely,
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