



Chemically Speaking LLC

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I just received the latest copy of the NFPA Journal and read with interest Jesse Roman's article "All Up In Our Grill" regarding food truck safety. I whole heartedly support your efforts to develop a standard to improve the safety of this industry.

I want to clarify what happened at the Philadelphia food truck incident. I was asked to review some pictures of the cylinder and valve by one of the government agencies conducting the investigation. I was horrified to find that the Pressure Relief Device (PRD) on the cylinder was plugged. The incident was not a gas leak and ignition, it was a violent rupture of the cylinder due to liquid expansion. The incident cylinder appeared to be ripped apart in the typical overpressure failure. A frame by frame review of the video shows the following from left to right. The cylinder violently ruptures, dispersing and mixing the propane (white cloud) with air. This finds an ignition source from a passing vehicle. The flame front then propagates back to the food truck where the highest concentration is and a deflagration (overpressure) occurs.





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After this incident I happened to see a food truck at a local park in NJ that had a similar setup. Propane cylinders enclosed in metal cabinets in the rear of the vehicle. I asked the owner about his setup and he stated that for safety reasons he located his grill in the front of the truck. Many food trucks have them in the rear where he has measured temperatures in excess of 150°F in the cabinet. In the US the DOT limits the fill of liquefied gases such as propane based on liquid density at a temperature of 130°F. At this temperature the liquid in a properly filed cylinder will expand to fill the contents. Exceeding this temperature will cause the spring loaded relief device to relieve the pressure. Unfortunately since the relief device was plugged the pressure due to liquid expansion could not be relieved. The enormous hydraulic force of the expanding liquid caused the cylinder to rupture, propelling the propane across the street.



At a Community Emergency Response Team (CERT) meeting last night, the Hunterdon County Salvation Army displayed their new disaster food truck. I found their propane setup to be ideal. A fixed tank located below the floor with controls located at an exterior access door.





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I would be happy to chat with you regarding this. For your information, I am on the following NFPA Technical Committees

- 2003 – Present, Principal Member of NFPA 55, Industrial and Medical Gas Committee
- 2007 – Present, Principal Member of NFPA 400, Hazardous Materials Technical Committee
- 2012 – Present, Principal Member of NFPA 318, Standard for the Protection of Semiconductor and Related Facilities

I am a Chemical Engineer that has worked in the compressed gas industry for 40+ years. I have a very active consulting business worldwide on compressed gas safety and Emergency Response. In June I will conduct 2 training classes in Delaware for the HazMat teams on compressed gas emergency response. I have been doing so since 2009.

Regards

Eugene Ngai