

Coffee Stand Owner Dies When Leak from Propane Cylinder Causes a Fire



Investigation: # 16WA00101

Release Date: October 20, 2016

SHARP Report: # 52-37-2016



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SUMMARY

In January of 2016, a 26-year-old drive-through coffee stand owner died from burns she received when her stand caught fire. Propane vapor leaking from a 20-pound barbecue style cylinder was ignited by the open flame of a propane space heater's pilot light. The space heater was used to heat the stand. She had been using the 20-pound cylinder with a coupler adapter to transfer propane to refill 1-pound cylinders. These cylinders were used to fuel the space heater. She received burns to 90% of her body and died four days later.

RECOMMENDATIONS

To prevent similar occurrences in the future, Washington State Fatality Assessment and Control Evaluation (FACE) investigators concluded that employers and business owners should follow these guidelines:

- Employers and business owners should recognize and train employees on the potential fire, explosion, and burn hazards associated with propane gas vapor in the vicinity of an open flame, such as the pilot light of a propane-powered space heater.
- Employers and business owners should not use adapters to transfer propane from larger cylinders to refill one-time use only 1-pound propane cylinders, as this practice creates a risk of fire, explosion, serious injury, or death.
- Employers and business owners should follow National Fire Protection Association (NFPA) building fire codes and local building codes to ensure safe building egress (exit).
- Employers and business owners should provide adequate heat in a safe manner to the workplace.

INTRODUCTION

In January of 2016, the Washington FACE Program was notified by a news media article of the death of a 26-year-old coffee stand owner. The victim was working inside the stand when an uncontrolled release of propane from a 20-pound barbecue style cylinder was ignited by the open flame of a propane space heater used to heat the building. The structure caught fire and the victim received burns from which she died four days later.

A Washington State FACE investigator gathered information about the fatality from incident investigators, including the incident city's fire marshal and an investigator with the U.S. Department of Transportation's Office of Hazardous Materials Safety, Pipeline and Hazardous Materials Safety Administration (PHMSA). The FACE investigator reviewed documents which included the fire department's incident report, records supplied by the PHMSA investigator, and the victim's death certificate. As the victim in this incident was the sole owner with no employees, the Washington State Division of Occupational Safety and Health (DOSH) did not conduct a post-incident inspection. Therefore, no inspection file was available for review.

Business Establishment

The business was a drive-through coffee stand. The concept model of this business was what has been popularly termed a "bikini barista" coffee stand. At these types of stands, espresso drinks and other beverages are served to customers by workers wearing bikinis or similar attire. The victim was the sole owner of the coffee stand business and had no employees.

Victim

The 26-year-old female victim was the owner and operator of the coffee stand. She had recently purchased the stand from its previous owner.

Incident Site

The incident took place at a drive-through espresso coffee stand located in the parking lot of a gasoline station with a convenience store. The coffee stand had been converted from a prefabricated shed to its present use. It had windows on four sides and a single door. Its dimensions were 10' x 10' 4" by 11' 4" inches tall.

Weather

At the time of the incident, the sky was overcast with a temperature of 39 degrees Fahrenheit.

INVESTIGATION

It was a chilly day in January. The victim was inside her drive-through-coffee stand operating her business as usual and serving beverages to customers. She was the sole occupant of the stand.

According to a customer interviewed by a member of the local fire department, between 9 a.m. and 10 a.m. that morning, the customer pulled his vehicle up to the stand's customer service window and noticed the smell of propane coming from inside the stand when the victim opened her sliding style customer service window. He asked her why he was smelling propane. She told him that she was using a space heater to heat the stand. She lifted up the space heater by its handle and showed it to him. It was a dual 1-pound cylinder space heater with radiant heat panels. The customer recognized the model of the heater, as he owned a similar one. It was a popular portable space heater designed for use in enclosed spaces and out of doors.

During a 5- to 10-minute conversation with the victim, the customer expressed his concern that he thought it was very dangerous to have that much propane odor in her stand. He asked her about a 20-pound barbecue-style propane cylinder that he saw inside the stand. She told him that she used it to fill several small 1-pound cylinders that she used for the space heater. And that she had a "thing" that connected to the larger propane cylinder that she used to refill the smaller cylinders. She told the customer that she needed to use the propane heater, as the days had been very cold recently and she had no other effective way to heat the stand and stay warm during her long workdays.

At 4:45 p.m., the city fire department responded to a dispatch of a fire at the coffee stand. When fire department responders arrived a few minutes later they encountered a fully developed fire. They immediately began putting out the fire.

A city police detective found the victim inside the gas station store in the rear near the restrooms. She was conscious and had severe burn injuries to much of her body. He went to comfort her. Moments later fire department paramedics arrived and began to administer aid. She was taken on a gurney to a waiting medic unit ambulance. On the way to the hospital she told a paramedic that her propane space heater and a propane cylinder had blown up and caused the whole stand to instantly fill with flames. She further related that she could not exit by the door because the deadbolt lock required a key to unlock and she was unable to reach the key which was located in another part of the stand near the fire. Eventually, she managed to open the stand's sliding service window and jump out.

She was taken to a hospital where she received treatment for her burn injuries. Four days later she died of these injuries.

An investigation by the city fire department found that the ignition source of the fire was the open flame of the space heater pilot light that ignited an uncontrolled release of propane vapor from the 20-pound propane cylinder that was located inside the stand.

PHOTOS



Photo 1: The coffee stand after fire department personnel had extinguished the fire.



Photo 2: The coffee stand interior after the fire.



Photo 3: Incident propane cylinders and space heater.



Photo 4: Incident 20-lb. propane cylinder as found inside the stand. A cylinder breach crack was caused by the fire (circled).

PHOTOS



Photo 5: Incident 20 lb. propane cylinder with threaded adapter attachment in valve orifice.



Photo 6: Close-up of the adapter.



Photo 7: Non-reusable DOT 39 propane cylinder on the right attached by an adapter to a larger propane cylinder. This configuration is similar to that of the incident cylinders and adapter.

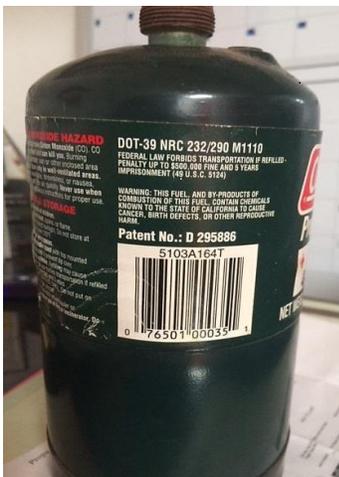


Photo 9: Standard warning label on 1-pound DOT 39 propane cylinder with message: "FEDERAL LAW FORBIDS TRANSPORTATION IF REFILLED – PENALTY UP TO \$500,00 FINE AND FIVE YEARS' IMPRISONMENT (49 U.S.C. 5124)"



Photo 8: Adapter example.

CAUSE OF DEATH

According to the victim's death certificate, the medical examiner reported the cause of death as "thermal burns of approximately 90% total body surface area."

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. Washington FACE investigators identified the following contributing factors in this incident:

- Cold weather.
- Inadequate heat for building.
- Lack of awareness by owner/operator of the potential fire and explosion hazard of propane gas in the close proximity of the open flame of a space heater.
- Unsafe use of one-time use, non-refillable 1-pound propane cylinders.
- Possible poor maintenance of 20-pound tank.
- Non-permitted building modifications relating to occupant egress (exit).

RECOMMENDATIONS AND DISCUSSION

Recommendation #1: Employers and business owners should recognize and train employees on the potential fire, explosion, and burn hazards associated with propane gas vapor in the vicinity of an open flame, such as the pilot light of a propane-powered space heater.

Discussion: Ensure that workers who use propane-powered space heaters receive specific training regarding hazards associated with their use. In this incident, the victim was apparently unaware of the serious hazard that the propane vapor could be ignited by the space heater's pilot light flame. Propane gas is flammable and ignition sources, such as an open flame, must be kept away from cylinders containing propane. An uncontrolled release of propane gas could result in a flash fire and/or explosion (rupture) of a cylinder. Always follow the propane heater manufacturer's instructions for safe operation. Cylinders should always be stored outdoors, so that if there is a leak, vapor will not accumulate. This practice decreases the possibility of causing a fire from an ignition source, as happened in this incident.

If the rotten egg or skunk smell of the chemical added to propane is present, this indicates that there is an uncontrolled release of propane vapor. Immediately do the following:

Extinguish all flames. Do not operate light switches or appliances or use phones, as sparks from these may ignite the propane vapor.

- Leave the area or building.
- Report the leak to your propane dealer or, if this is not possible, call 911.

- Do not return to the area or building until qualified personnel have determined that it is safe to do so.

There are portable propane-powered space heaters that are designed and manufactured for temporary indoor or enclosed space use. These space heaters have an oxygen depletion sensor (ODS) that automatically shuts off the heater when it detects low levels of oxygen. The incident space heater was designed to both be used in enclosed spaces and outdoors, and it had an ODS. This heater consumes oxygen and according to the manufacturer, must be properly vented when operated. A space heater that is designed for outdoor use only should never be used indoors or in an enclosed space. Again, always follow the manufacturer's instructions for safe operation of propane space heaters.

Additionally, propane-powered space heaters produce carbon monoxide (CO). Always check the manufacturer's operating manual to ensure safe use. CO is an odorless, colorless poisonous gas produced by the incomplete combustion of carbon-containing materials. Common symptoms of carbon monoxide poisoning are headache, nausea, vomiting, dizziness, confusion, and weakness. Severe carbon monoxide poisoning causes neurological damage, illness, coma, and death.

Recommendation #2: Employers and business owners should not use adapters to transfer propane from larger cylinders to refill one-time use only 1-pound propane cylinders, as this practice creates a risk of fire, explosion, serious injury, or death.

Discussion: The explosion and fire occurred while the victim was using a propane adapter to transfer propane from a 20-pound cylinder to 1-pound cylinders. Fire investigators determined that a leak from the 20-pound cylinder was the source of propane vapor that was ignited by the space heater's pilot flame, thereby causing a flash fire. It is unknown why the leak occurred. It is possible that the adapter was improperly secured to the 20-pound cylinder's valve, thereby causing propane leakage. Or there may have been damage to the 20-pound cylinder's valve, or some other factor that caused the leak. The condition of the 20-pound cylinder prior to the incident is unknown. What is known is that the cylinder was manufactured before September 30, 1998. This is the date by which the National Fire Protection Association (NFPA) guidelines, as specified in NFPA 58 Liquefied Petroleum Gas Code, required propane cylinders with a 4 to 40-pound capacity to be manufactured with an Overfilling Prevention Device (OPD). Washington State adopted this requirement in 2002. There is no federal requirement to have an OPD. The 20-pound cylinder in this incident did not have an OPD. This indicates that the cylinder may not have been properly maintained if the OPD was not installed when it was refilled.

The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) recommends that cylinders that are in poor condition or have not been requalified by certified propane personnel should not be used, as they may put users at risk of severe injuries or death. Both propane (Class 2.1, Flammable Gas) and the cylinder to which it is stored are regulated by the Hazardous Material Regulations (HMR). Cylinders containing flammable gases are required to fully conform to the packaging, qualification, maintenance, and use requirements of the HMR. Propane cylinders must be requalified or replaced every 5-12 years depending on the cylinder type, condition, and previous requalification method. Users

should have cylinders inspected by certified propane personnel at regular intervals to ensure that they are in serviceable condition. PHMSA propane cylinder safety bulletins can be accessed at <http://www.phmsa.dot.gov/hazmat/outreach-training/compressed-gas-cylinder-safety-information>

Though not a factor in this incident, because the 1-pound cylinders are manufactured for one-time only use and are not subject to the more rigorous manufacturing standards of refillable cylinders, they may present a safety hazard if refilled and reused. Over time, with the stresses of multiple refills and emptying, these cylinders may become less durable and potentially subject to failure, presenting a risk of fire, explosion, serious injury, and death.

Additionally, Federal law forbids the transportation of these 1-pound cylinders, also known as DOT 39 cylinders, if they are refilled. Washington State law does not allow the refilling or reuse of containers manufactured in accordance with the specifications of 49 CFR Part 178 and authorized by 49 CFR Chapter 1 as a “single trip” or “nonrefillable container” in LP (Liquefied Petroleum) gas service.

Also, see CFR 1910.110, Subpart H, Hazardous Materials, Storage and handling of liquefied petroleum gases.

Recommendation #3: Employers and business owners should follow National Fire Protection Association (NFPA) building fire codes and local building codes relating to building egress (exit).

Discussion: This was a new business which the city fire marshal’s office had not yet inspected for code compliance with the fire code. The business was scheduled for inspection later that month. The previous owner of the stand had made non-permitted modifications to the coffee stand. Some of these modifications were related to building egress, which affected the victim’s ability to exit the stand quickly when the fire broke out. The door was immediately adjacent to where the fire started. The victim was standing in this area when the fire ignited. In violation of building and fire codes, there was a deadbolt on the door that required a key to unlock. Initially the victim attempted to leave by this door but was unable to do so quickly because the key was hanging in an area above where the fire started and she was unable to reach it. After eight seconds she slid open the customer service window and exited the stand. During this time, she received severe burns.

It is recommended that doors be fire code compliant, thereby allowing building occupants to exit quickly in case of a fire. In this case, a single action unlocking and opening device would have allowed the victim to escape more quickly.

Recommendation #4: Employers and business owners should provide adequate heat in a safe manner to the workplace.

Discussion: It is unknown why the victim was using a propane space heater to heat her coffee stand. The city fire marshal’s office inspection which was scheduled for later that month would have assessed any heating source for fire safety code compliance. After this incident, the city fire marshal’s office checked to see how other drive-through coffee stands were heating their

stands. They found that all twenty-two of the stands they inspected were using electrical heating.

Employers and business owners should ensure that a safe heating source is available. In work situations where there is no heating supplied and where cold temperatures are expected and there is a need to provide temporary heating, for example in a seasonal roadside stand, a building under construction, or a coffee stand such as this one, then provision should be made to provide a safe source of heat.

Always follow temporary heating device manufacturer's operating instructions and all local, state, and federal safe operating requirements.

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INVESTIGATOR INFORMATION

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WASHINGTON STATE FACE PROGRAM INFORMATION

The Washington State Fatality Assessment and Control (WA FACE) program is one of many workplace health and safety programs administered by the Washington State Department of Labor & Industries' Safety & Health & Research for Prevention (SHARP) program. It is a research program designed to identify and study fatal occupational injuries. Under a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH grant # 2U60OH008487-11), WA FACE collects information on occupational fatalities in WA State and targets specific types of fatalities for evaluation. WA FACE investigators evaluate information from multiple sources. Findings are summarized in narrative reports that include recommendations for preventing similar events in the future. These recommendations are distributed to employers, workers, and other organizations interested in promoting workplace safety. NIOSH-funded, state-based FACE programs include: California, Kentucky, Massachusetts, Michigan, New York, Oregon, and Washington. WA FACE does not determine fault or legal liability associated with a fatal incident. Names of employers, victims and/or witnesses are not included in written investigative reports or other databases to protect the confidentiality of those who voluntarily participate in the program.

Additional information regarding the WA FACE program can be obtained from:

[Washington State FACE Program](#)

www.lni.wa.gov/Safety/Research/FACE/default.asp

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ACKNOWLEDGMENTS

This report was reviewed by stakeholders from labor and business communities and various Washington State and Federal worker safety agencies. Though we are unable to acknowledge specific individuals for their contributions to this report, we would like to recognize the following for their help and support of the FACE mission and objectives:

- Division of Occupational Safety and Health (DOSH)
- Federal FACE Program management (NIOSH)
- Safety & Health Assessment & Research for Prevention (SHARP)
- Fire department officials of incident city