In-Station Training

TM 25-07 Outside Odor of Gas

Author

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Purpose

Response to an outside odor of gas is often considered to be a “routine” response. The odorant used in propane and natural gas (commonly ethyl mercaptan) can be detected well below the lower flammable limit and often no hazardous levels of flammable gas are present. However, this is not always the case.

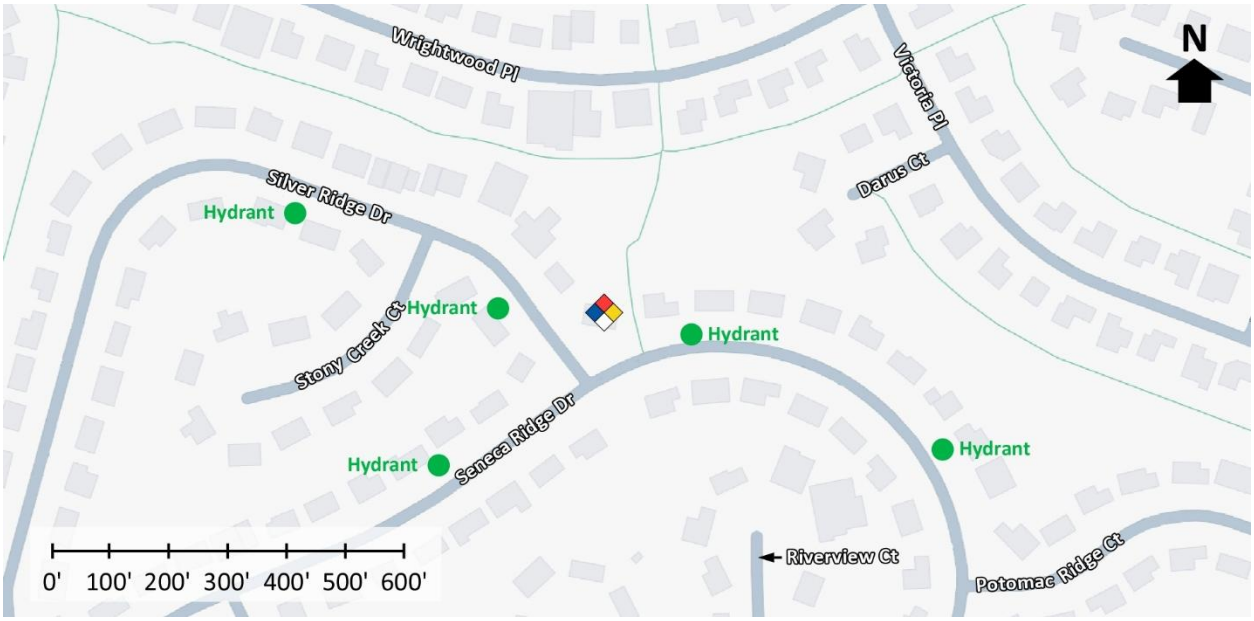
Learning Outcomes

Firefighters and officers perform an effective size-up, select an appropriate strategy, and implement tactics based on the strategic decision-making model when responding to flammable gas incidents.

Conducting the Drill

This incident involved an outside odor of gas at 347 Silver Ridge Drive, Sterling, Virginia on February 16, 2024, at 19:40 (Fox 5 DC Digital Team, 2024; Corliss, Lyons, & Vitka, 2024; Volou, 2024; LoudounNow, 2024; & LC-CFRS, 2025). Review the map and photos (Figures 1-7) to gain an understanding of the area and building involved.

Figure 1. Map of the Incident Area



Note: Adapted from Google. (2023a). [Map, 347 Silver Ridge Drive, Sterling, VA]. https://bit.ly/3OMZpkG.

Ther The closest hydrant is to the west southwest on Seneca Ridge Drive with additional hydrants on Silver Ridge Drive and Seneca Ridge Drive as illustrated in Figure 1.

Figure 2. Aerial View.

Note: Adapted from Google. (2023b). [Aerial view 347 Silver Ridge Drive, Sterling, VA]. https://bit.ly/4bDavSR.

Figure 3. Side Alpha-Initial Reported Incident Location

Note: Adapted from Zillow. (2024). *345 Silver Ridge Dr, Sterling, VA 20164*. https://bit.ly/3EbOsqc.

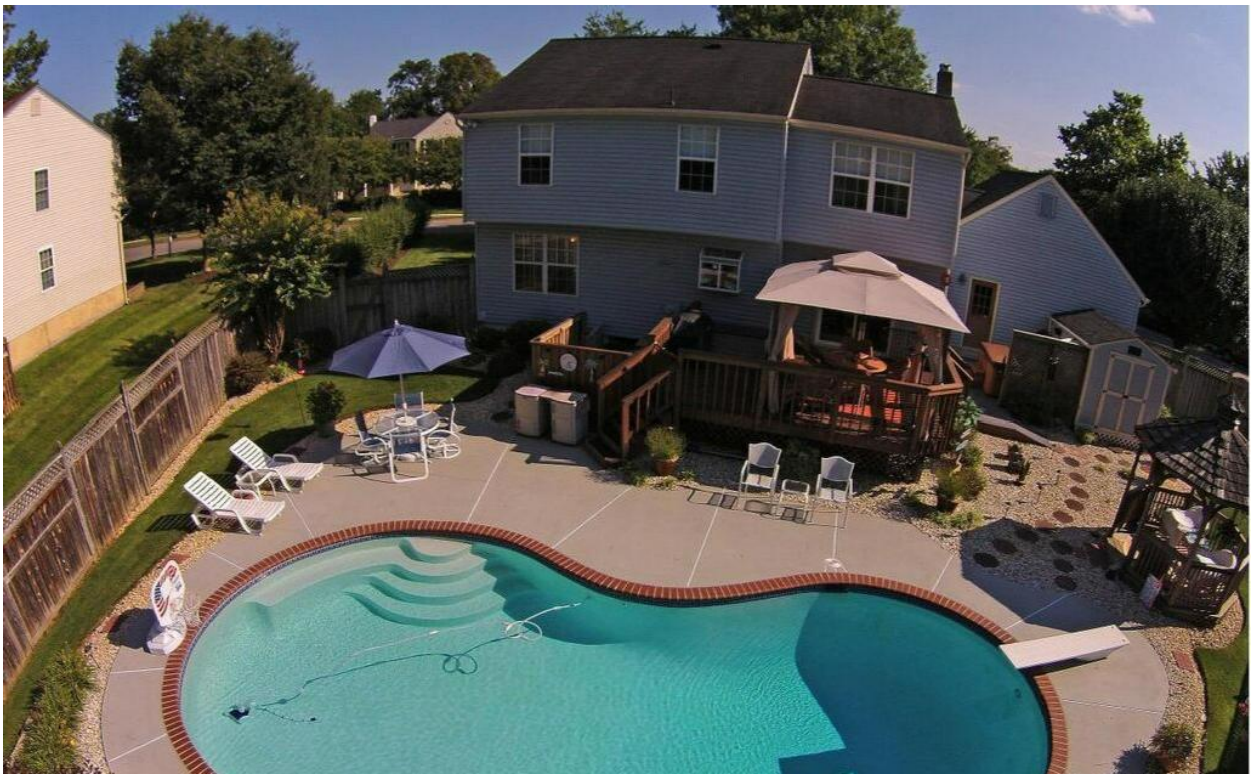
Figure 4. Side Alpha-Incident Location

Note: Adapted from Redfin. (2015). 347 Silver Ridge Dr. Sterling, VA 20164. https://bit.ly/3T1upQ9.

Figure 5. Alpha/Bravo Corner-Incident Location

Note: Adapted from Redfin. (2015). 347 Silver Ridge Dr. Sterling, VA 20164. https://bit.ly/3T1upQ9.

Figure 6. Side Charlie-Incident Location



Note: Adapted from Redfin. (2015). 347 Silver Ridge Dr. Sterling, VA 20164. https://bit.ly/3T1upQ9.

Figure 7. Bravo/Charlie Corner-Incident Location

Note: Adapted from Redfin. (2015). 347 Silver Ridge Dr. Sterling, VA 20164. https://bit.ly/3T1upQ9.

Important! *This 10-Minute Training is based on the incident that occurred at* 347 Silver Ridge Dr. Sterling, Virginia *on February 16, 2024, that resulted in the line-of-duty death of Firefighter Trevor Brown of the Sterling Volunteer Fire Company and injury to 11 other members of Loudoun County Fire and Rescue. Data for this training was developed from news reports, incident radio traffic, and the serious incident investigation report (LC-CFRS, 2025). This training is dedicated to the memory of Firefighter Brown and to the other members of Loudoun County Fire and Rescue injured in this incident.*

The temperature is currently 41° F with wind from the east southeast at 5 mph (Weather Underground, 2024). **You are the company officer of Ladder 1**. It is Friday, February 16th, and at 19:40 you have been dispatched along with an engine to 345 Silver Ridge Drive for an outside odor of gas. This would ordinarily be a single engine response, but as you were closer the computer-aided dispatch system added you to the incident. The engine and ladder have four-person staffing[1]. Both the ladder and engine companies are equipped with four-gas atmospheric monitoring instruments.

Time starts now! Answer the first eight questions within the next 10 minutes. Decide and put your answers in the form of communication you would have with your crew, other companies, and the first arriving command officer. Save discussion for after answering the first eight questions.

If needed, you may use the *Emergency Response Guidebook* (US DOT, 2024), *Pocket Guide to Hazardous Chemical Hazards* and *CAMEO Chemicals* (NOAA, 2024) to inform your strategic and tactical decision-making.

1. What critical factors would you consider when dispatched and during response? What conversations would you have with your crew during response?

The engine goes en route but you anticipate that you will arrive several minutes before they do. You will approach from southwest on Seneca Ridge Drive. The engine company will arrive from the same direction approximately three minutes after you.

While responding, dispatch advises that they have received multiple calls for an outside odor of gas in the area.

[1] If your first alarm deployment is different, use your own resource assignment and staffing with the first and second arriving resources typical for your agency (e.g., two engines vs. engine and ladder).

Figure 8. Conditions on Arrival

Note: Adapted from Redfin. (2015). 347 Silver Ridge Dr. Sterling, VA 20164. https://bit.ly/3T1upQ9.

2. State your initial radio report (IRR) exactly as you would transmit it to dispatch.

3. What specific actions would you take (as the company officer) immediately upon arrival and exiting the apparatus and what task orders would you give your crew?

Approaching the reported incident location at 345 Silver Ridge Drive, you can smell a slight odor of gas but maintain a reading of 0% of the lower explosive limit (LEL) on your atmospheric monitor. The homeowner at the reported incident location advised that they could smell gas outside, but not in the house. Continuing investigation you get a reading of 2% of the LEL at the storm drain inlets in front of 347 Silver Ridge Drive, but did not detect any odor.

4. Would you change the action you are taking or modify the assignments given to your crew? If so, what task orders would you provide?

5. State your update report exactly as you would transmit it to dispatch.

6. Engine 1 advises that they are Level 1 southwest on Seneca Ridge Drive, state the tactical assignment you would give them exactly as you would transmit it.

The homeowner of 347 Silver Ridge Drive advises that they believe that they were the reason for the call as they have a leaking 500-gallon propane tank on their property. The homeowner tells you that the tank was for a pool heater that had not been used for some time and that they had contacted the propane company to fill the tank. At 14:30, the propane delivery driver had put 125 gallons into the tank, discovered that it was leaking, and stopped filling the tank. No action was taken by the propane company to mitigate the leak. The homeowner directs you to Side Bravo where you observe propane vapor seeping from the ground around the dome covering the propane tank valves. The homeowner indicates that there are other occupants in the house and that there is a strong odor of gas in the basement[2].

7. What action will you take based on this additional information? State the communication you would have with dispatch and the orders that you would provide your crew and Engine 1.

8. This question is based on upgrade of the resource determination and response of a command officer to the incident. Based on the anticipated effectiveness of your tactical operations, state your conditions, actions, and needs (CAN) report that you would provide to the first arriving command officer as part of command transfer to IC #2.

Reflect on your strategic decision-making and responses to questions one through eight before answering the next six questions. Give some thought to what cues, patterns, or anomalies (differences from conditions that you would anticipate) inform your answers.

9. What was the problem?

[2] Some of this information was provided to the company officers of the first arriving ladder and engine. However, information about the presence of an occupant and odor of gas in the basement was provided to crew members but not communicated to the company officers.

10. What was getting in the way of achieving your tactical priorities?

11. Was there anything in this incident that could have hurt or killed you (right now)?

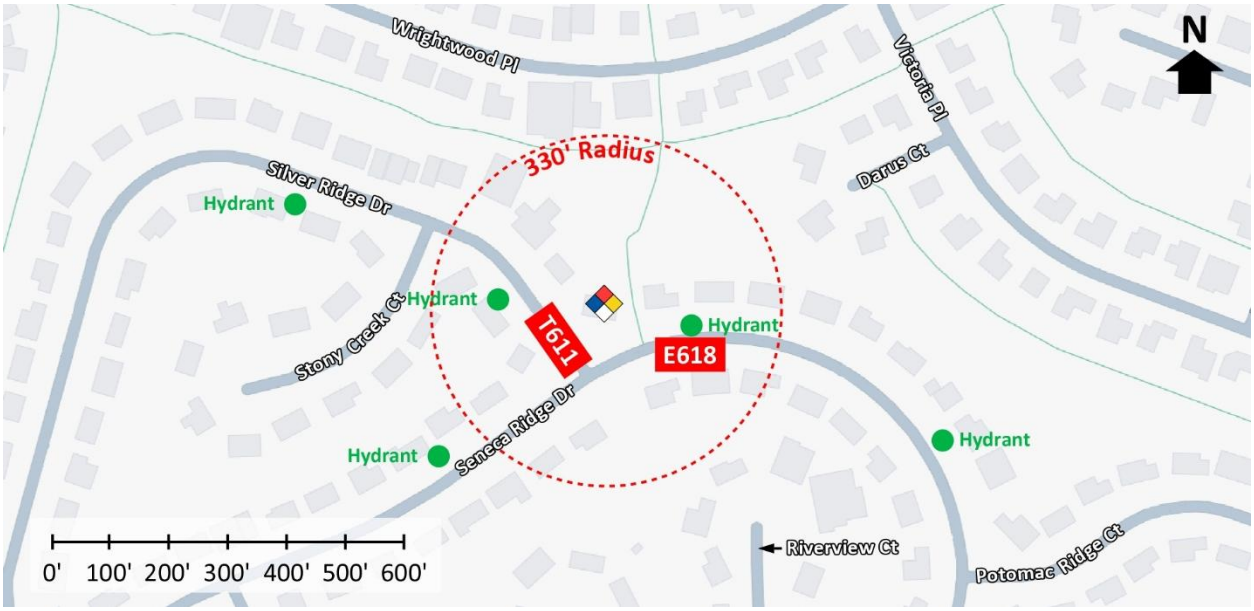
12. Was it reasonable to believe that the Main Fire Occupancy was occupied?

13. Was there searchable space?

14. If you believed it was reasonable that the building was occupied and there was searchable space, what could you do about it?

This incident resulted in the death of Firefighter Trevor Brown and injuries to 13 other fire service personnel and civilians due to an explosion of the propane/air mixture within 347 Silver Ridge Drive. Most of the personnel on the first arriving ladder and engine company were incapacitated by their injuries. In addition to destroying the Incident Occupancy, Exposures Bravo 1, Bravo 2, and Delta 1 were determined to be structurally unsound due to the overpressure resulting from the explosion.

Figure 9. Apparatus Positioning and Blast Radius



Note: Adapted from Google. (2024c). [Map, 347 Silver Ridge Drive, Sterling, VA]. https://bit.ly/3OMZpkG.

The debris field extended between 250 feet and 300 feet from the Incident Occupancy. Figure 9 illustrates a 300-foot radius around the incident occupancy and the position of the engine and ladder companies at the time of the explosion.

15. Review Figure 9 that illustrates the positioning of the ladder and engine company. Was this similar or different than where you positioned your apparatus in this training? What was the basis and rationale for your apparatus positioning?

16. The ladder company officer and an engine company firefighter entered the Incident Occupancy to remove an occupant who was in the basement. When they entered, they detected 40% of the lower explosive limit (LEL) on entry through the door on Side Alpha. The the four-gas atmospheric monitor indicated “over range” for percentage of the lower explosive limit (LEL) while they were in the basement. However, they did not smell an odor of gas on Floor 1 or in the Basement. What could account for the lack of odor and an “over range” reading on the four-gas monitor?

17. If you entered the incident occupancy for primary search, and your atmospheric monitor sounded an audible alarm (which is typically at 10% of the LEL) what action would you take? Leave immediately or complete the primary search? What is the basis for your choice of action?

18. The companies operating at this incident placed a battery powered positive pressure fan at the door on Side Alpha. After instructing the occupant to evacuate the building (which they did), the officer of the ladder company and an engine company firefighter remained in the basement, opening windows in the basement. Based on the conditions presented in this 10-Minute Training, was this a reasonable approach to reduce the concentration of propane in the basement? Why or why not?

The ladder company officer and engine company firefighter were in the Bravo/Charlie corner of the basement when the explosion occurred. Both members were trapped under a large amount of debris. It was dark, but the ladder company officer was able to see and determined that he could not self-extricate and that there was fire above and behind him. Consider this information as you respond to the last two questions.

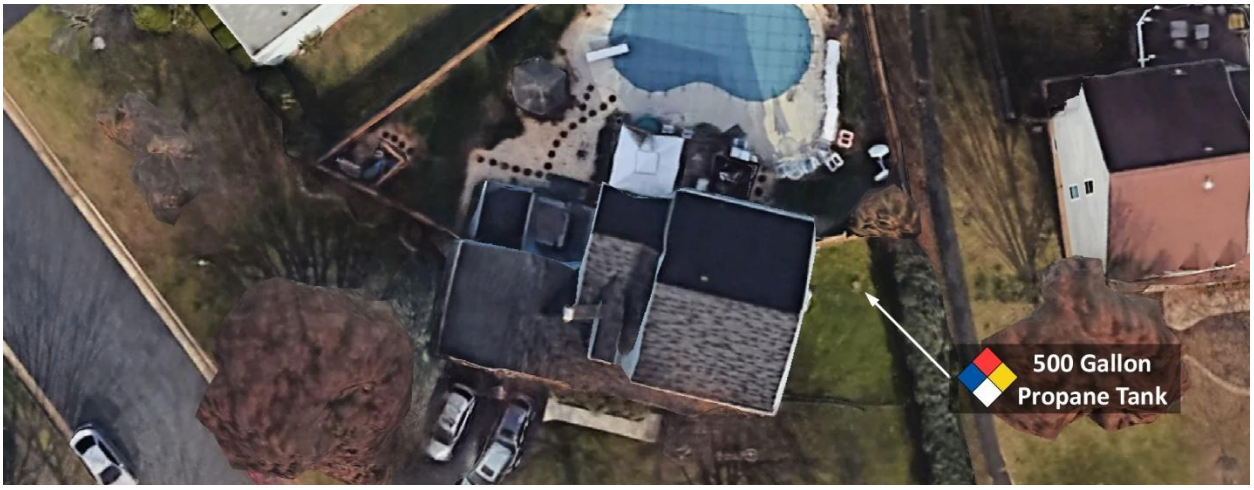
19. State your mayday message exactly as you would transmit it.

20. When the explosion occurred, the ladder company officer was IC #1. If you transmitted the Mayday message as stated in the previous question, who do you anticipate would respond to it?

Additional Learning: Read the *Loudoun County Significant Incident Investigation Report* (LC-CFRS, 2025) on this incident and discuss the observations, recommendations, and analysis with your crew. How can the lessons learned from this incident be implemented within your agency and what actions can you take to improve the safety and effectiveness of your company when responding to flammable gas incidents?

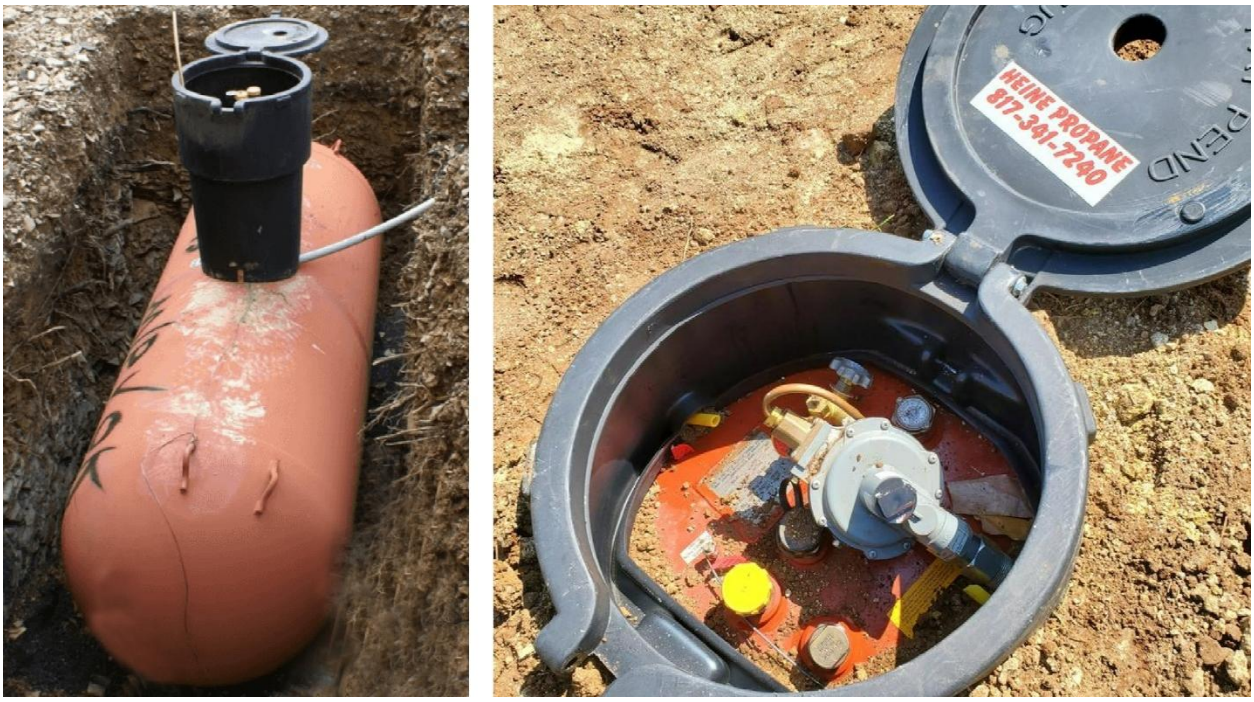
The 500-gallon underground propane tank was located on Side Delta of the Incident Occupancy as illustrated in Figure 10. Review the configuration of underground propane tanks as illustrated in Figure 11 with your crew.

Figure 10. Location of the 500-Gallon Propane Tank



Note: Adapted from Google (2024d). [Aerial view 347 Silver Ridge Drive, Sterling, VA]. https://bit.ly/4axzW8e.

Figure 11. Similar Underground Propane Tank Installation



Note: Adapted from Connelly, M. (2018). *Thinking of an underground propane tank? Here's how it's done.* https://bit.ly/4aEY7Ss. & Heine Propane. (2025). *Underground propane tank services.* https://bit.ly/4h7PXEl.

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