In-Station Training

TM 24-30 Odor of Gas-Inside

Author

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Purpose

Response to an odor of gas is often considered to be a “routine” response. However, natural gas and propane leaks inside a building present significant hazards to occupants and responders. Don’t be complacent!

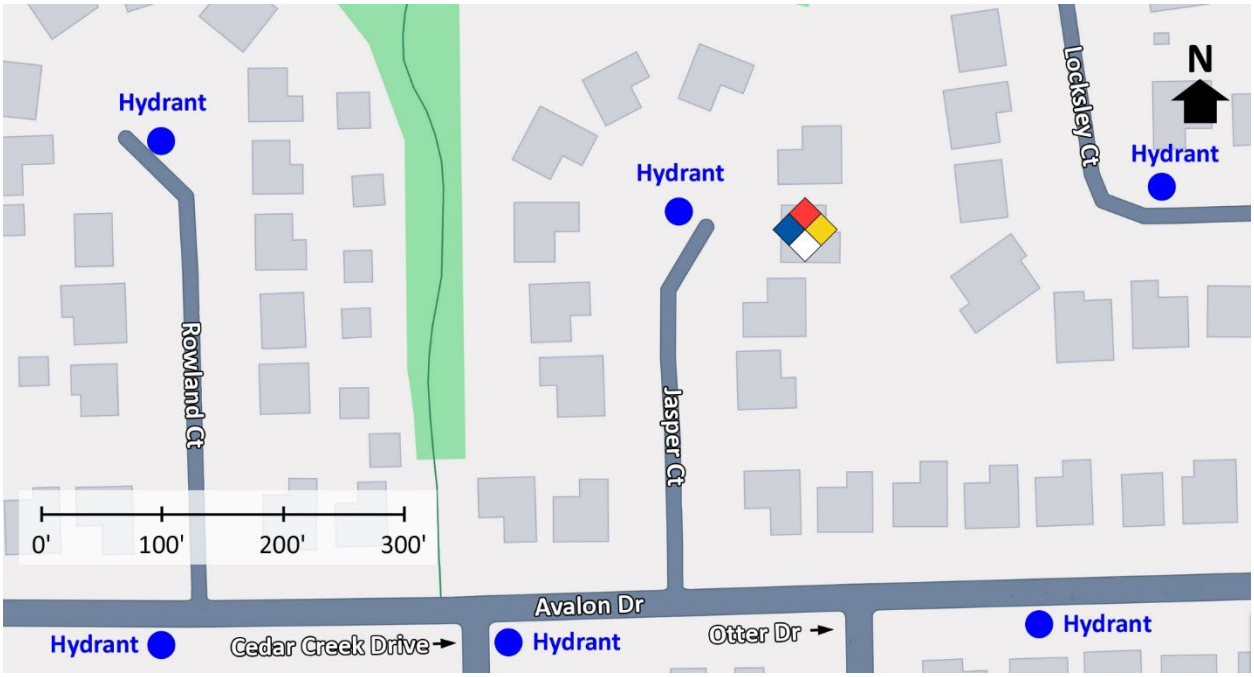
Learning Outcomes

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 an odor of gas incident.

Conducting the Drill

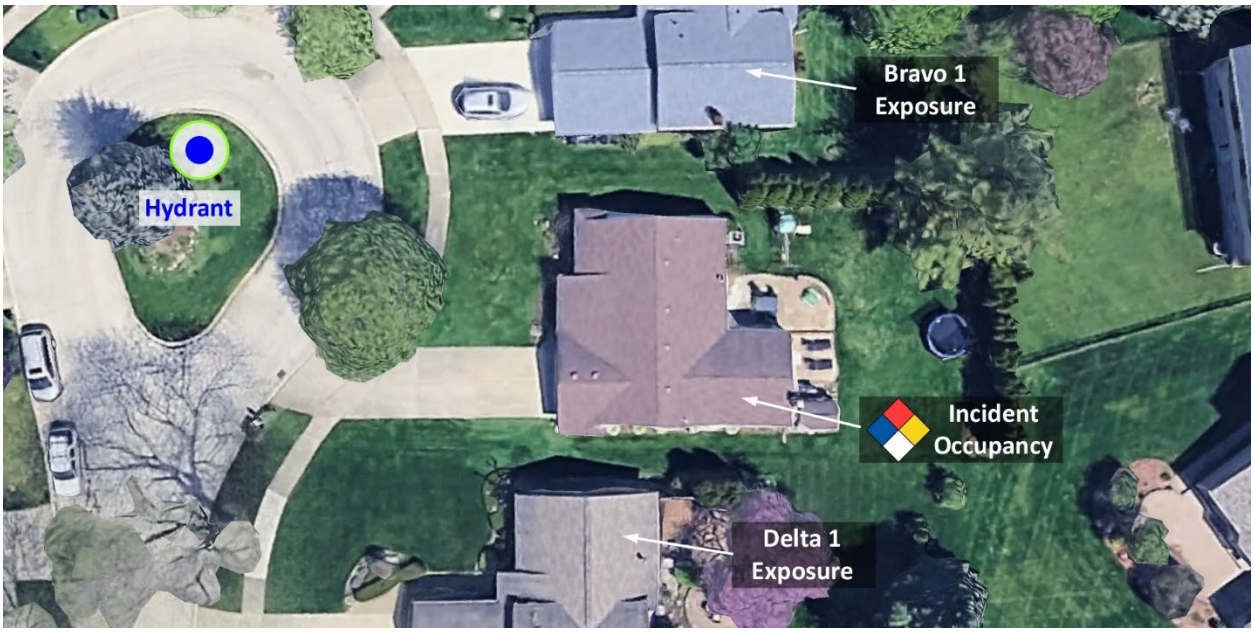
This incident involved a reported odor of gas inside a residence at 3310 Jasper Court, Troy, Michigan on Wednesday, June 11, 2025, at 21:02 (Aidan, 2025 & Broadcastify, 2025). Review the map and photos (Figures 1-6) to gain an understanding of the area and building involved.

Figure 1. Map of the Incident Area



Note: Adapted from Google. (2025a). [Map, 3310 Jasper Court, Troy, MI]. https://bit.ly/4kRONy7.

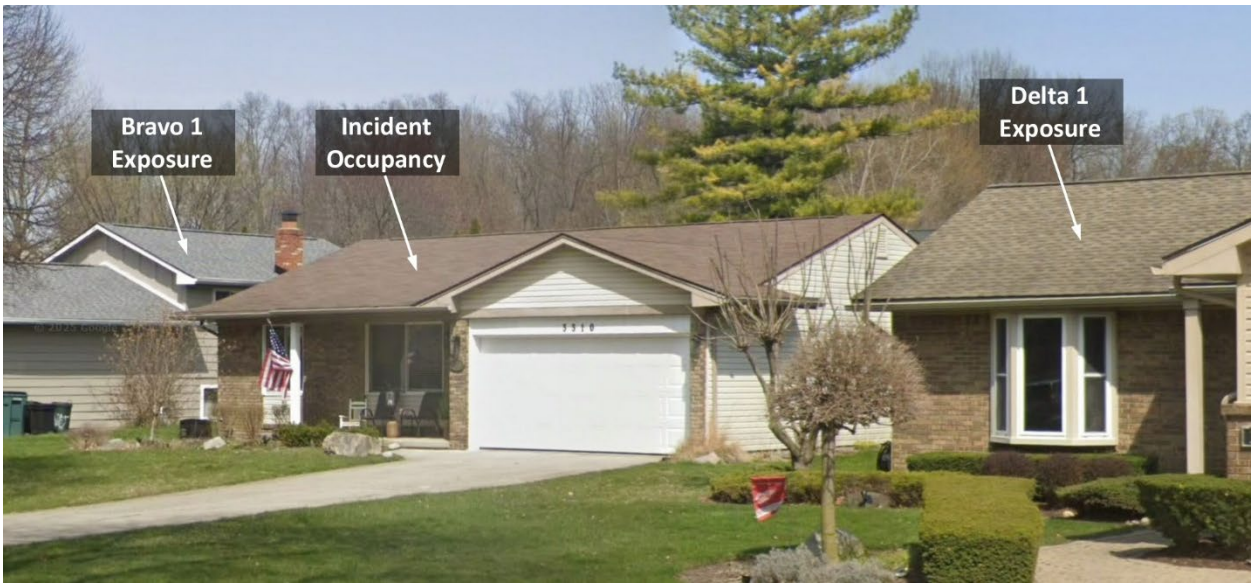
Figure 2. Aerial View



Note: Adapted from Google. (2025b). [Aerial view, 3310 Jasper Court, Troy, MI]. https://bit.ly/3GULV5p.

The closest hydrant is in the cul-de-sac on Jasper Court. There are multiple hydrants in the area as illustrated in Figures 1 and 2.

Figure 3. Alpha/Delta Corner



Note: Adapted from Google. (2025c). [Street view, 3310 Jasper Court, Troy, MI]. https://bit.ly/4f11DbN.

Figure 4. Side Alpha

Note: Adapted from Google. (2025d). [Street view, 3310 Jasper Court, Troy, MI]. https://bit.ly/4nZ8lTU.

Figure 5. Alpha/Bravo Corner

Note: Adapted from Google. (2025e). [Street view, 3310 Jasper Court, Troy, MI]. https://bit.ly/4eUrQbW.

Figure 6. Side Charlie

Note: Adapted from Google. (2025f). [3d aerial view, 3310 Jasper Court, Troy, MI]. https://bit.ly/3TPCdUU.

The temperature is currently 82° F with wind from the south southwest at 8 mph (Weather Underground, 2025). **You are the company officer of an engine company**. It is Wednesday, June 11th, and you have been dispatched along with a ladder company, and command officer to 3310 Jasper Court for a natural gas leak inside a residence at 21:02. The engine and ladder have four-person staffing[1].

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.

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

Dispatch provides an update indicating that the occupants report smelling an odor of gas inside, that they have natural gas service to their house, no one is feeling ill, and that they have evacuated. You hear a command officer and ladder company go enroute. You will arrive from the east on Avalon Drive. The

[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).

ladder company will arrive from the west on Avalon Drive four minutes after you, followed by the command officer. Examine Figure 7 illustrating conditions on arrival.

Figure 7. Conditions on Arrival at Avalon Drive and Jasper Court

Note: Adapted from Google. (2019). [Street view, Avalon Drive at Jasper Court, Troy, MI]. https://bit.ly/3Uku0bk.

2. What direction will you provide your apparatus operator related to apparatus positioning? State the direction you would provide exactly as you would say it.

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

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

Figure 8. Conditions on Side Alpha

Note: Adapted from Google. (2018). [Street view, 3310 Jasper Court, Troy, MI]. https://bit.ly/44Ywcuk.

The occupants are out of the house and report that they have been smelling gas for about the last half hour. You locate the gas meter on Side Bravo at the Alpha/Bravo corner of the house. Using a four gas monitor you obtain the following readings on the exterior of the house: 21% O_2, 0% LEL, 0 ppm CO, 0 ppm H_2S.

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

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

7. Ladder 1 arrives and reports that they are Level 1 on Avalon Drive at Cedar Crest Drive. State the tactical assignment you would give them exactly as you would transmit it.

Using a four gas monitor you obtain the following readings at the door on Side Alpha: 21% O_2, 0% LEL, 0 ppm CO, 0 ppm H_2S.

8. State the 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?

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)?

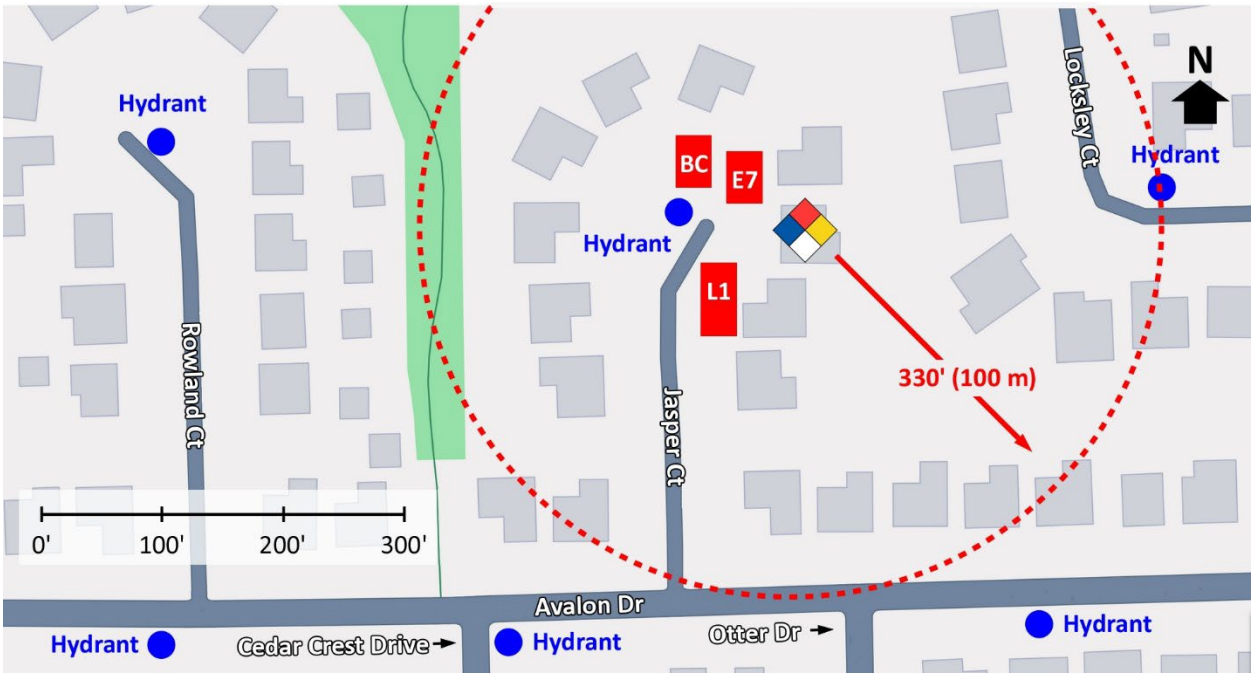
12. Was it reasonable to believe that the Incident Occupancy was occupied?

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?

Examine Figure 9 and watch the first 02:00 incident video (Aidan, 2025) before answering the remaining questions.

Figure 9. Apparatus Positioning



Note: Adapted from Google. (2025a). [Map, 3310 Jasper Court, Troy, MI]. https://bit.ly/4kRONy7.

15. The engine, ladder company, and chief officer were all parked in front of or adjacent to the reported incident location. Was this similar or different than where you positioned your apparatus? What are the potential risks of positioning in this area? If you think the risk is minimal, see 10-Minute Training 25-07!

16. In the incident video, it appeared that civilian vehicles entered the incident area after the arrival of the fire department. What potential problems does this present? How did or would you address control of access into the incident area?

17. Describe the process you would use for investigating the odor of gas inside the residence. How would you go about atmospheric monitoring? Where would you investigate, in what order, and what levels would you monitor (low, middle, high)?

Additional Learning: Review the following size-up and investigation considerations for natural gas and propane incidents along with the characteristics of natural gas and propane with the members of your crew. Ensure that all members are proficient in the use of the atmospheric monitoring equipment you carry on your apparatus

Size-Up & Investigation: Natural gas or propane incidents may not present obvious visible indicators of the nature and extent of the incident. Most often, these types of incidents will be *nothing showing, investigating the offensive strategy*. Consider the following as part of size-up of natural gas or propane incidents. Remember you may encounter propane when responding to a building that has natural gas service (think about propane fired gas grills and propane powered forklifts).

- Reported conditions.
- Wind and terrain (approach from uphill and up wind whenever possible)
- Visible conditions will not necessarily indicate the presence of natural gas or propane (but a natural gas meter and/or above ground piping or propane storage and transport containers may indicate potential).
- Leaking natural gas (other than liquefied natural gas) will not generally produce a visible vapor cloud. In the case of propane, presence of a vapor cloud may be a strong indication, but flammable concentrations are likely to exist outside the area of the visible vapor cloud.
- Consider that natural gas has a lower vapor density than air and will rise, in enclosed areas this may result in accumulation on upper floor or in the attic. On the other hand, propane has a higher vapor density than air and will sink, in enclosed areas this may result in accumulation in basements or lower floors.
- Spot apparatus at least two houses away or 333 feet (100 meters) from the dispatched address, upwind and up slope whenever possible
- All later arriving units shall maintain Level 1 Staging a minimum of 800 feet away from the address/area of the leak, upwind and up slope whenever possible.
- Establish traffic control to minimize potential life hazard (and potential for ignition should the release be outside).
- Limit the number of personnel allowed to approach the hazard area for size-up
- When responding to a residential or commercial propane incident wear self-contained breathing apparatus (SCBA) with facepiece in the ready position (ready for rapid donning).
- Atmospheric monitoring should be performed on approach, around the building (performing a 360^{o} recon), and on entry at residential and commercial propane incidents
- Conduct focused monitoring in areas where propane storage, appliances, equipment may be located.

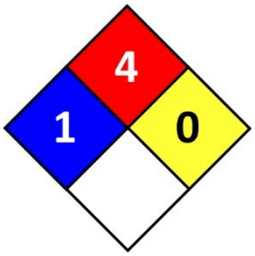
Important: If your apparatus is not equipped with SCBA (e.g., ambulance) or atmospheric monitor with a flammable gas/vapor sensor (which are only carried on engines), special call the appropriate resources.

Characteristics of Natural Gas and Propane: Natural gas and propane are the two most common fuel gases that firefighters and fire officers will encounter. While these gases have commonalities (both are flammable), they also have important differences (most importantly, natural gas is less dense than air and will rise and propane is denser than air and will sink).

Natural Gas

Natural gas contains many different compounds. The largest component of natural gas is methane, a compound with one carbon atom and four hydrogen atoms (CH_4). Natural gas also contains smaller amounts of other hydrocarbon gases such as ethane, butane and propane, and nonhydrocarbon gases, including trace quantities of carbon dioxide, nitrogen, hydrogen sulfide, and helium. Table 1 provides an overview of the characteristics and physiological effects of methane.

Table 1, Properties and Characteristics of Methane

Product Name (UN/NA ID)	Formula	NAERG	
Methane, Compressed (1971), Natural Gas Methane, Refrigerated Liquid (1972), Liquefied Natural Gas (LNG)	CH_4	Guide 115	
Description Colorless, tasteless, odorless, lighter than air, flammable gas. As methane is odorless, methyl mercaptan is added to provide a distinctive “gas” odor when methane is used as a fuel gas.			

Molecular Weight	Vapor Density	Specific Gravity	Vapor Pressure	Ionization Potential
16.04 g/mol	0.544	n/a	> 1 ATM @ 70° F	13.7 eV
Solubility	**Flash Point**	**LFL**	**UFL**	**Ignition Temperature**
Slightly Soluble	n/a (gas)	5.0 %	15.0 %	1,112° F (600° C)
TLV-TWA (ACGIH)	**STEL (15 min)**	**IDLH**	**Routes of Entry**	
1000 ppm	n/a	n/a	Inhalation, Contact (Liquid)	

Physiological Effects

Methane is a simple asphyxiant. Methane refrigerated liquid (liquefied natural gas) is a cryogenic material transported and stored at extremely low temperature (e.g., -260° F (-162° C).

Symptoms of Exposure

Inhalation of methane may result in dizziness, confusion, excitation, or asphyxia; Contact with methane refrigerated liquid will result in freeze injury.

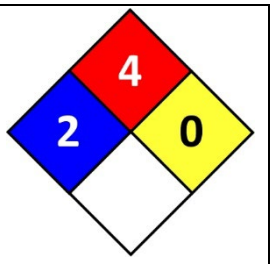
Other

Methane (natural gas) is commonly transported through pipelines. However, compressed natural gas (CNG) is also used as a vehicle fuel. CNG cylinders do not present a boiling liquid expanding vapor explosion (BLEVE) risk as they do not contain liquid. However, they can fail catastrophically with a resulting ignition of the flammable gas. Methane refrigerated liquid (liquefied natural gas (LNG)) containers do present a BLEVE risk if the container is damaged (typically due to mechanical harm) or thermally stressed (due to flame contact above the vapor space). Note that a BLEVE does not require a fire or flame impingement prior to container failure (mechanical damage and an increase in ambient temperature may result in a BLEVE).

Propane

Propane (C_3H_8) is a flammable hydrocarbon gas. It is a gas at standard temperature and pressure, but compressible to a transportable liquid. Propane is commonly used as a fuel gas. Table 1 provides an overview of the characteristics and physiological effects of propane.

Table 2. Characteristics & Physiological Effects of Propane

<table>
<tr><td colspan="3">Product Name (UN/NA ID)
Propane (1075)</td><td>Formula
C_3H_8</td><td>NAERG
Guide 115</td><td rowspan="2"> 
</td></tr>
<tr><td colspan="5">Description
Colorless, tasteless, odorless, heavier than air, flammable gas. As propane is odorless, ethyl mercaptan is added to provide a distinctive “gas” odor.</td></tr>
<tr><td>Molecular Weight
44.09</td><td>Vapor Density
1.5</td><td>Specific Gravity
0.59 @ 60° F</td><td>Vapor Pressure
124.9 @70° F</td><td colspan="2">Ionization Potential
14.01 eV</td></tr>
<tr><td>Solubility
XX%</td><td>Flash Point
n/a (gas)</td><td>LFL
2.1 %</td><td>UFL
9.5 %</td><td colspan="2">Ignition Temperature
920° F (493° C)</td></tr>
<tr><td>TLV-TWA (ACGIH)
1000 ppm (5% LEL)</td><td>STEL (15 min)
n/a</td><td>IDLH
2100 ppm (10% LEL)</td><td colspan="3">Routes of Entry
Inhalation, Contact (Liquid)</td></tr>
<tr><td colspan="6">Physiological Effects
Propane is a simple asphyxiant and rapid evaporation of propane liquid on the skin will result in rapid cooling.</td></tr>
<tr><td colspan="6">Symptoms of Exposure
Inhalation of propane may result in dizziness, confusion, excitation, or asphyxia; Contact with propane liquid may result in frostbite</td></tr>
<tr><td colspan="6">Other
Propane containers may present risk of a boiling liquid expanding vapor explosion (BLEVE) if the container is damaged (typically due to mechanical harm) or thermally stressed (due to flame contact above the vapor space). Note that a BLEVE does not require a fire or flame impingement prior to container failure (mechanical damage and an increase in ambient temperature may result in a BLEVE).</td></tr>
</table>

References

Aidan. (2025). 6/11/2025 *Troy Fire Department responds to a gas leak *pre arrival*.* Retrieved July 20, 2025, from https://bit.ly/4nZIDym.

Broadcastify. (2025). *Oakland County Fire/EMS MABAS 3201 (North) - Dispatch/Tac/Talk (P25) 06/11/2025 09:01 PM <--> 09:31 PM EDT.* Retrieved July 20, 2025, from https://bit.ly/4lXRJKk.

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Google. (2025f). [3d aerial view, 3310 Jasper Court, Troy, MI]. Retrieved July 20, 2025, from https://bit.ly/3TPCdUU.

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