



In-Station Training

TM 26-42 Residential Refrigerant Leak



Author

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Purpose

Refrigerant leaks may result in a minor hazard or may present a life-threatening health risk. Effective size-up requires consideration of multiple sources of information.

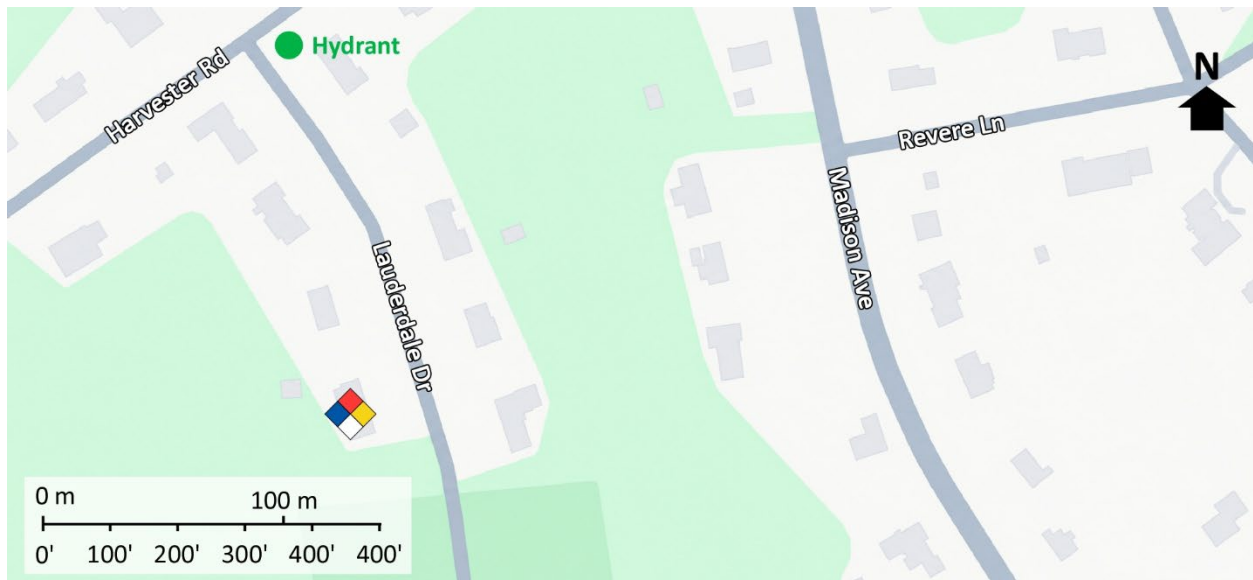
Learning Outcomes

Initial incident commanders perform an effective size-up, select an appropriate strategy, and implement tactics based on the strategic decision-making model.

Conducting the Drill

This incident involved a residential refrigerant leak at 40 Lauderdale Drive, Trumbull, Connecticut on Monday, September 28, 2026, at 08:27 (Broadcastify, 2026; LaBella, 2026; Long Hill Volunteer Fire Co. #1 Inc., 2026). Review the map and photos (Figures 1-5) to gain an understanding of the building and area involved.

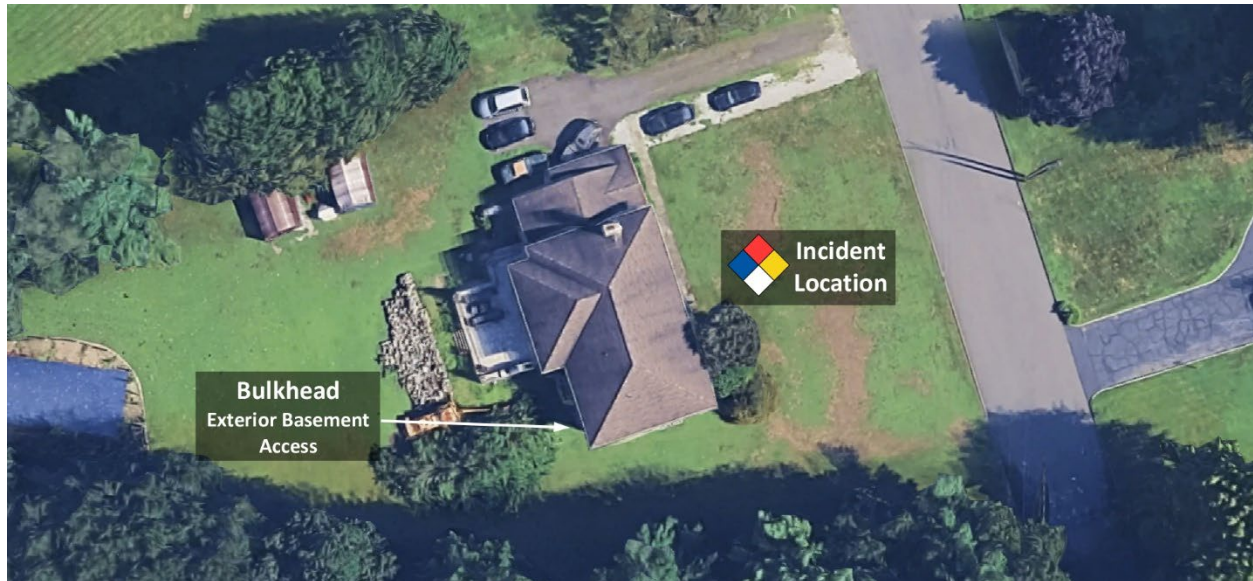
Figure 1. Map of the Incident Area



Note: Adapted from Google. (2026a). [Map, 40 Lauderdale Drive, Trumbull, CT]. Map data ©2026 Google. <https://bit.ly/3U51uy4>.

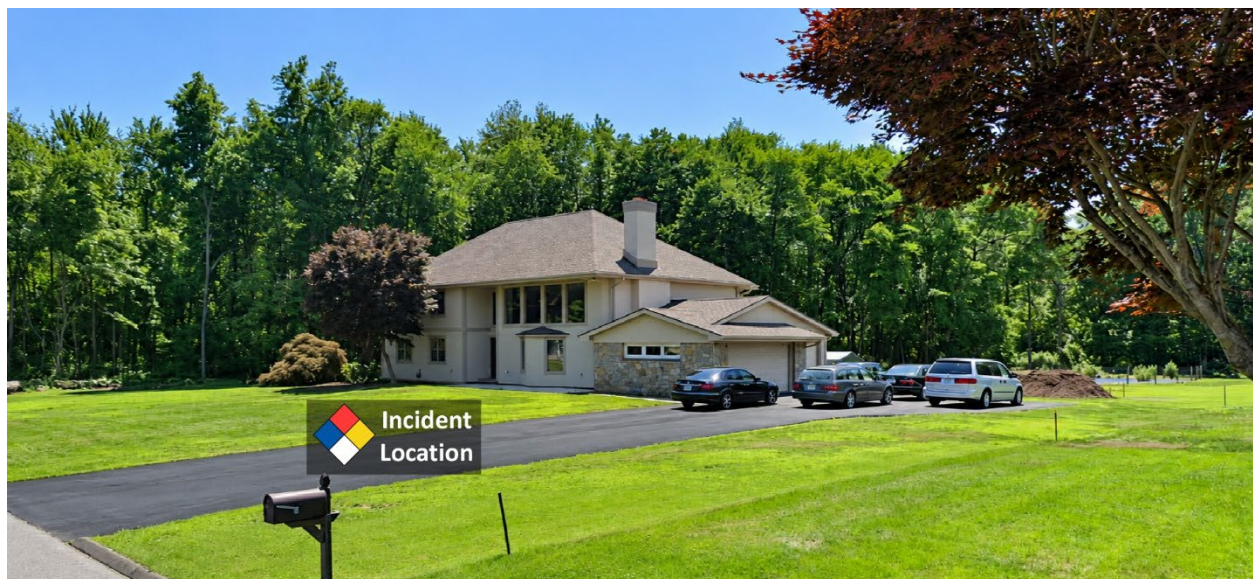
The closest hydrant is at the intersection of Harvester Road and Lauderdale Drive as illustrated in Figure 1.

Figure 2. Aerial View



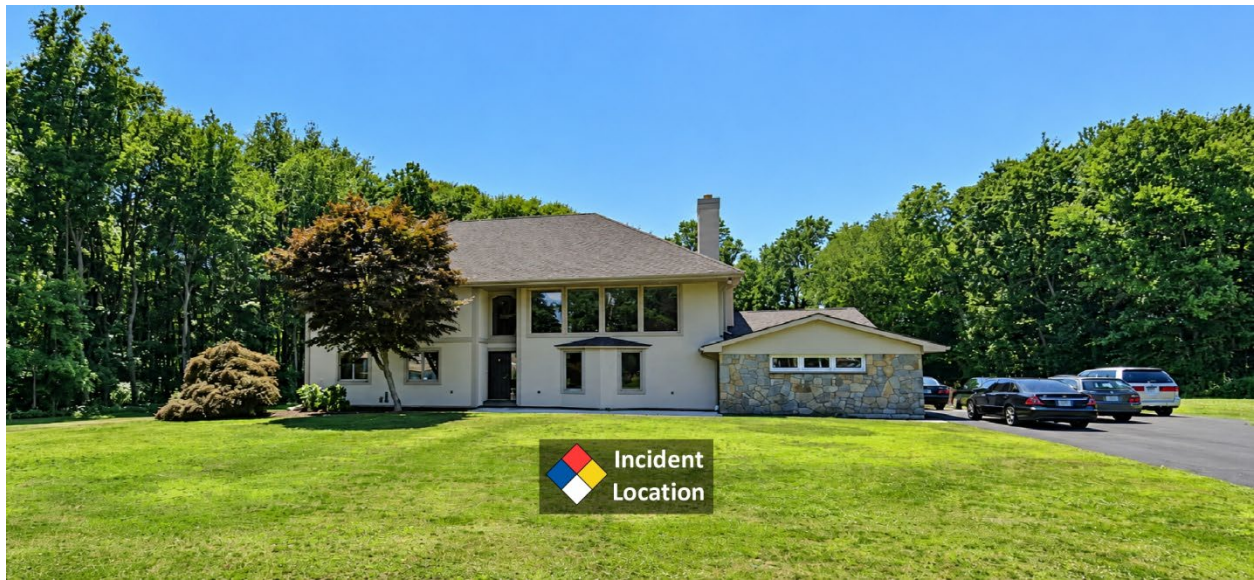
Note: Adapted from Google. (2026b). [Aerial view 40 Lauderdale Drive, Trumbull, CT]. Imagery © Google, Imagery © Airbus Maxar Technologies, Map Data © 2026. <https://bit.ly/4huLCOH>.

Figure 3. Alpha/Delta Corner



Note: Adapted from Google. (2025a). [Street view 40 Lauderdale Drive, Trumbull, CT]. ©2026 Google. <https://bit.ly/4rISJWI>. [Street view image edited for clarity with ChatGPT Images 2.5] (Open AI, 2026b).

Figure 4. Side Alpha



Note: Adapted from Google. (2025b). [Street view 40 Lauderdale Drive, Trumbull, CT]. ©2026 Google. <https://bit.ly/4dnzYlX>. [Street view image edited for clarity with ChatGPT Images 2.5] (Open AI, 2026b).

Figure 5. Alpha/Bravo Corner



Note: Adapted from Google. (2025c). [Street view 40 Lauderdale Drive, Trumbull, CT]. ©2026 Google. <https://bit.ly/3ToZP6i>.

The incident is in a suburban residential neighborhood. The area consists primarily of detached single-family homes on relatively large lots. Houses in this neighborhood were constructed from the 1960s to the present. Most residential properties in this area are owner-occupied. English is the predominant language, with a smaller but notable proportion of households speaking other languages at home

(OpenAI, 2026). Fire and EMS call volume in this area is low and typical of other low-density areas of the suburban community.

The temperature is currently 56° F (13° C) with wind from the north northeast at 8 mph (13 kph) with gusts to 10 mph (16 kph) (Weather Underground, 2026). It is Monday, September 28th at 08:27, and you are dispatched on a single engine response for an unknown odor, possibly a refrigerant leak from a refrigerator at 41 Lauderdale Drive. Your engine has four-person staffing¹. **You are the officer of the first arriving engine company.**

Use the following reference resources as needed: [Emergency Response Guidebook](#) (US DOT, 2024), [Pocket Guide to Hazardous Chemical Hazards](#), and [CAMEO Chemicals](#) (NOAA, 2024) as needed to inform your decision making.



Time starts now! Answer the first ten questions within the next ten minutes. Save discussion until after you have answered these questions.

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

Immediately after you go en route, dispatch advises that this address is approximate as the call was received from a relative of the occupant and they are uncertain of the exact address and they are attempting a callback.

2. Based on the dispatch information and what you know about this occupancy and response area, what do you anticipate finding on arrival?



Important! Answer questions three through ten in the form of communication you would have with your crew and dispatch. State the communications exactly as you would say them face-to-face or over the radio. Save explanation or discussion until after you have completed these questions.

You arrive from the north on Lauderdale Road. Examine Figure 6 illustrating conditions on arrival (there is no incident or simulation video for this incident).

¹ If your staffing and deployment are different, use your own resource assignment and staffing.

Figure 6. Conditions on Arrival



Note: Adapted from Google. (2025b). [Street view 40 Lauderdale Drive, Trumbull, CT]. ©2026 Google. <https://bit.ly/4dnzYlX>. [Street view image edited for clarity with ChatGPT Images 2.5] (Open AI, 2026b).

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 would you give your crew?

You determine that the actual incident address is 40 Lauderdale Drive (across the street from the reported location). The homeowner reports that he was disassembling an old refrigerator down in the basement and accidentally cut a refrigerant line and states that he smelled an unusual odor, like after you strike a match, but stronger.

If you perform 360-degree reconnaissance and atmospheric monitoring with a four-gas monitor, you observe an exterior basement access and have readings of 21% oxygen (O₂), 0% of the lower explosive limit (LEL), 0 ppm of carbon monoxide (CO), and 0 ppm of hydrogen sulfide (H₂S) as illustrated in Figure 7.

Figure 7. Side Charlie – Bravo/Charlie Corner



Note: Adapted from Long Hill Volunteer Fire Co. #1 Inc. (2026). [Facebook post - reported leak of an unknown substance]. <https://bit.ly/4i3PvKg>. [Image edited to show closed bulkhead doors using ChatGPT Images 2.5] (Open AI, 2026b). Image manually edited to add the generic four gas monitor.

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 follow-up report exactly as you would transmit it to dispatch.
7. Would you continue your investigation on the interior? If so, refer to the Appendix on Page 12, otherwise continue with Question 8.

The remainder of this 10-Minute Training is based on an upgrade from a single engine response to a hazmat first alarm consisting of two additional engines, a ladder company, medic unit, and hazardous materials team.

8. Ladder 1 arrives and reports that they are Level 1 on Lauderdale at Harvester. State the tactical assignment you would give them exactly as you would transmit it.

9. Engine 2 arrives and reports that they are Level 1 on the hydrant on Lauderdale at Harvester. State the tactical assignment you would give them exactly as you would transmit it.
10. Based on 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 ten before answering the next eight questions. Think about what cues, patterns, or anomalies (differences from conditions that you would anticipate) informed your answers.

11. What information most influenced your expectations?
12. Did anything in the incident post-arrival challenge your initial expectations?
13. What was the actual problem once you arrived? Given the information provided in this 10-Minute Training, do you have an idea of what type of refrigerant might be involved? If so, what? If not, how might you find out?
14. What were your tactical priorities and what was getting in the way of achieving them?
15. During initial operations, was there an immediate threat of serious injury or death to you, your crew, or other companies?
16. Was it reasonable to believe that the Main Fire Occupancy was occupied?

17. Was there searchable space?

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

This incident involved release of sulfur dioxide (SO₂) refrigerant from an early 1940s vintage refrigerator. Companies operating at this incident encountered high readings on their atmospheric monitoring instruments, withdrew, and requested response of the regional hazmat team (Long Hill Volunteer Fire Co. #1 Inc., 2026). While not reported, the high readings were likely for H₂S due to sensor cross sensitivity with SO₂.

19. Were the actions of responders to this incident similar or different to your incident action plan in this 10-Minute Training? What critical factors influenced your strategic and tactical decision making?

20. If your crew had made entry to investigate and your four-gas monitor went into alarm for H₂S as you descended the basement stairs, would you have performed decontamination after withdrawing? If so, how would you have approached the decon process?

21. How would your incident action plan have differed if you received a report that the homeowner was incapacitated in the basement immediately after you arrived, and your four-gas monitor went into alarm for H₂S as you descended the basement stairs?

Additional Learning

There are two areas of additional learning provided with this 10-Minute Training, an examination of the types of refrigerants that may be encountered (particularly in residential settings) and the impact of sensor cross sensitivity when performing atmospheric monitoring.

Residential, Commercial, and Industrial Refrigerants

In the 1920s and 30s, sulfur dioxide, methyl formate, ammonia, and methyl chloride were used as refrigerants. Initially used in industrial settings, these refrigerants began to be used in household refrigerators in the late 1920s. In the 1930s, a second generation of refrigerants was introduced, primarily based on chlorofluorocarbons (CFCs), collectively known as Freons. However, these substances were discovered to deplete the ozone layer and began being phased out in 1987, with

hydrofluorocarbons (HFCs) introduced as replacements. HFCs do not deplete the ozone layer but have significant global warming potential. Today, hydrofluoroolefins (HFOs) and natural refrigerants such as carbon dioxide, ammonia (which has consistently been used as a commercial refrigerant), and hydrocarbons are increasingly used.

Refrigerant leaks from contemporary residential refrigerators do not generally present an acute health hazard, but some refrigerants, such as the hydrocarbon R-600a (isobutane), are flammable.

Refrigerators in recreational vehicles commonly use ammonia as a refrigerant and may be encountered in residential settings (an RV in a garage or a repurposed RV refrigerator). Ammonia has a characteristic odor, is corrosive and toxic, and will burn, although it has a narrow flammable range.

Older residential refrigerators (1920s through early 1940s) may use sulfur dioxide, ammonia, methyl formate, or methyl chloride, all of which present significant acute health hazards. In addition, methyl formate and methyl chloride are extremely flammable.

When responding to a report of a possible refrigerant leak and an unusual odor, the type of refrigeration appliance or application, the age of the appliance or equipment, and the description of the unusual odor can provide useful cues to the potential substance involved. If there is potential for involvement of hazardous refrigerants, or the nature of the substance is unknown, a technical-level hazmat response is indicated.

Work with your crew and take a few minutes to answer these questions for the following substances that have been used as refrigerants: Sulfur Dioxide, Ammonia, Methyl Formate, Methyl Chloride.

- What does this substance look like and what odor is likely to be reported (it is preferable not to smell these yourself, but don't ignore your own senses).
- Initial isolation and protective action distances (remember that the Emergency Response Guidebook recommends initial isolation distances based on an outdoor, transportation release).
- What are the primary hazards (e.g., toxicity, flammability, corrosivity, etc.)
- What are the important physical characteristics that impact dispersion (e.g. state of matter, vapor density, specific gravity)
- Can you detect the presence of these materials or measure their concentration with the instruments carried on your apparatus?

Atmospheric Monitoring Instrument Cross Sensitivity

Watch [The Meter Minute - Cross Sensitivities](#) (The Meter Guys, 2026) and review the following information on cross sensitivities for the sensors typically found in a four-gas monitor (Industrial Scientific, 2026; Mine Safety Appliances, 2026; Forensics Detectors, 2026). However, cross sensitivities vary and you should review data on the atmospheric monitoring equipment carried on your apparatus.

Carbon Monoxide (CO) Sensors:

- Hydrogen (H₂): This is a common interference which can result in false positive readings for CO.
- Acetylene: Can cause a positive reading on standard CO sensors.
- Alcohols: Can cause positive readings on standard CO sensors.
- Nitric Oxide (NO): Can create a very strong positive reading for CO

Hydrogen Sulfide (H₂S) Sensors:

- Nitric Oxide (NO): Can create a moderate positive H₂S reading.
- Sulfur Dioxide (SO₂): Can create a moderate positive H₂S reading.
- Chlorine (Cl₂): Can have a negative cross-sensitivity, which can suppress or mask true H₂S readings.

Oxygen (O₂) Sensors:

Generally stable, but extreme fluctuations in pressure, heavy moisture/condensation, or replacement by high concentrations of background solvent vapors can skew readings. (Electrochemical (O₂) cells are rarely cross-sensitive to other specific toxic gases, but they do become less sensitive over time).

Combustible Gas/LEL Sensors (Catalytic Bead or MPS):

- Silicones, Lead, and High Concentrations of H₂S (>200 ppm): Can permanently poison or desensitize catalytic bead sensors, reducing their ability to detect combustible gases.
- Extreme (O₂) Variations: Dropping oxygen below 10% or raising it significantly can cause erroneous readings.

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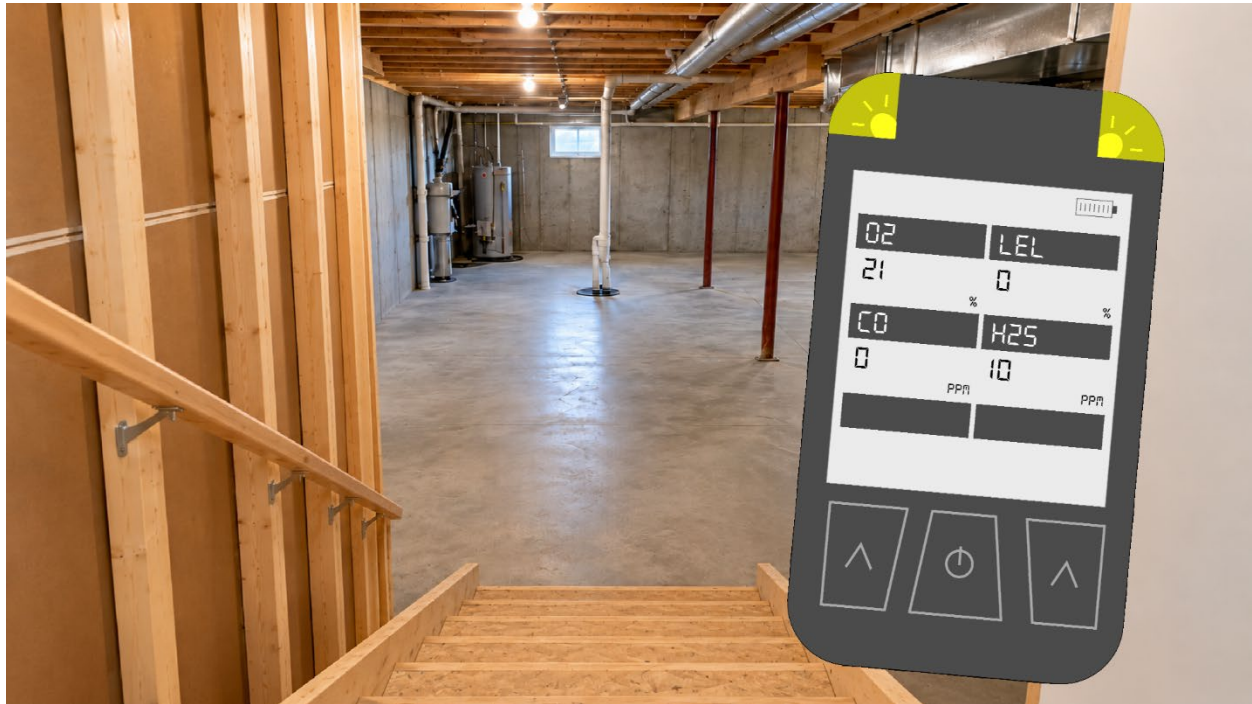
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Appendix – Interior Conditions

If you make entry and access the basement via the interior stairs (or the exterior basement access), your four gas monitor goes into alarm and indicates readings of 21% oxygen (O_2), 0% of the lower explosive limit (LEL), 0 ppm of carbon monoxide (CO), and 10 ppm of hydrogen sulfide (H_2S) as illustrated in Figure 8 as you approach the bottom of the stairs.

Figure 8. Interior Access to the Basement



Note: Generic interior basement access image generated using ChatGPT Images 2.5 (Open AI, 2026b). Image manually edited to add the generic four gas monitor.

Return to Question 8.