Volunteer Firefighter Dies when Propane from an Underground Tank Leaked into a Residential Home causing a Catastrophic Explosion – Virginia

Typical residential with basement and garage

Photo 2 and 3: View of structure pre-incident.
(*Courtesy of Fire Marshal's Office*)

Dispatch – outside odor of propane

- She had a leak in an underground propane tank that supplied her swimming pool. (500-gallon underground)
- The propane delivery driver deposited approximately 125 gallons of propane into the tank before he noticed the leak. He was unable to extract the delivered propane due to a concern with the tank's valves.
- As they approached the area, a strong odor of gas was noted, along with gas meter readings of 80 to 100 percent on LEL. The propane tank dome was raised, and vapors were coming from the surrounding ground. However, no vapors were observed coming from the tank valves.
- Units entering the structure received elevated gas readings at the front door. (PPV) fan at the front door directing air into the house.
- A gas meter reading was taken in the basement. It went into alarm mode, giving an over range indication exceeding 10% of the Lower Explosive Limit (LEL).

Explosion – 36 minutes after arrival

- Once the occupant left the basement, F/F’ s began to manually open the basement windows. Suddenly, without warning, there was a catastrophic explosion.
- FF2 (deceased firefighter) was standing in the front yard in line with the front door. He was struck by debris from the explosion and sustained a fatal injury. Lieutenant T611 and E618FF1, who were in the basement, survived the explosion. They were trapped and located in voids surrounded by heavy debris. They were conscious and alert with the ability to declare Maydays
- After approximately 40 minutes, both trapped personnel were rescued and transported to medical facilities with serious injuries. FF2 was declared deceased.

Findings during the initial Size-up

Properties of propane VD -1.5

- Two storm drains checked in adjacent property- elevated readings but no odor
- A reading of 67% of LEL was measured; however, there was some question of accuracy as there was no alarm or odor

Maintain and trust the Meter

- When the crew entered the basement to evacuate occupant the meter went into Over Range- OR.
- Crews attempted ventilation from inside the basement

Photo 6: Aerial view of area effected by explosion.
(*Courtesy of NBC News*)

Recommendations Fire Departments should:

1. Establish Incident Command at the start of the incident (32 min.)
2. Use a Personnel Accountability system to ID personnel (48 min.)
3. Follow SOG's and best practices for hazmat incidents.
4. Ensure that all members are trained in Mayday procedures
5. Develop and Implement professional development program for all ranks.

Photo 1: Aerial view of structure and surrounding area post explosion. *(Courtesy of fire department)*

Recommendations and action levels. No Life Hazard- establish Hot Zone 330’ distance

LEL PERCENTAGE	REQUIRED ACTION
10% or Less	Continue with caution to mitigate the hazard
10% to 25%	Continue to monitor in full protective equipment to determine the source of the gas.
25% or Greater	Immediately withdraw from the area to a designated cold zone, outside of the hot/blast zone. Request additional resources including the hazmat team and expand the incident command system.