PRIVATE DWELLING FIRES

Hidden Hazards

by Battalion Chief Charles Kasper

After Collapse, Tower Ladder 76 continued to operate while allowing the gas fuel fire to burn until the supply could be shut off.

When we think of the private dwelling neighborhoods of New York City most of us conjure up a picture of areas with fewer alarms, less fire duty and generally less danger. Battalion Chief Kasper of Battalion 21 in Staten Island quickly dispels this notion in the following article. Private dwelling fires present a number of unusual problems. Our firefighters must be able to adapt to the hidden dangers and the hazards that can manifest themselves in rapid succession at these fires.

On April 30, 1994, at 0020 hours, a phone alarm for Box 4371 was received by several nearby units for a fire at 125 Hallister Street in the Pleasant Plains section of Staten island. The bright glow in the night sky alerted responding units that a major incident was in progress. What they did not know was the scope and variety of problems they would soon encounter.

First arriving units were confronted with a large, 50 by 75 foot, two-story center hall colonial private dwelling that was completely involved. Radiant heat was causing fire extension to Exposures 2 and 4 — similar type buildings separated from the fire building by a scant 15 feet.

Thirty-five feet from the fire building the decorative light at the head of the driveway had melted.

As heat was trapped under the eaves of Exposure 2, the 2 1/2-foot-deep overhangs began to smolder. A few seconds later, the entire side of the house that was exposed to the fire burst into flames. Unimpeded, the fire entered the attic from front to rear via the eaves and raced across the attic, taking possession of the top floor.

Prior to the arrival of firefighting units, three occupants of the building had escaped with their lives. They were later removed from the scene and transported to area hospitals. Two of the victims suffered cuts and bruises; they were treated and released. The third, a police officer, had to be transported to the Burn Center at New York Hospital-Cornell Medical Center via Police helicopter.

Unaware that the occupants had already escaped, Engine Company 151 and ladder Company 76 mounted an aggressive interior attack in a valiant attempt to effect rescue. They were forced to withdraw due to the heavy volume of fire and the probability of collapse. Engine 151 repositioned its line to operate on Exposure 4, successfully limiting fire extension and damage to that house. Ladder 76 positioned its apparatus in front of the fire building and readied their tower ladder for use.

Initial operations were hampered by several serious hazards:

1) The building had been subjected to a tremendous explosion and subsequent fireball. The front brick facade wall was down and the rear wall had been completely blown away. The intensity of the blast had sent the front door some 30 feet onto the front sidewalk. The structure was obviously in imminent danger of collapse

2) The natural gas service lines to both the fire building and Exposure 2 had been ruptured by the explosion, allowing gas to flow unchecked. This hampered fire suppression efforts and contributed to the heavy damage sustained by Exposure 2. It would take Brooklyn Union Gas nearly two hours to control the flow of gas, allowing the safe extinguishment of the fire, without risking a second explosion from the build-up of escaping gas

3) Electric lines were down in three separate locations, while other wires remained precariously intact on top of their support poles. This configuration of live wires made the boom operation of Ladders 76 and 87 both difficult and hazardous.

Hazards continued to appear as the fire fight progressed. In Exposure 2, a central air conditioner had been installed in the attic with flexible ductwork deployed throughout. The fire in the attic melted the plastic sheathing, leaving the bare, spiral metal framework. As ladder companies pulled ceilings to expose the fire, the metal framework dropped down on them like a giant slinky. The relatively thin wire was hot to the touch and difficult to see in the smoke.

As unsuspecting members became snared, their efforts to disengage caused the wire to entangle them further. One firefighter was caught about the throat. In the struggle to get free, he received second- and third-degree burns. (The member was admitted to the Burn Center and later underwent skin grafting.)

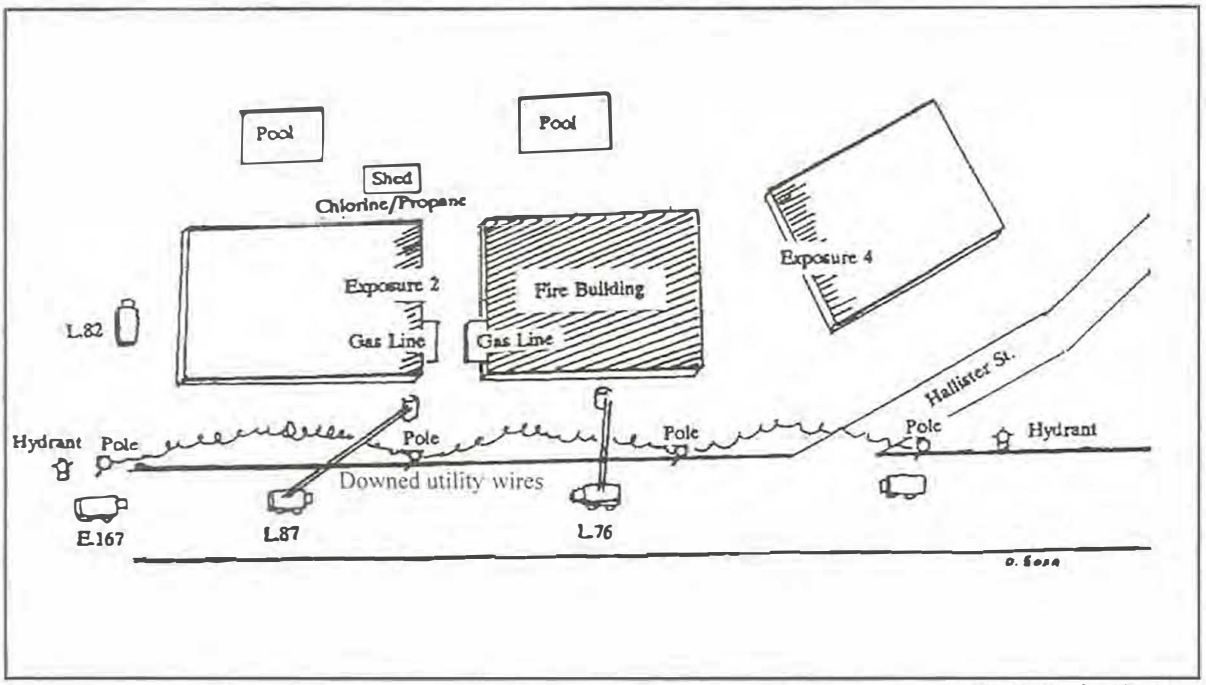

Illustration by Olga Sosa

As members fought to extinguish the fire in Exposure 2, the original fire building collapsed completely in an inward and outward fashion.[1] This reduced the radiant heat somewhat but a new problem emerged.

A tool shed behind Exposure 2 had also been ignited by the radiant heat. As members of Engine 163 and Rescue 5 approached the shed, a 20-pound propane cylinder (*See reference A: Propane*) used to supply a barbecue, exploded.

[1] An inward/outward collapse is described by Deputy Chief Vincent Dunn as one in which the exterior wall breaks apart horizontally. The top collapses inward, back on top of the structure while the bottom collapses outward on to the street. Wood-braced-frame constructed buildings collapse in this manner, and a timber truss roof collapse can cause a secondary collapse of a front wall in this manner. [See Vincent Dunn, *Collapse of Burning Buildings - A Guide to Fireground Safety* (Saddle Brook, N.J. Fire Engineering Books & Videos, 1988), p. 13 and 62-66.]

Fortunately, the shed contained the explosion and no one was injured.

More troublesome was the fact that the shed also contained a 25-pound drum of granulated chlorine, which began to react vigorously with the water being applied to the fire. Thick clouds of low-lying gas (Chlorine is 2 1/2 times heavier than air. *See reference B: Chlorine*) were produced and the telltale bleach odor spread through the area.

Mask-equipped members extinguished the fire in the shed and immediately withdrew. However, the container continued to produce billows of chlorine gas that hampered ongoing fire operations until Hazardous Materials Co. 1 arrived and overpacked the remaining product in a 55-gallon drum.

The chlorine was present on site because of a large in-ground pool behind Exposure 2, in addition to another pool behind the fire building. These pools were indiscernible in the darkness, and the clouds of chlorine gas just added to the visibility problem. Members operating outside were forced to don facepieces because of the toxic vapors. This increased the danger of their falling into the pools. Firefighters were assigned as safety personnel to control and guide operating members safely past the pools.

Tactical Support Unit 2, assigned on the second alarm, proved its value once again. This multi-functional vehicle provided excellent exterior lighting, using both boom and portable lights, improving visibility to enhance overall safety. [*See "The Tactical Support Units," by Jack Calderone, WNYF, 3rd/91, p. 10.*]

A second alarm was transmitted at 0036 hours. A total of 28 units responded to this operation. Final extinguishment required the use of four handlines (two 2 1/2 -inch and two 1 3/4-inch) and a tower ladder stream. The fire was placed under control at 0141 hours, over an hour and a quarter after the initial receipt of alarm. Seven firefighters received injuries requiring hospitalization; one home was completely destroyed and another two sustained considerable damage.

LESSONS

A critique of the fire was conducted, highlighting the many hazards a major private-dwelling fire can present:

1. **Early collapse.** This structure of wood platform construction completely collapsed within 10 minutes of the first-arriving Fire Department units. Incident Commanders must anticipate that a fire may be well advanced when the Fire Department arrives and be prepared to withdraw members and apparatus to safe positions if

Heavy Chlorine fumes that hung over the area added to the difficulty and danger of this fire.

PROPANE

Note: Placard may also have 1978 designations

FORMULA: $CH_3CH_2CH_3$
PHYSICAL PROPERTIES:

VAPOR DENSITY: 1.5
SPECIFIC GRAVITY: 0.590
BOILING POINT: -43.8° F
IGNITION TEMP: 842° F

COLOR: NONE

ODOR: NONE (MAY BE ADDED)

NOTES: Shipped as a LIQUEFIED PETROLEUM GAS
Liquid FLOATS AND BOILS on water. Expansion Ratio 270-1

HEALTH: SCBA for high concentrations of GAS. Concentration greater than 10% causes dizziness; High concentrations cause asphyxiation. Vaporizing liquid may cause frostbite; may be toxic and poisonous when burning.

FLAMMABILITY: Flammable; Containers may explode if ignited and the vapor space of the container is heated and allows the product to build pressure faster than the relief device can operate; Cool exposed containers, Protect members effecting shut-off with water; Let fire burn, flashback along vapor trail may occur.

REACTIVITY: No reaction with water; Common materials - Stable during transport.

DOT RESPONSE GUIDE 22
EXTINGUISHING AGENTS: Let tank truck burn unless leak can be stopped. Smaller tank car or smaller tanks/cylinders, Extinguish/Isolate from other Flammables. Small Fires-Dry chemical or CO_2/large fires - water spray or fog) EXTINGUISH ONLY IF THE SOURCE CAN BE FOUND AND STOPPED.

LEAKS: Stop discharge if possible; restrict access, evacuate area, shut ignition sources, stay upwind; Use water spray to knock down vapor. Call HAZ-MAT.

PROTECTIVE EQUIPMENT: SCBA; Full firefighting protective clothing.

FIRST AID: Move to fresh air, call emergency medical care; Not breathing, give artificial respiration, CPR if indicated; Breathing difficult, give oxygen; Frostbite thaw with water; Do NOT RUB AFFECTED AREAS.

EVACUATION: Isolate for 1/2 mile in all directions if tank, railcar, or tank is involved in fire. Pieces of the container may travel in excess of 1/2 mile.

Reference A

Have any questions about chemicals or hazardous materials? Contact Haz-Mat Ops at SOC.

CHLORINE

Poison gas, nonflammable, oxidizer
UN: 2.3 STCC: 49-041-20

FORMULA: Cl_2
PHYSICAL PROPERTIES:

VAPOR DENSITY: 2.45 (much heavier than air)
SPECIFIC GRAVITY: 1.56 (heavier than water)
BOILING POINT: -30° F
IGNITION TEMP: Nonflammable

COLOR: Greenish-yellow (small amounts may be invisible)

ODOR: Pungent like bleach, choking, irritating

EXPANSION FACTOR: 457:1
NOTES: POISON, OXIDIZER< CORROSIVE IRRITANT;
WATER SOLUBILITY: Slight (0.65g/100g)

Can make metals burn and organic materials, including rubber and plastic, explode. Chlorine has caused more deaths and injuries than any other hazardous material. Chlorine is shipped as a liquefied compressed gas. (Treat as a cryogenic.) Most containers are fused at 160° F, but even they can explode in heat.

HEALTH: Poison, irritant. (Must wear Positive pressure SCBA, protective gear.) One thousand parts per million causes severe breathing difficulty. Fifteen parts per million causes throat irritation. Three parts per million irritates eyes and mucous membranes.

FLAMMABILITY: Chlorine is nonflammable, but it is an oxidizer and will intensify fires. It may make flames explode (even metals like copper and aluminum may burn when heated in the presence of chlorine.)

REACTIVITY: Strong oxidizer, irritant (see above). Reacts with water to form dilute, but corrosive hypochlorous acid, which decomposes on standing to yield small amounts of chlorine, oxygen and chloric acid. Can form explosive mixture with ammonia. The corrosive action of chlorine and water will make leaks worse.
DOT RESPONSE GUIDE 20
EXTINGUISHING AGENTS: Does not burn.

SPILLS: Vapor. Shut off valve or plug. Ventilate if indoors. Liquid: Shut off or plug. Dam, dike, or pit. Ventilate if indoors. Use A kit for 100 pound cylinders; B kit for 1-ton cylinders; C kit for tank cards. Do not immerse containers in water.
PROTECTIVE EQUIPMENT: For small gas leaks, positive pressure SCBA, face shields, rubber gloves and boots; seal arm and leg openings with duct tape.

FIRST AID: Decontaminate before placing in confines of ambulance. Remove to fresh air, give oxygen.

EVACUATION: Small leak: 140' in all directions. Large spill 0.7 by 1.0 miles Cylinder in fire: 1500 feet in all directions. Bulk container in fire: 2500 feet in all directions.

Reference B

Daylight reveals the total devastation of this private dwelling fire.

conditions indicate the need. Additional clearance should be given for taller appurtenances such as chimneys

2. **Radiant Heat**. A fully-involved private dwelling generates a considerable amount of radiant heat that invariably will threaten nearby buildings. Eaves are particularly vulnerable. The buildings at this site were just 15 feet apart; the New York City Building Code allows private dwellings to be separated by as little as 3 feet, depending on construction classification and other factors. (Exterior Separation: See NYC Building Code Table 3-4 pgs. 58 and 59.)

3. **Utilities**. This fire caused problems with both gas and electrical service. Prompt summoning of the appropriate utility companies is essential for early mitigation of these hazards

4. **Propane**. Although they might be found in many types of occupancies, propane-fueled barbecues are particularly common to private dwellings. Their presence should be anticipated and their location determined as part of the standard procedure for private-dwelling fires. Propane barbecues and spare cylinders are routinely stored in garages and tool sheds, or on patios and decks. Rule 25-11 (8) of the Rules of the City of New York states that L.P.G. in excess of one (1) pound shall not be permitted, for any reason, in any individual occupancy within a structure, except as provided for in regulations promulgated by the Fire Commissioner

5. **In-ground pools**. An unsuspecting firefighter, especially in darkness or heavy smoke, can easily fall unnoticed into an in-ground pool. Even an empty pool, as they often are kept in winter, would subject a firefighter to serious injury. The presence of an in-ground pool should be announced to everyone at the scene and, if necessary, a member should be posted to warn anyone in the vicinity

Recent tests have shown that a member wearing bunker gear without an SCBA would have approximately two minutes and thirty seconds of buoyancy in fresh water. The time is reduced to one minute and thirty seconds for a member wearing a Self-Contained-Breathing-Apparatus (SCBA.) It is recommended that a member who has fallen in water call for help and try to remain calm. Thrashing about will reduce buoyancy. Slowly tread water and do not try to swim. *(See Safety Message # 82 October 13, 1995.)*

6. **Chlorine**. The presence of any type of pool is a strong indicator that chlorine will be somewhere on the premises as well. Chlorine is toxic, corrosive, and reactive to heat, water, and certain organic substances. The Haz-Mat Unit should be special-called to handle this material.