

# Residential Investigation #3

Mr. Chris Crawford  
Risky Business Services

Re:	<i>Insured:</i>	Gas Company #1
	<i>Loss Location:</i>	Ohio
	<i>Claim No.:</i>	<omitted>
	<i>Date of Loss:</i>	October 2003
	<i>IC1 Project No.:</i>	<omitted>

Dear Mr. Crawford,

On October 4, 2003, a low energy explosion occurred in a framed residence owned by the claimant, Mr. William Green. Just prior to the explosion, the claimant reportedly had attempted to locate a liquefied petroleum (LP) gas leak in the tubing and fittings leading to a wall-mounted gas heater. The gas heater was the only load on a 120 gallon LP storage tank provided by the insured, Gas Company #1.

On October 2003, you contacted Investigations Company #1 (IC1) and requested IC1's assistance in determining the origin and cause of the explosion. The author of this report, Scott A. Jones, P.E., C.F.E.I. and Mechanical Engineer of IC1, (812) 944-9988, was assigned to conduct the investigation.

By the time of the author's involvement, the wall-mounted heater and all of the adapters, tubing and fittings associated with the claimant's portion of the LP gas supply system had been removed from the residence during prior investigative efforts. All items reportedly removed from the residence were provided to the author for inspection during the inspection of the affected residence.

## Interview with Mr. Stacy Furington, Gas Company #1 Service Technician

On October 2003, the author interviewed Mr. Furington, to learn his observations with regard to LP gas service to the claimant's residence. Mr. Furington reported that he was the field technician that was responsible for the claimant's account.

Salient items from the interview were as follows:

- The subject LP gas service to the affected residence was established approximately three years prior to the subject event. There had been two heating seasons without event.
- Gas Company #1 supplied the 120 gallon LP gas tank, regulator, and an approximate three foot span of 3/8 inch copper tubing from the regulator to a point outside the affected residence. The interconnection to the claimant's gas distribution system occurred outside the affected residence.
- On the day of the loss, the claimant reported to Mr. Furington that he opened the main LP gas valve on top of the storage tank in preparation for preparing the heater for operation. The claimant reported that he lit the pilot flame and indicated that he observed the heater cycle on and off. The claimant's wife reportedly smelled LP gas in the utility room where the heater was mounted. The claimant reportedly applied soap solution to the LP gas piping to discover the location of the leak. He reportedly did not discover a LP gas leak. There was no indication that the claimant sought the assistance of emergency responders or Gas Company #1 to perform leak isolation and ventilation procedures.
- Approximately 3 minutes after performing leak isolation procedures, the claimant and his spouse heard a loud "rumble" emanating from the direction of the utility room. The claimant and his spouse were reportedly located in another part of the residence. Upon investigation, they discovered towels and clothing stored in a closet in the utility room on fire. Emergency responders from the Fire Department were notified and responded to the scene to extinguish the residual fires.

## **OBSERVATIONS**

On October 2003, the author conducted an engineering inspection of the LP gas supply and distribution system at the affected residence. Mr. Furington and Mr. Frederick Voyles, C.F.I. of Investigations Company #2 of Columbus, Ohio, were in attendance for the entire inspection. Mr. Voyles was acting on behalf of the claimant's insurer, Insurance Company #1.

The front of the 2 story residence, which was in excess of 50 years old, appeared as shown in *Photograph 1*. The origin of the explosion was in a one story utility room that was situated at the back (south) side of the residence (*Photograph 2*). The LP gas storage tank was situated adjacent to the south exterior wall of the utility room as shown. The storage tank was at approximately 55% capacity at the time of the inspection (*Photograph 3*).

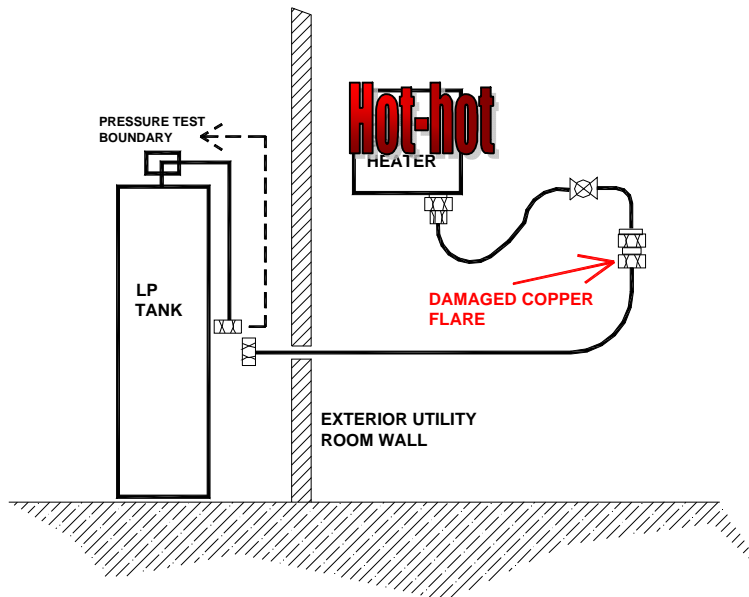
Evidence of an over-pressure event (i.e., low order explosion) was as follows:

- The east side windows were blown out (*Photograph 4*).
- Cinder block chimney attached to the south wall of the utility room was fractured (*Photograph 5*) with large block sections displaced into the surrounding yard.
- The utility room door and at least one other interior door were displaced from their hinges (*Photograph 7*).

- The claimant had reportedly utilized a tractor to push the west wall and surrounding structure of the utility room into alignment prior to the author's visit. Cripple boards and lag bolts had been placed on the structure to hold the corrected alignment.
- An electric heater had been placed in the approximate position of the affected LP gas heater. Wallboard repairs had been performed to the interior utility room walls (*Photograph 6*). *Author's note: the claimant's son reportedly removed the affected heater and associated gas piping soon after the event.*

### ***System Layout***

The author created the AutoCAD sketch shown below to assist the reader in understanding the system layout:



**Figure 1 - LP System Layout**

### ***Pressure Test of Gas Company #1 Piping and Fittings***

The author performed a soap bubble leak check of the Gas Company #1-supplied LP gas piping from the top of the Gas Company #1 120 gallon storage tank, through the regulator, to the 3/8 inch copper distribution pipe that remained connected to the regulator. As shown in **Figure 1**, the distribution pipe had been previously disconnected external to the residence, presumably by the claimant's son.

The author connected stopcocks with a precision manometer gauge to the end of the Gas Company #1 3/8 inch copper tube at the boundary shown in **Figure 1** (*Photograph 8*). The author opened the tank isolation valve to permit pressurization of the tube with LP

gas to a pressure of 11.5 inches water column (WC) (*Photograph 9*). The pressure was held for 5 minutes, and no leakage was detected.

### ***Claimant's Heater, Piping, and Fitting's Inspection***

Mr. Voyles presented the claimant's Hot-hot heater (*Photograph 10*), 3/8 copper piping (*Photograph 11*), and associated isolation valve and fittings (*Photograph 12*) for the author's inspection. Mr. Voyles had taken the items as evidence during his prior investigative efforts.

No anomalous conditions were discovered with the Hot-hot heater. The author did discover one copper flare, positioned as shown in **Figure 1**, to be severely deformed and the sealing surface was heavily scored and distorted (*Photograph 13*). In addition, Teflon sealing tape had inappropriately been applied to the flared tubing joint.

### ***DISCUSSION***

*A 5 minute leak test of the LP tank, regulator, piping and fittings supplied by the insured, Gas Company #1, showed no fugitive LP gas leakage from the portions of the system supplied by the insured.*

The claimant's portion of the LP gas distribution system to the residence had been disassembled by the time of the author's involvement. Therefore, an in situ pressure test of the integrity of the claimant's portion of the distribution system could not be performed.

The author, however, discovered two anomalies in the inspected portion of the claimant's LP gas distribution system, and both items were situated within the residence. One of the copper flares, which was situated at the position shown in **Figure 1**, was heavily scored and distorted. Such indications are created when a flare nut connection is tightened when the copper tube flare is not squarely aligned with the associated mating flare. In addition, an unknown party(s) had improperly used Teflon sealing tape in the subject flare connection.

Either of the anomalous conditions discovered in the claimant's LP gas distribution tubing is sufficient to cause a loss in the integrity of the system and subsequent release of (fugitive) LP gas.

The author interviewed first responding fire fighter Joe Richey at the Fire Department on October 2003 following the site inspection. Mr. Richey observed that he discovered the 3/8 inch flared fitting at the bottom of the Hot-hot heater to be hand-tight during his post fire investigation.

*It is believed that fugitive LP gas accumulation in the utility room provided the fuel for the low energy explosion. It is believed that the pilot flame for the Hot-hot heater was the ignition source for the explosion. It is believed that one or more anomalous conditions caused by the insured (i.e., improperly aligned flared fitting, inappropriate use of Teflon sealing tape, or an improperly tightened fitting) caused the introduction of the LP gas into the residence.*

*There were no reported conditions discovered during the investigation that actions or omissions by the insured, Gas Company #1, had causation in the subject event.*

The conclusions drawn in this investigation are based on an analysis of the information collected during the site visit, researched data and engineering knowledge, and information provided by the insured and the client. Information or data that becomes available at a later date may justify the modification of the results or conclusions at that time. IC1 maintains additional information regarding the subject claim on file and the preparation of a more detailed report can be undertaken if warranted in the future.

We appreciate the opportunity to work with you on this claim. Pending further direction this file will now be placed in a closed status. Please let us know if we can be of further assistance on this claim or any future claims.

Sincerely,

Investigations Company #1

Scott A. Jones, P.E., C.F.E.I.  
*Mechanical Engineer*