

SUPPORTING INFORMATION	Incident Date		June 8, 2022
	Location		Spillimacheen
	Regulated industry sector		Gas - Propane system
	t Injury	Qty injuries	0
		Injury description	None
	npac	Injury rating	None
	Damage	Damage description	A propane explosion inside a home caused several windows to blow out and the front wall to be pushed out, off the foundation.
		Damage rating	Major
	Inciden	t rating	Major
	Incident overview		A propane tank, servicing a residential home, was filled by a propane supplier and turned off. When the occupant of the home turned the gas supply back on at the tank, a gas leak occurred at an open uncapped gas line inside the home resulting in an explosion (Image 1-3).
INVESTIGATION CONCLUSIONS	Site, system and components		The residential home had propane gas supplied for a furnace, hot water tank and BBQ outlet supplied by a 500 US water gallon (USWG) propane storage tank (Image 8). The tank was located away from the home and supplied gas through an underground gas line which rose above ground outside the home, then reduced pressure with the use of a pressure regulator before entering the home. A copper gas line was run to a gas fired hot water tank with a ball-type shutoff valve upstream of the appliance. The valve operates from fully open to fully closed with a ¼ turn of the handle. When the handle is in line with the valve it is open allowing flow and when the handle is perpendicular to the valve it is closed stopping flow (Image 7). It is common practice in the propane delivery industry that when fuel is delivered to empty residential client tanks with no residual pressure, that the gas supply at the tank is shut off when fuel is added. This is done for safety to prevent potential gas leaks due to the unknown condition of the gas system inside. The <u>Gas Safety Regulation</u> identifies that a person must not perform <i>regulated</i> work in respect to a gas system unless authorized or permitted to do so. <i>Regulated</i> work includes the <i>alteration</i> of gas systems and equipment which includes replacement and removal. The regulation also identifies that if a gas supply has been turned off, a person must not turn the supply back on again until the person carefully checks all outlets and pilots to ascertain that they are relighted or turned off. The CSA B149.1 gas code states that when an appliance is not connected to an outlet of a piping system, the outlet shall be made tight by means of a plugged valve or a cap or plug compatible with the material of the piping or tubing system.



Failure scenario(s)	The occupant of the home had been away for months leaving the house vacant. The propane tank servicing the furnace and hot water tank in the home had run out of propane. When the occupant returned, the heat in the house had been off, due to the fuel running out, and the gas hot water tank and water lines had frozen causing damage and water leaks. The occupant hired a general contractor to replace the gas hot water tank with a new electric one and install fans and dehumidifiers to dry out the basement. The contractor did not hold gas or electrical certifications and had little experience with gas systems. The contractor did not have the appropriate fittings to plug or cap the gas line after removing it from the old hot water tank. The contractor left the gas line uncapped and planned to return five days later with the appropriate fittings to seal it off but did not inform the occupant of the home of the uncapped line. The occupant contacted the propane supplier to deliver fuel to the empty propane tank so the propane furnace could be turned back on to supply heat. When the fuel supplier arrived for the delivery, nobody was home, and the tank was completely empty. The delivery driver followed company procedure and shut off the main gas supply valve on the tank prior to filling it. They then filled out a notice on a door card (Image 9) identifying that fuel had been delivered and the tank had been turned off and affixed it to the door of the house.
Facts and evidence	<ul> <li>Home occupant statement</li> <li>The home was unoccupied for months during which time the supply of propane had run out and the water tank and lines had frozen.</li> <li>The gas hot water tank needed to be replaced and they contacted the general contractor to replace it with an electric one.</li> <li>They did not know there was an open gas line in the house.</li> <li>They were not very familiar with the propane system and did not know how to turn the gas supply on at the tank.</li> <li>They called the propane supplier who instructed them how to turn the gas supply back on at the tank.</li> <li>They initially thought the smell in the home was the dehumidifier and turned it off. They then suspected a gas leak and went out to the propane tank to shut the valve off they had opened earlier.</li> <li>The gas had been turned on for approximately 30 minutes before the explosion occurred.</li> </ul>



#### Contractor statement

- June 5, 2022 (Three days before the incident) they removed the gas hot water tank and installed the new electric one.
- They disconnected the gas line from the hot water tank by unthreading the brass flare nut from the flare fitting on the hot water tank gas valve.
- There was not any propane in the tank or pressure in the line at the time and the home occupant informed them that fuel was to be delivered sometime that week.
- They did not have the proper plug to seal off the gas line, so they left it uncapped.
- They obtained a plug for the line and planned on installing it when they returned to complete further work on June 10th.
- They had not informed the home occupant that the gas line was uncapped.
- They did not hold a gas or electrical certification and had very little experience with working on gas systems.

#### Propane supplier statements

- They received a call from the client requesting a propane delivery.
- They arrived to deliver fuel on June 6<sup>th</sup> and found the tank was empty and the delivery driver opened the dip tube valve and found there was not any vapor pressure left in the tank.
- The home occupant was not home at the time of the fuel delivery.
- Fuel was delivered and following company protocol the delivery driver shut off the gas supply valve on the tank and left a form on the door informing that fuel had been delivered and the tank valve had been shut off.
- On June 8<sup>th,</sup> the client called and spoke to an office administrator and asked how to turn the gas back on.
- The office administrator informed the client the tank had been shut off for safety reasons and informed them how to turn the gas supply valve back on at the tank.

#### Site observations

• The new electric hot water tank was visible and the copper gas line to the old gas hot water tank was seen uncapped and the gas service valve for the hot water tank was observed in the mostly open position with the yellow handle mostly in line with the valve (Image 6)

#### Documents

- The door knocker form that was left at the house identifies that fuel had been delivered and the tank had been turned off.
- The Canadian Propane Association PTI 300-01 Bulk Truck Propane Delivery course material instructs that when a customer's container is empty and the customer is not there, to close the service valve prior to filling the container and leave a warning tag on the door of the home.



The cause of the incident was the release of propane gas from a gas line left uncapped following the removal of the hot water tank by the uncertified contractor, with little experience of gas systems.

Contributing factors to the cause of the incident include:

• The contractor not informing the home occupant of the uncapped gas line.

## • The gas supply company instructing the home occupant how to turn the gas supply back on without having knowledge of the site conditions.

• The home occupant turning on the gas supply without carefully checking all outlets and pilots to ascertain that they are relighted or turned off.



Image – 1 Side of home showing damage and debris from explosion.

# Causes and

contributing factors





Image 2 - Front of home showing damage and debris from explosion.





Image 3 – Explosion damage to home including blown out windows and pushed out log wall.





Image 4 – Well water pressure tank access from outside the house. Red box showing new electric hot water tank location.





Image 5 - (Provided by the contractor) Old gas fired hot water heater prior to replacement showing the gas service valve yellow handle in the fully open position.





Image 6 – New electric hot water tank after the incident. Red box showing the uncapped gas line and gas service valve yellow handle in the mostly open position.





Image 7 – Exemplar valve showing the handle in the fully closed (left) and fully open (right) positions.





Image 8 – 500 USWG propane storage tank located away from the house. Red box showing the tank lid covering the propane service valve that was shut off by the propane company when fuel was delivered.



Sorry We Missed You
Date Aure 6 Time 14 30
PLEASE CALL OUR OFFICE TO RESCHEDULE:
Fuel Delivery     Repairs     Tank Inspection     Tank Has Been Turned Off     We Were Unable To Fill
Comments:
1001

Image 9 – Door knocker left on door informing that fuel was delivered and the tank had been turned off.