

Incident Summary (5615627) (Final)

Cul	Incident Date		April 28, 2017	
	Location		Cultus Lake	
	Regulated industry sector		Gas – Propane System	
	Impact	Injury	Qty injuries	0
			Injury description	None
			Injury rating	None
	Damage	Damage description	Damage description	A brass fitting in the service valve was strained and broke in half. The damage released a substantial amount of propane in an unplanned, uncontrolled manner but was contained at the site of the equipment.
			Damage rating	Major
Incident rating		Major		
Incident overview		A 500 USWG propane storage tank installed at a residential home, rolled off of its blocks and snapped a brass fitting installed in the tanks service valve. A substantial amount of propane was released into the atmosphere before the flow of fuel could be stopped.		
INVESTIGATION CONCLUSIONS	Site, system and components		<p>A propane storage tank is a steel container designed to contain Liquefied Petroleum Gas (LPG) in both liquid and vapour states. Propane is stored as a liquid and expands in volume 270 times to be used a combustible vapour fuel. Propane is kept in the liquid form by pressure. When the pressure inside of the container drops the liquid propane will boil off and change state to a vapour until an equalisation pressure is achieved.</p> <p>Propane tanks of the size and type involved in this incident (500 USWG) have four steel feet welded to the bottoms of the tanks. These tanks are generally installed on two non-combustible blocks installed on a firm and level base.</p> <p>The tank has a service valve which is installed on the top of the tanks in the vapour space. When opened it allows vapour propane to enter the gas system. Gas pressure in the system is controlled by gas pressure regulators. A first stage regulator is installed at the service valve of the tank which reduces the gas pressure from internal tank pressure to 10psi. A second stage regulator is installed at the house which reduces the gas pressure from 10psi to 10-14"wc (approx. .5psi) before it enters the house. The first stage regulator was connected to the tank service valve with a solid brass fitting.</p>	
	Failure scenario(s)		The two concrete blocks that the propane tank was sitting on both sunk into the ground on the same side. This caused the tank to lean to over to the point that the tank rolled off of the blocks. The copper gas line pulled on the first stage regulator at the tank snapping off the brass fitting from the service valve to the regulator. The rolling action of the tank allowed the service valve to be positioned below the liquid level of the tank. Liquid propane leaked out of the broken brass fitting to atmosphere until the service valve was shut off by attending first responders.	

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	<p>Facts and evidence</p>	<p>Witness statement – Propane technician who attended site</p> <ul style="list-style-type: none"> • Fire Dept. on site when he arrived and they had shut the vapour service valve off prior to him arriving • It was a 500 USWG horizontal propane storage tank installed at a residential home • The tank was approx. 15ft away from the home • The tank was last filled in February 2017 and at that time no report was made by the delivery driver that the tank was leaning at all. • The tank was installed on two concrete blocks • The top of the blocks were 6” above ground on one end and had sunk flush to the ground on the other end • There was no evidence of the tank being struck by any machinery or mobile equipment • The gas line to the house was a ½” copper tube line with a full sized first stage regulator which was connected to the service valve by a solid brass ¼” by POL fitting • The tank had rolled off of the blocks pulling on the copper tube and regulator. The brass ¼” x POL fitting snapped and the vapor service valve rotated under the liquid level of the tank and liquid propane began leaking out of the broken fitting in the service valve. • Based on the time of the last fill, the usage of the customer through previous years and the quantity left in the tank after the fire department shut the valve off (25%), It is estimated by the propane supplier that between 40 – 50% of the volume of the tanks worth of liquid propane escaped into the atmosphere. That is 750 – 950 litres of liquid propane or 18 -23 million BTU’s worth of energy • The tank was not a new installation and had been in place for several years before this happened
	<p>Causes and contributing factors</p>	<p>It is highly likely that soft unstable ground under one side of the blocks allowed the weight of the tank and fuel to push one side of the blocks into the ground causing the tank to roll off of the blocks snapping the brass fitting in the service valve causing the fuel leak.</p>

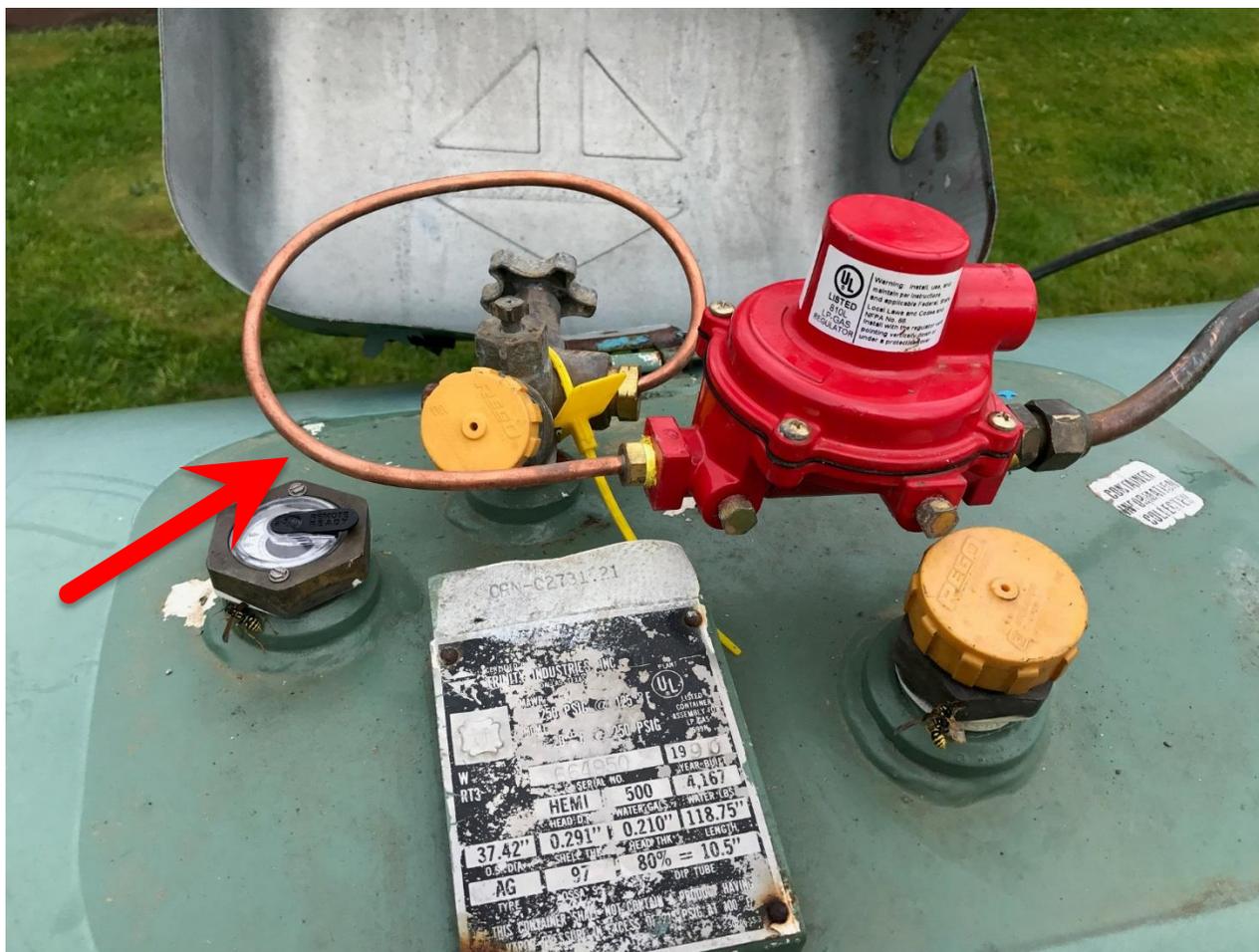
Photos or diagrams



Propane tank after repair



Concrete blocks after repair. Top of this side of the blocks were flush with ground when the tank rolled.



New flexible copper connector which replaced solid brass connector.



Example of solid brass connector that snapped when the tank rolled.