Incident Summary #II-1110571-2020 (#20084) (FINAL)

SUPPORTING INFORMATION	Incident Date		November 28, 2020
	Location		Nanoose Bay B.C.
	Regulated industry sector		Gas - Propane system
	Impact – Injury	Qty injuries	2
		Injury description	-6 year old child found unconscious and received a significant concussion -9 year old child received a severe laceration on right cheek
		Injury rating	Major
	Impact – Damage	Damage description	An uncontrolled release of propane resulted in damage to the structure of an outdoor living area as a result of an explosion.
		Damage rating	Major
	Incident rating		Major
	Incident overview		A propane gas log lighter was installed in an outdoor living area of a single family home. The gas line supplying the log lighter cracked inside an unventilated enclosure and created an uncontrolled release of propane resulting in an explosion.
INVESTIGATION CONCLUSIONS	Site, system and components		An uncertified log lighter was installed in a wood burning fireplace in an outdoor living area of a single family dwelling home. -The log lighter consists of a single burner device connected to a propane fuel source operating at a pressure of 11-13” of water column. -All piping connecting to the log lighter was contained in a tightly constructed under counter void, which was sheeted with ½’ plywood and covered with masonry concrete and stone. -The piping delivering the fuel source was ran primarily in soft copper tubing. -The gas piping was not accessible in the under counter location it was installed -The log lighter is operated by a manually operated shut off valve. The shut off valve either allows the fuel to flow or stop pending on its manually operated position. - When fuel is manually turned to the on position and ignited at the log lighter this allows the wood to burn without the use of an accelerant such as paper and kindling. - When the wood fire is established, the propane is then turned off to the log lighter.

Failure scenario(s)	-Upon original installation of the log lighter, it appeared the ½" soft copper tubing propane supply line to the log lighter was bent in a manner which created a kink on the tubing. -Movement from the propane log lighter over time, caused the soft copper supply line to work harden, eventually creating fatigue to the soft copper. -This fatigue in the soft copper supply line eventually caused the fuel to leak through a crack in the soft copper. -Upon starting a wood burning fire, the log lighter was energized and as a result propane was released from the failed copper tubing supply line. -The propane leak was downstream of the shut off valve and would only leak upon turning on the manually operated shut off valve. -As a result of this leak propane filled the tightly constructed under counter void where it began to accumulate. - Propane then migrated through the gas supply piping chase, to where the main wood burning fire was established. - The fuel was then ignited by the wood burning fire resulting in an explosion.
Facts and evidence	-The soft copper tubing appeared to have a very sharp bend and the copper tubing was visibly kinked and appeared to have a visible crack. At the time of the investigation the piping was tested by a gas contractor and the following was witnessed during the investigation: -The gas contractor pressure tested the gas supply line with 30 psi of air pressure. -The witnessed pressure test would not hold the air pressure applied and was released to atmosphere within a matter of seconds. Log Lighter Manufacturers installation instructions: -The log lighter was not secured in a rigid manner as manufacturer installation instructions required, as a result the burner would move horizontally over one inch, which then applied force to the soft copper propane supply line. -The manufacturer suggests in an installation example: To use rigid piping for the fuel supply line, the supply line was ran with approximately 14' of black iron pipe which then transitioned to a field bent ½' soft copper line which was attached directly to the fuel shut off. Log Lighter Certification: The standard, CSA America 8.93; Interim requirement for Gas fired log lighters for wood burning fireplaces, was originally released in 1993 at the request of industry to establish interim requirements for certification of log lighters for wood burning fireplaces in the US. These interim requirements were drafted with the understanding that should they not be incorporated into a standard within five (5) years, they may be withdrawn and all existing certifications cancelled. These requirements were reaffirmed several times without being further developed or integrated into a certification standard up until they were withdrawn in 2018 and all ongoing certifications to this requirement were cancelled.

	The manufacturer of the log lighter, had their log lighters certified to this standard up until these requirements were no longer available in 2018. The issue is that the certification was never a Canadian Certification. The certification marks identified on the installation instructions were provided by the certification agency and were part of the listing of the log lighter. The mark is a US recognized mark only. From research on this type of product, there is no route for a manufacturer to achieve a Canadian certification for a log lighter. -The homeowner was using the fireplace and had multiple fires on the evening of the explosion. The homeowner indicated in his statement they were using the log lighter and had turned off the fuel to the log lighter shortly after 9:00pm. -Shortly after the propane was de-energized an explosion occurred. -All of the under counter plywood and masonry facing was blown from the framing at the time of the explosion and created a 10 meter debris field. As a result of the explosion 2 children were injured and received treatment at emergency.
Causes and contributing factors	It is plausible the explosion was a result of the following issues: - The copper piping being kinked created a weak point in the propane supply line. -The log lighter and associated piping was not adequately supported, this created further movement and caused the soft copper supply line to work harden creating a crack - The uncontrolled release of propane was in a tightly constructed unventilated void which met code requirement, however due to the lack of ventilation this allowed the propane to accumulate which then was ignited by the wood burning fire.

Picture #1 manually operated fuel shut off valve

Picture #2 Unsupported propane log lighter

Picture #3- Copper tubing with kink (location of propane leak)

Picture #4 Where propane accumulated in tightly constructed void

Picture #5 Debris from explosion 10 meters away, !/2 plywood with stone finish