

## Incident Summary #II-1244996-2021 (#23770) (FINAL)

SUPPORTING INFORMATION	Incident Date		August 30, 2021	
	Location		100 Mile House B.C.	
	Regulated industry sector		Gas - Natural gas system	
	Impact	Injury	Qty injuries	2
			Injury description	Two individuals within dwelling brought to hospital for potential carbon monoxide poisoning with nausea and headache symptoms.
			Injury rating	Moderate
	Damage	Damage	Damage description	Free-standing fireplace firebox warped from overheating and gasket material failed.
			Damage rating	Moderate
	Incident rating		Moderate	
Incident overview		A natural gas fired free standing fireplace released carbon monoxide (CO) into the ambient air of the mobile home living space. Two occupants were exposed and were taken to the hospital for treatment.		
INVESTIGATION CONCLUSIONS	Site, system and components		<p>A free-standing gas fireplace with a continuous pilot was installed in the living room of the mobile home and vented vertically through the roof to outdoors (<a href="#">Photo 1</a>). The appliance would be susceptible to vent spillage when operating in a negative pressure environment.</p> <p>A single pipe portable air conditioner was installed in this same space with its exhaust hose piped through a sealed window opening. (<a href="#">Photo 2</a>)</p> <p><b>Free-standing gas fireplace:</b> A gas fired appliance that is free standing and is not built into the homes structure. The gas fireplace uses natural gas to produce heat and vent the remaining products of combustion safely outdoors through a venting system.</p> <p><b>Pilot</b> — a flame that is used to ignite a gas/air or propane/air mixture at the main burner(s).</p> <p><b>Continuous pilot</b> — a pilot that burns without turndown throughout the entire time the burner is in service, whether the main burner is firing or not.</p> <p><b>Portable single pipe air conditioner:</b> The single hose air conditioner pulls warm air from the room, sends it past coils cooled by refrigerant, and then sends heated air and moisture through the hose and out of the house. This does create a negative air pressure situation as air is pushed out of the room if air is not replaced by fresh air.</p> <p><b>Category 1 venting:</b> Is a metal vent system that is used on Category 1 appliances to convey products of combustion safely to the outdoors. Typically, these appliance types have a draft hood and are more susceptible to down draft or spillage during a negative air pressure situation.</p> <p><b>Negative air pressure:</b> Negative air pressure occurs when the pressure inside your home is lower than the pressure outside</p>	

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	<p><b>Fresh Air:</b> air that enters a home from the outdoors by natural or mechanical means to replace air that is being used by appliances or exhausted by fans.</p> <p><b>Spillage Susceptible appliance:</b> an appliance, be it natural gas, oil, propane, or wood, is spillage susceptible if it is possible for negative pressure in the house to cause flue gas to flow into the house rather than up the chimney.</p>
Failure scenario(s)	<p>During the summer months the occupants used a single pipe air conditioner unit that exhausts warm room air through a sealed window opening, to cool down the living room. The exhausted air was not being replaced by fresh air in the proper manner, fresh air was being drawn in through the venting of the fireplace causing the fireplace to spill products of combustion into the space.</p> <p>Even though the free-standing fireplace was not being used in heat mode the continuous pilot was left on. Due to lack of maintenance, improper set up and a failing gasket, the pilot burning in this type of environment caused CO to be drawn into the room.</p>
Facts and evidence	<p>After first responders sent occupants to the hospital, the gas utility technician performed CO measurements and readings at the unit were measured at 120 parts per million (PPM) from the fireplace with the pilot on.</p> <p>Safety Officer and contractor went to site and measured 829 PPM CO leaking from the heat exchanger when portable air conditioner was in use and the doors and windows were closed. (<a href="#">Photo 4</a>)</p> <p>The gas manifold pressure and input of the fireplace was measured during testing. The input was measured at 34,363 BTU/H, which is above the maximum allowance to the manufacture requirements of 27,000 BTU/H.</p>
Causes and contributing factors	<p>The incident most likely occurred due to a portable air conditioner causing building depressurization which allowed the products of combustion from the fireplace into the dwelling.</p> <p>A contributing factor was that the heater was installed incorrectly, contrary to the manufacture requirements, and was over-fired which likely caused the failure to the firebox and gaskets.</p>



Image 1 – Fireplace installed in living room of mobile home



Photo 2 – Living room showing fireplace and air conditioner (Blue box).





Photo 3 - Top of firebox flue port



Photo 4 - CO reading (829ppm) at high fire as found setting with portable air conditioner on.



Photo 5 - Space heater burner on at high fire as found setting showing lazy yellow and orange flame indicating incomplete combustion.