Incident Summary #II-1726846-2024 (#48017) (FINAL)

SUPPORTING INFORMATION	Incident Date		June 11, 2024
	Location		Terrace, BC
	Regulated industry sector		Gas
	Impact – Injury	Qty injuries	0
		Injury description	N/A
		Injury rating	None
	Impact – Damage	Damage description	Furnace condensate corroded through a black iron gas pipe, leading to an uncontrolled release of natural gas.
		Damage rating	Moderate
	Incident rating		Moderate
	Incident overview		Corrosive condensate from a high-efficiency furnace in a home was allowed to leak directly onto a black iron gas pipe located in a home's crawlspace. The condensate corroded a hole through the gas pipe, causing an uncontrolled release of natural gas.
INVESTIGATION CONCLUSIONS	Site, system and components		A black iron pipe conveys low-pressure natural gas from the gas meter, through the crawl space, to a high-efficiency natural gas furnace. A high efficiency condensing natural gas furnace provides heat throughout the dwelling. The furnace utilizes two heat exchangers: a primary heat exchanger, which extracts initial combustion heat, and a secondary heat exchanger, which further extracts heat from exhaust gases. As exhaust gases pass through the secondary heat exchanger, much of the remaining heat is extracted. As the vent gases cool, they condense to form water and carbon dioxide (which together form carbonic acid). The resulting condensate drains through a pipe into the building's wastewater system, while the remaining flue gases are vented outdoors via a plastic vent pipe."
	Failure scenario(s)		The furnace condensate drainpipe was routed from the furnace, down through the floor, and into the crawlspace, but was not terminated into a designated wastewater pipe. Instead, the highly acidic condensate discharged directly onto a black iron gas pipe, causing the pipe to deteriorate over time and ultimately resulted in an uncontrolled release of natural gas.

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Facts and evidence	A postal worker delivering mail to the residence smelled natural gas and reported it to the local gas utility. Upon arrival, a gas utility technician measured a gas concentration of 14% in the driveway and 39% at the entrance to the crawlspace. Natural gas is explosive at concentrations between 4% Lower Explosive Limit (LEL) and 14% Upper explosive limit (UEL). The gas meter was shut off and the house and crawl space were ventilated. A licensed gas contractor was hired to repair the gas piping system and reroute the furnace condensate drain line.
Causes and contributing factors	The improper installation of the furnace condensate drain caused the corrosion of the black iron piping, resulting in the uncontrolled the uncontrolled release of natural gas into the crawl space.