Incident Summary #II-1135989-2021 (#20547) (FINAL)

SUPPORTING INFORMATION	Incident Date		December 31, 2020
	Location		Maple Ridge
	Regulated industry sector		Gas - Natural gas system
	Impact – Injury	Qty injuries	0
		Injury description	N/A
		Injury rating	None
	Impact – Damage	Damage description	Extensive and irreparable fire damage to the piping system, boiler system, and venting system.
		Damage rating	Major
	Incident rating		Major
	Incident overview		Boiler safeties failed to turn off the supply of natural gas during unsafe operation which caused a fire outside of the boiler in the mechanical room located on the roof of a hotel. This fire caused irreparable damage to the boiler as well as significant damage to the building.
INVESTIGATION CONCLUSIONS	Site, system and components		On a properly maintained boiler, on a call for heat, the boiler will open the gas valve and release gas into the combustion chamber where it will be ignited by an ignitor. Safety controls installed on the boiler monitor the conditions inside the boiler and are designed to shut off the gas in the event of an unsafe condition. The burnt gases will rise through a heat exchanger which transfers heat to water that circulates through it. The burnt gas then flows out through the venting system to the outdoors. The gas will continue to flow until the call for heat is satisfied and the gas valve will close extinguishing the fire inside the boiler. Gas fired boilers should be regularly inspected and maintained for proper and safe operation. During regular servicing, heat exchangers are inspected, and safety controls are typically inspected and tested to ensure proper functionality.
	Failure scenario(s)		The boiler at the hotel had been operating without any recent inspection or maintenance which caused a build-up of soot on the heat exchanger of the boiler, This build-up eventually caused a block in the boiler system causing a condition called “flame rollout”, where the fire inside the combustion chamber burns out of the front of the boiler and into the mechanical room instead of upwards and through the venting system. A flame rollout safety switch failed to shut off gas during the unsafe condition. The boiler placement was installed too close to the wall as per code requirements and the wall next to the boiler caught fire.
	Facts and evidence		During investigation of the boiler, the finned heat exchanger was observed to be plugged with soot and carbon. The original location of the installation of boiler and proximity to the wall was observed and found to be too close to a combustible wall. Burn mark patterns were observed starting from installed boiler location and spreading outward.

Causes and contributing factors	It is highly probable that lack of proper maintenance on the boiler allowed the boiler heat exchanger to become plugged up as well as a lack of identification of a possible safety control failure. This combined condition most likely created a flame rollout condition which then caught the adjacent wall on fire.