

## Incident Summary #II-1018194-2020 (#17917) (FINAL)

SUPPORTING INFORMATION	Incident Date		May 25, 2020
	Location		Burnaby BC
	Regulated industry sector		Gas - Natural gas system
	Impact Damage Injury	Qty injuries	0
		Injury description	NA
		Injury rating	None
		Damage description	Carbon Monoxide release into residential tower
		Damage rating	Minor
	Incident rating		Minor
	Incident overview		A boiler was producing high CO levels which were exhausted through the boiler exhaust system and carried in the ambient air by the wind currents to the inlet of the hallway pressurization unit where CO entered the building.
INVESTIGATION CONCLUSIONS	Site, system and components		<ul> <li>-A.O.Smith Copper fin tube type domestic water heater. One of two boilers that are used for heating the domestic hot water supply.</li> <li>-The boilers are not vented with atmospheric venting but are power vented to the exterior of the building. A power venter system has a motorized fan that pulls the products of combustion from the vent connection of the boiler through a horizontal vent and out through a combination, wall mounted, power venter and vent termination.</li> <li>-The hallway pressurization unit is a gas fired Engineered Air indirect fired make-up air unit which draws outside air into a residential high rise building to pressurize the common hallways.</li> <li>Both the boiler vent termination and the make-up air unit are located on the roof in close proximity to each other.</li> </ul>
	Failure scenario(s)		<ul> <li>-A boiler was producing excessive carbon monoxide and emitting it to the outside through the power venter</li> <li>-The prevailing wind carried the products of combustion from the boiler exhaust outlet into the enclosure that contains the hallway pressurization unit.</li> <li>-The products of combustion entered the air stream serving the hallways and triggered the CO alarm</li> </ul>
	Facts a	nd evidence	-First responders reported readings of between 50 PPM (parts per million) and 150 PPM of Carbon Monoxide when performing air quality sampling throughout the building.



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	-Copper fin tube type boilers require regular cleaning of the buildup on the heat exchangers created from the reaction between the copper and the products of combustion.
	-The boiler did not appear to have been cleaned prior to the incident.
	-The heat exchanger was plugged with soot and the refractory material was visible resting on the burner tray.
	- A section of the internal boiler refractory material had fallen down on the burner tray disrupting the flames proper combustion characteristics and causing incomplete combustion creating high levels of carbon monoxide in the exhaust and soot on the heat exchanger.
	- Soot was evident on the boiler exhaust vent outlet and on the concrete above the opening into the roof well containing the hall pressurization unit.
	- The warmth from the products of combustion from the second boiler's exhaust outlet could be felt as the wind carried the exhaust gases through the opening into the roof well enclosure containing the hall pressurization unit.
	<ul> <li>The installation meets Code clearance requirements between the boiler exhaust outlets on the exterior of the building and the hall pressurization unit.</li> </ul>
Causes and contributing factors	It is very likely that the refractory material falling onto the burner tray created flame impingement which resulted in incomplete combustion, soot formation on the heat exchanger and high levels of carbon monoxide in the exhaust gases. Prevailing winds carried the exhaust gasses towards the inlet of the make-up air unit





Boiler with heat exchanger removed





Boiler heat exchanger showing soot and buildup on burner tubes





Boiler exhaust vent termination with visible soot





Make-up air unit for hallway pressurization