

Incident Summary #II-1265213-2021 (#24329) (FINAL)

SUPPORTING INFORMATION	Incident Date		October 5, 2021
	Location		Burnaby
	Regulated industry sector		Gas - Natural gas system
	Impact	Qty injuries	0
		Injury description	NA
		Injury rating	None
	Damage	Damage description	Holes in a gas line and an uncontrolled natural gas release into an occupied space.
		Damage rating	Moderate
Incident rating		Moderate	
Incident overview		A natural gas line had holes drilled into it by fastening screws during installation of the microwave's supporting bracket. Natural gas was released from the holes and by way of wall openings into the apartment.	
F INVESTIGATION CONCLUSIONS	Site, system and components	<ul style="list-style-type: none">- The building is a 26 story high rise building of concrete construction. The interior walls of this 17th floor apartment are steel framed with gypsum wall board covering.- The gas riser line feeds multiple floors and is a 1.25 inch black iron schedule 40 pipe with a 0.14 inch (3.556mm) wall thickness. It is run within the steel framed kitchen wall in the apartment space. A gas stove cooking appliance is connected to the gas riser line below the microwave installation location.- While there is a gas code requirement for protection of tubing material, the same requirement does not apply to black iron piping material:<ul style="list-style-type: none">- Gas code 6.16.4 - Gas tubing (copper or corrugated stainless steel) installed in a hollow wall within 1.75 inch of the surface shall be protected from physical damage and puncture by steel plates or sleeves at least 16 USG (1.59mm) thick.- Black iron piping material with a 3.556mm wall thickness installed in a hollow wall does not require protection plates as the wall thickness of the pipe exceeds that of the 1.59mm thick protection plates required for tubing.- Microwaves installed above stoves typically mount directly to a mounting bracket (Figure 1) fastened with metal screws to framing members in the wall. This is rather than being mounted on a shelf or in a cabinet, as the microwave incorporates an exhaust fan requiring vertical passage for fumes from the stove burners.	
	Failure scenario(s)	Prior to installation of a wall mount microwave's mounting bracket, the installer used a stud finding device which indicated metal in the wall that, unknown to the installer, was a natural gas pipe. The installer, suspecting the metal to be a steel stud, used a small screwdriver and a hammer to pierce the drywall and check what was behind	

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	<p>the drywall. The screwdriver tip hit metal immediately behind the drywall and the installer indicated it seemed like steel stud.</p> <p>The installer then used an impact type drill which has a percussive effect, that eases drilling, to install self tapping framing screws (Figure 2) to secure the mounting bracket. The self tapping screws have a drill bit type end that enables them to drill through metal. The result was that the vertically run natural gas line directly behind the drywall (Figure 3) was drilled into in two locations. This created a natural gas leak in the wall cavity which issued through wall openings into the apartment over a six day period. The occupant reported a gas smell, which was subsequently confirmed during testing (Figure 4) by a gas utility representative. As there are no localized shut off valves, the gas contractor had the gas to the entire building shut off at the meter for several hours to stop and repair the leak.</p>
Facts and evidence	<p>Microwave installer statements</p> <ul style="list-style-type: none"> - During installation of the microwave backplate, they used a Franklin stud finder, a Makita impact drill and self tapping framing screws. - They had used the stud finder and hammered a small screwdriver into the drywall to confirm the suspected stud location. When the screwdriver tip hit metal directly behind the drywall, they were under the impression that they had located a steel stud. <p>Homeowner statements</p> <ul style="list-style-type: none"> - A relative of the homeowner was in the process of installing the microwave when the gas pipe was drilled into. - The installer used a stud finder device which showed indication at the gas pipe location. Under the impression they had located a stud, they screwed into the gas pipe. - The natural gas leaks were not identified at the time of the drilling. - In the days after the gas line was drilled into, the homeowner smelled the rotten egg gas smell in the apartment and contacted the strata and then the gas utility. - The gas utility technician attended the site and identified natural gas being released (Figure 4) in certain locations where the wallboard had openings for pipes. - The gas range was operated in the apartment on multiple occasions prior to identification of the leak (by the gas utility technician) but did not ignite the leaking gas. <p>Repairing gas fitter statements</p> <ul style="list-style-type: none"> - The damaged gas pipe was 1-1/4 inch black iron pipe schedule 40. - To repair the punctured pipe, they had to shut the gas off at the meter to bleed the entire building. - The wall where the pipe was installed was only deep enough to fit the pipe. - The leak was only able to be found by removing a portion of drywall.
Causes and contributing factors	<p>The incident was caused by the drilling of holes in the gas pipe which was mistaken by the installer of the microwave bracket as a steel stud behind the drywall.</p>

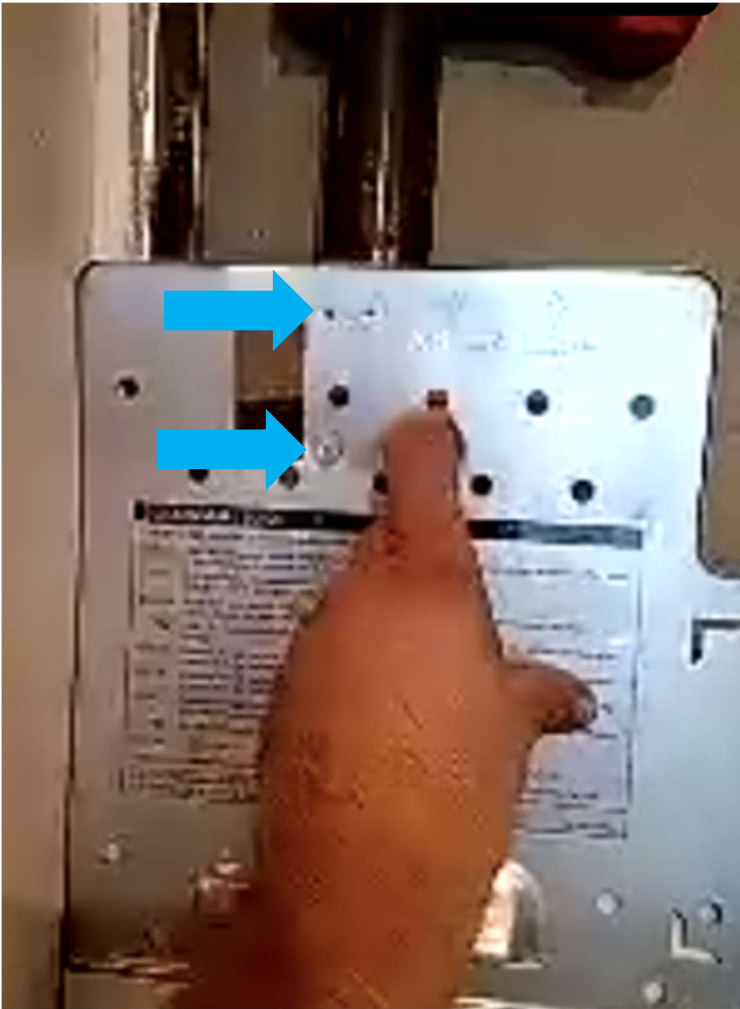


Figure 1 - Mounting bracket, with holes directly in front of gas line



Figure 2 - Gas pipe with holes (left), screws in the pipe (center) and after removal (right)
One of the self tapping screws was likely replaced with a wood screw during install.



Figure 3 - Gas pipe in the wall



Figure 4 - Utility gas technician test results 150 parts per million (ppm) under bathroom sink (left) and 70 ppm behind kitchen stove (right)