

## Incident Summary #II-922268-2019 (#15652) (FINAL)

SUPPORTING INFORMATION	Incident Date		October 12, 2019
	Location		North Cowichan
	Regulated industry sector		Electrical - Low voltage electrical system (30V to 750V)
		Qty injuries	0
	t Injury	Injury description	NA
	Jpac	Injury rating	None
	In nage	Damage description	Non-metallic sheathed cable, plastic device box and duplex receptacle damaged by fire.
	Dan	Damage rating	Minor
	Inciden	nt rating	Minor
	Incident overview		Contaminants such as septic gases and household cleaners seeped into a wall through a damaged ABS drain pipe. The gases oxidized and corroded the copper wiring in the wall, which caused a duplex receptacle to overheat and combust.
INVESTIGATION CONCLUSIONS	Site, system and components		A wood framed wall was being constructed on the inside of a concrete foundation with plumbing and electrical wiring located within the wall cavity. Components included: Vapour barrier: Would usually consist of a layer of 6mil polyethylene taped and caulked to create a barrier and prevent the transmission of moisture into a building through outside walls. A vapour barrier was not present at the time of failure. Plumbing: ABS plumbing drains in building consists of P traps and vents. P traps and vents work to keep sewage gases from entering buildings. Plastic, copper water pipe with steel and brass valve fittings. Electrical: Wiring cable, receptacles and switches Possible contaminants that are corrosive to the building materials used (plumbing & electrical) include the following: Sewer gas: Gasses produced by bacteria during the break down of organic waste can include the highly toxic and corrosive hydrogen sulphide as well as ammonia, methane, sulphur dioxide and carbon dioxide. Sodium Hypochlorite: Commonly referred to as liquid bleach. Bleach is corrosive and can speed up the oxidation process of copper.
	Failure	scenario(s)	A drain pipe was punctured when an electrical cable was installed. This allowed fluids to leak out of the drain pipe and introduced corrosive substances into electrical outlet boxes. The boxes were not provided with a proper vapour seal/barrier that may have prevented fluid entry.



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Facts and evidence	A cable installer had retrofitted a coaxial cable into a residential dwelling approximately 20 years ago. When drilling hole through the wall to install wiring the installer accidentally intersected a plumbing drain beneath the kitchen sink on the downstream side of the P trap, ( <i>Photos 3 and 4</i> ). The breech of the pipe allowed moisture, household cleaners, and septic system gasses to infiltrate the outside wall of the dwelling. The corrosive mixture was able to penetrate the outside wall due to poor vapour barrier sealing practices around the electrical outlet boxes, ( <i>Photos 1, 2 and 6</i> ). Corrosion of the copper conductors in the outlet box caused excessive heat from a high resistance connection and/or arcing that started to burn the insulation, plastic outlet box and the plastic duplex receptacle. Corrosion could also be seen on the copper plumbing fittings, ( <i>Photos 8 and 9</i> ). Witness reported that they could notice a "funky smell" in the area and said they had used bleach to try to get rid of the smell.
Causes and contributing factors	It is highly probable that the receptacle and outlet box caught fire because of overheating or arcing of electrical connections due to the corrosive materials introduced by the damaged drain pipe and poor vapour seal. The probable cause of the fire was damage from careless installation of electrical wiring and lack of a sealed vapour barrier to protect electrical outlets from moisture contact.

## Photographs





Photo 1: Burnt receptacle and outlet box.





Photo 2: Outside wall with damaged drain. The electrical boxes do not have gaskets, and no sealant was used on the wall. The electrical boxes were wrapped in polyethylene and the cables poked through the polyethylene into the boxes, the holes in the polyethylene were not sealed.





Photo 3: Section of drain pipe with a coaxial cable installed through it.





Photo 4: Damaged drain pipe. Hole drilled through pipe when electrical cable installed





Photo 5: Damaged receptacle





Photo 6: Oxidation of a nearby receptacles terminals.





Photo 7: Rodent damaged wire in the same wall as the burnt receptacle, notice the heavy corrosion of the bare bonding conductor.





Photo 8: Brass and copper plumbing fittings show corrosion.





Photo 9: Copper and steel plumbing fittings corroded.