Incident Summary (II-699373-2018) (Final)

SUPPORTING INFORMATION	Incident Date		May 26, 2016
	Location		Abbotsford, BC
	Regulated industry sector		Electrical – low voltage (Not exceeding 750 volts)
	Impact – Injury	Qty injuries	0
		Injury description	N/A
		Injury rating	N/A
	Impact – Damage	Damage description	A receptacle and surge protected power strip were destroyed in a fire located in the bedroom of a residential unit in a multi-family building. Minor fire and smoke damage to the bedroom wall.
		Damage rating	Moderate
	Incident rating		Moderate
	Incident overview		A fire occurred where a surge protected power strip was plugged into a receptacle. The surge protected power strip was used to provide power to a portable heater, a portable air conditioning unit, a lamp, and a power bar for additional electrical equipment.
INVESTIGATION CONCLUSIONS	Site, system and components		The incident occurred in the master bedroom of a ground floor unit of a multifamily, multistory, wood frame building that was built in 1982. The North wall in the bedroom had a 15A, 125V duplex receptacle with a 1875W, six outlet surge protected power strip plugged into the lower outlet. The surge protected power strip provided power to a 1500W portable oil filled heater, a 1040W portable AC unit, a floor lamp and a cord connected power bar. The power bar was used for a desk top computer, printer, portable phone, fax machine, answering machine, and a small dehumidifier. A chair used at the computer desk was stored in front of the outlet and power strip when the chair was not in use. A 15A, 1 pole breaker in the electrical panel protected the branch circuit for the receptacles in the master bedroom, spare bedroom and two receptacles in the living room. The 15A breaker in the electrical panel may not trip immediately in an overload condition. Depending on magnitude of the overload and the breaker characteristics, the overload may persist for an extended period of time before the breaker trips. This is different than a fault condition in which the high current will cause the breaker to trip quickly.

Incident Summary (II-699373-2018) (Final)

Failure scenario(s)	The portable oil filled heater or the portable AC unit combined with other connected electrical loads draw enough current to overload the 15 amp circuit. Over time, the overloading caused excessive heating at the connection point between the bedroom wall receptacle and the plug for the surge protected power strip power. Repeated overheating would cause the tension of the receptacle contact to weaken and would create a high resistance connection between the receptacle's contact parts and the blades of the surge protected power strip . The intermittent current flow from loads cycling on and off creates heating and cooling cycles at the receptacle connections which causes a thin oxidation layer to form on the connection surfaces. This oxidation layer acts as an insulator and additional resistance occurs at the receptacle contacts. The additional resistance caused even more heat to build up at the contact points which eventually lead to the connection between the receptacle and the plug of the power strip to fail. When the connection failed, an arc fault was created between the ungrounded (hot) opening of the receptacle and ungrounded (hot) blade of the power strip. The arc fault can reach several thousand degrees centigrade which caused the receptacle to disintegrate and the fire to start.
Facts and evidence	Witness statements of events leading up to the fire: - The occupant of the dwelling unit was in the bedroom and working on the computer when he heard a buzzing, zapping sound come from location were the surge protected power strip was plugged into the receptacle. The computer turned off and when he looked over to the receptacle, he saw flames shooting up the wall. The occupant grabbed a fire extinguisher and put the fire out. The occupant then called the fire department. - The occupant stated that the surge protected power strip provided power to the 1500W portable oil filled heater, a 1040W portable AC unit, a floor lamp and a cord connected power bar. Only the heater and the equipment connected to the power bar were in use at the time of the fire. - The occupant declared that he had moved a chair from the receptacle location to the computer location and may have bumped the surge protected power strip that was plugged into the outlet before the fire had started.

Incident Summary (II-699373-2018) (Final)

- The occupant also stated that there had been no issues with the breaker tripping in the electrical panel before the fire.

Abbotsford Fire Department statement:

- Abbotsford Fire Department attended the site for a fire at an electrical outlet. The fire was out when they arrived on site. After determining the power was off to the outlet (the breaker was tripped), the fire department removed the outlet from the box to check for hot spots inside the box and wall. A power strip with several cord connected devices had been plugged into the receptacle.

Observation of the room:

- The 15A / 125V receptacle was charred and burnt and a portion of the receptacle was missing on the ungrounded (hot) side of the receptacle. The identified (neutral) conductor and bond conductor were still connected to the receptacle but the ungrounded conductor appeared to have burnt off. The neutral conductor connected to the receptacle through the back-wired connection on the receptacle. The conductors were charred and burnt and insulation was missing from the line conductor.

- The receptacle plate was scorched on the inside and a burn mark in the bottom, left side of the plate corresponded with the missing portion of the receptacle and burn marks on the back of the surge protected power strip.

- The 1875W surge protected power strip had six outlets and had a certification mark for use in BC. The power strip had burn marks on the back of the outlet. The plastic tabs that fit in the upper portion of the outlet to provide support for the power strip had melted off the device. The neutral blade of the plug had marks that would indicate high heat. The ungrounded (hot) blade of the plug was melted and a portion of the blade was missing which indicated an arc fault.

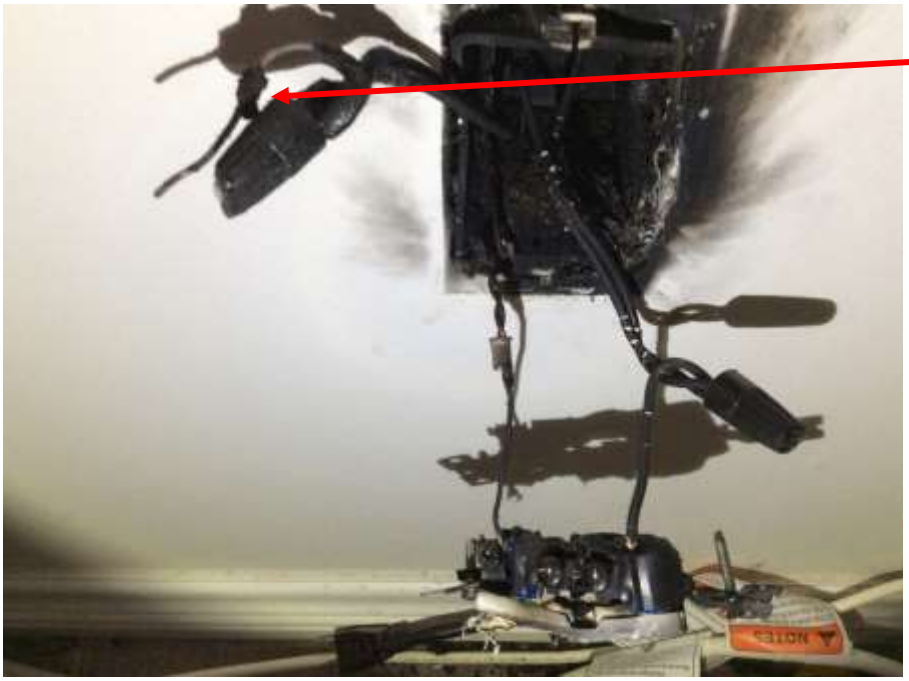
- Cord ends for the 1500W portable oil filled heater, 1040W portable AC unit, floor lamp and cord connected power bar were below the outlet.

- The junction box the receptacle was mounted on was burnt on the inside and the bottom, left side of the box (as looking from the wall) was melted and distorted. The wall above the junction box had minor fire and smoke damage.

- The 15A, 1 pole breaker in the electrical panel for circuit 18 was in the tripped position.

Incident Summary (II-699373-2018) (Final)

Causes and contributing factors	The cause of this incident is very likely an overheated connection between receptacle and the blades of the surge protected power strip caused by a circuit that been over loaded for an extended period of time. A contributing factor may have been the chair that was stored in front of the receptacle. When the chair was moved, it may have bumped the surge protected power strip and the power strip may not have been fully seated into the receptacle. If the plug was not fully seated, less metal would have been in contact and it would have compounded the overheating at the connection.



Ungrounded (hot) conductor is burnt off of receptacle. Wire connector is also melted.

Location of chair when not in use at computer.

Inside of box is burnt. Bottom corner is melted

Lamp

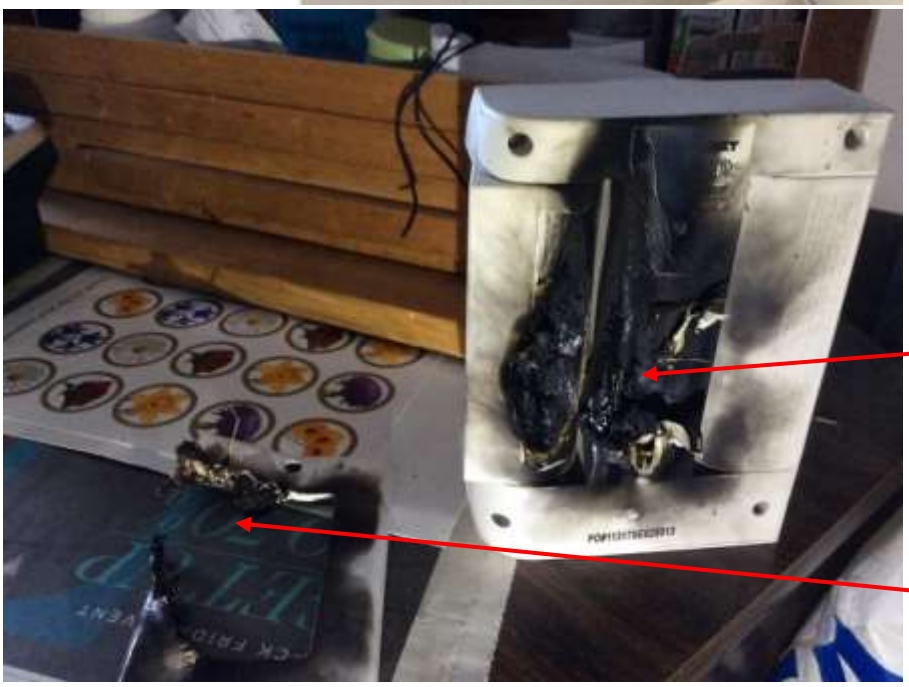
Power bar

AC unit

Heater

Desk top computer

Tripped breaker in panel.



Back of surge protected power strip

Bottom of cover plate is melted

Cover plate and back of surge protected power strip aligned.

Front of surge protected power strip

Certification mark on power strip

Plastic tabs have melted off of the top of the power strip.

Identified (neutral) blade has been exposed to high heat.

A portion of the ungrounded (hot) blade has melted from the arc

The ungrounded (hot) terminals are missing off the side of the receptacle and the high heat from the arc has disintegrated the side and back of the receptacle body.

Melted plastic tabs off of the top of the power strip in the receptacle.

Location of the power strip blades in the receptacle.