

## Incident Summary #II-3757342-2023 (#40798) (FINAL)

SUPPORTING INFORMATION	Incident Date	October 28, 2023	
	Location	Sparwood	
	Regulated industry sector	Electrical - Low voltage electrical system (30V to 750V)	
	Impact	Qty injuries	1
		Injury description	1 person deceased.
		Injury rating	Fatal
	Damage	Damage description	N/A
		Damage rating	None
	Incident rating	Severe	
Incident overview	One person was found unresponsive inside of a house under construction. A portable gasoline fueled electric generator was being used indoors in an enclosed space supplying power for construction including a space heater.		
INVESTIGATION CONCLUSIONS	Site, system and components	<p>The portable electric generator provides 120/240-volt electricity for temporary power purposes. Generators have a rated running output and is powered by a single cylinder gasoline fueled 4 stoke engine. The generator has an approval mark from CSA identifying adherence to the CSA 22.2 100-14 standard for electric motors and generators. The equipped engine meets Environment Canada's emission standards for spark-ignited engines at or below 19 kilowatts. There are no current requirements for carbon monoxide safety shutoff systems for portable electric generators in BC.</p> <p>The installation manual and warning labels affixed to the generator itself, provide danger warnings informing that <i>"Using a generator indoors can kill you in minutes."</i> and <i>"TOXIC FUMES HAZARD. Running engines give off carbon monoxide, an odourless gas that can cause nausea, fainting, or death. Do not start engine indoors or in an enclosed area even if windows and doors are open."</i> <i>"Only use OUTSIDE and far away from doors and vents."</i></p> <p>Carbon monoxide is a colourless, odourless, tasteless gas that is toxic to humans and animals. Exposure to carbon monoxide interferes with the body's ability to absorb oxygen, which can result in serious illness or death.</p> <p>Rapid-onset or sudden exposure to high levels of carbon monoxide can be lethal, fast and without warning. Entering a space that has a high concentration of carbon monoxide can quickly incapacitate an occupant. In this hazardous environment there may be no opportunity to feel ill and seek to escape, potentially rendering an occupant unconscious with continued exposure to the lethal effects of carbon monoxide.</p>	

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<p>Failure scenario(s)</p>	<p>The house was under construction and the exterior walls were sealed with insulation and plastic vapor barrier. A worker was inside the house while the gasoline fueled generator was running indoors to provide power for a heater and a small air compressor contrary to the warnings on the generator and in the generator's manual.</p> <p>While the generator was operating, it circulated exhaust gases containing carbon monoxide into the enclosed space. The exhaust gases circulated until the concentration of carbon monoxide elevated in the space up to dangerous levels. There were no carbon monoxide alarms in the area to alert the worker or integrated carbon monoxide safety systems on the generator that could have shut down the generator when levels got too high.</p> <p>The worker was found inside unresponsive, and first responder emergency services detected the presence of carbon monoxide in the indoor space.</p>
<p>Facts and evidence</p>	<p>Generator manual:</p> <ul style="list-style-type: none"> <li>• AC output voltage is 120/240 volts.</li> <li>• AC output power "running" 9000 watts.</li> <li>• Fuel type is gasoline.</li> <li>• The engine is 457 cc displacement, 15HP, Single cylinder, 4 stroke, over head valve.</li> <li>• Fuel tank capacity is 25 Litres.</li> <li>• Run time @ 25% Load is 12 hours.</li> <li>• DANGER! Label stating, <i>"Using a generator indoors can kill you in minutes."</i></li> <li>• WARNING! Labels stating <i>"TOXIC FUMES HAZARD. Running engines give off carbon monoxide, an odourless gas that can cause nausea, fainting, or death. Do not start engine indoors or in an enclosed area even if windows and doors are open."</i></li> </ul> <p>Site photos:</p> <ul style="list-style-type: none"> <li>• The house was at lock up stage with doors, windows installed.</li> <li>• The exterior envelope of the building had Styrofoam, fiberglass, and spray-foam insulation. The above ground exterior walls and main floor ceiling into the attic space had a plastic vapour barrier installed which was also sealed around the doors and windows.</li> <li>• The electrical supply had not yet been connected to the house.</li> <li>• The generator was observed indoors with power cords connecting too an air compressor and a kerosine heater.</li> <li>• Two liquid fuel contains were observed indoors next to the generator and heater.</li> <li>• The fuel gauge on the generator showed empty.</li> <li>• Warning labels were observed in good condition and legible on the generator stating <i>"Generator exhaust contains carbon monoxide. This is a poison that you cannot see or smell. NEVER use inside a home or garage. EVEN if doors and windows are open. Only use OUTSIDE and far away from windows, doors, and vents."</i></li> </ul> <p>Interview statements:</p> <ul style="list-style-type: none"> <li>• First responders measured CO in the house when they arrived.</li> <li>• The worker was found unresponsive in the basement of the home close to the generator.</li> </ul>

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### Causes and contributing factors

It is highly probable that the use of a fuel burning portable electric generator in the enclosed unventilated basement space contrary to the warnings on the generator and in the generator's manual resulted in an accumulation of hazardous concentrations of carbon monoxide.

No use of carbon monoxide alarms or integrated carbon monoxide safety systems on the generator were likely contributing factors to the incident.

*Note: The scope of investigation and findings are limited to the likelihood of the equipment having produced a carbon monoxide environment. Cause of death is determined by the BC Coroners Service.*



Image 1 – Front of house under construction.



Image 2 – Gasoline generator (middle) found indoors powering a small air compressor (left) and a kerosine/diesel fueled space heater (right).



Image 3 – Front of generator.



Image 4 – Fiberglass insulation and vapor barrier showing home sealed from fresh air.



Image 5 – Generator fuel gauge showing empty.



Image 6 – Warning label on generator.



Image 7 – Safety warnings in instruction manual and on generator.