Incident Summary #II-1998184-2025 (#59269) (FINAL)

SUPPORTING INFORMATION	Incident Date		November 24, 2025
	Location		Langley
	Regulated industry sector		Electrical - Low voltage electrical system (30V to 1000V)
	Impact – Injury	Qty injuries	0
		Injury description	N/A
		Injury rating	None
	Impact – Damage	Damage description	An electric vehicle (EV) charger caught fire and was destroyed. The burning lithium-ion battery released toxic emissions in the area and caused heat and fire damage to other disconnected EV chargers stored adjacent to it.
		Damage rating	Major
	Incident rating		Major
	Incident overview		An EV charger with an integrated lithium-ion battery pack overheated and burst into flames while disconnected from the electrical grid and stored in a storage yard.
+INVESTIGATION CONCLUSIONS	Site, system and components		The charger involved in the incident was a “Boost 200” battery integrated direct current (DC) fast charger manufactured by FreeWire Technologies. The charger can provide a maximum charging of 200-kW through a CCS1 style connection. The boost charger was certified to standards for both UL and UL-C (Canada) including the UL2202 - Safety requirements for Electric Vehicle (EV) Charging System Equipment. **Boost style chargers** Boost-style EV chargers have integrated 160-kWh lithium-ion batteries and are designed to deliver up to 200-kW DC output fast charging even when the local power grid can’t supply enough energy. Instead of pulling all the power directly from the grid during charging, the system uses its built-in batteries as a buffer. The batteries can slowly store energy from the grid and then release it quickly to the EV when needed, providing a “boost” in power. This system can reduce strain on the grid and allow high-speed charging in areas with limited electrical capacity. **Battery temperature control systems** Boost chargers use a Battery Management System (BMS) to keep their lithium-ion batteries operating safely and efficiently. These systems use heating, ventilation, and air conditioning (HVAC) for both cooling and heating functions. Cooling is achieved through liquid, air circulation, and air conditioning units combined with sensors that monitor battery temperature to prevent overheating during high-power charging or rapid discharge. Heating is equally important because batteries perform poorly in very cold conditions. The battery block is made up of eight individual 100-V battery module “stacks” that are bolted together and wired to create one large 800-V battery “cube” (Image 6). The system uses four electric heating mats above the battery stacks to warm the cells when needed to an optimal range before charging or discharging.

Incident Summary #II-1998184-2025 (#59269) (FINAL)

	Maintaining the correct temperature is critical for safety, as extreme heat can cause thermal runaway and fire, while extreme cold can reduce charging speed and damage the battery. By actively managing temperature, the charger intends to achieve safe reliable performance and battery life. **Equipment certification and testing** EV vehicle chargers are tested and certified through a structured evaluation by an accredited certification body that confirms the product meets the same level of safety as a recognized standard. This includes reviewing the design, assessing critical safety components, and conducting laboratory testing. When an exact standard does not exist which can be common for new and emerging technologies, certifiers apply comparable standards alongside engineering judgment and risk analysis to demonstrate equivalent safety outcomes. When certification is granted, it applies only to the tested configuration and remains valid only while no unapproved design, component, or software changes are made. **Lithium-ion battery thermal runaway and fires** Thermal runaway in a lithium-ion battery is a chain reaction where the battery's temperature rises uncontrollably, leading to catastrophic failure. It usually starts when the battery is damaged, overcharged, or exposed to high heat, causing internal components to break down. As the temperature climbs, the separator inside the battery can melt, creating an internal short circuit. This triggers chemical reactions that release even more heat and flammable gases, accelerating the process. If the heat cannot escape, the pressure builds up until the battery vents or ruptures, and the gases often ignite, resulting in fire or even explosion. Because this reaction is self-sustaining and spreads quickly, thermal runaway is one of the most serious hazards associated with lithium-ion batteries. Lithium-ion battery fires pose serious risks because they generate intense heat, release toxic emissions, and are difficult to control. When these batteries overheat, they can enter a state called thermal runaway, causing rapid ignition and even explosions. The fire can reach temperatures above 1,000°C, easily spreading to nearby materials and structures. Burning batteries release harmful gases including hydrogen fluoride and carbon monoxide, which are dangerous to inhale and can contaminate the environment. Extinguishing these fires can be challenging because they often require massive amounts of water and can reignite hours or days later. Beyond health and safety hazards, such incidents can lead to significant property damage, operational disruptions, and environmental contamination, making prevention and proper handling critical.
Failure scenario(s)	Freewire Technologies designed and manufactured Boost EV chargers. The original design was approved and certified under three separate model number series and authorized to carry the MET certification mark, indicating compliance with multiple UL and CSA safety standards. Freewire technologies ceased operation in 2024. In 2023, a commercial charging station opened in Hope BC that utilized new Freewire Boost 200 chargers. Several of the Freewire boost chargers had common issues with the BMS HVAC units not operating correctly due to incorrect wiring, undersized breakers and incorrect temperature dial settings. Field fixes for the issues included rewiring, increases breaker size and dial adjustments. These alterations were not submitted to or approved by the certification body, meaning the products in the field no longer reflected the certified design.

Incident Summary #II-1998184-2025 (#59269) (FINAL)

	After two years of service, a plan was made to upgrade the chargers to “direct to grid” style chargers that did not have the integral lithium-ion battery packs. In July 2025, the chargers were disconnected from the site’s power supply by technicians. The battery packs in the chargers were not discharged prior to removal and still held an estimated 70-80% charge when removed. They were then transported by truck and stored outdoors at a secure, fenced storage yard in Langley BC. The chargers remained at the storage site for over five months with no signs of tampering or vandalism. While the chargers sat in storage disconnected from grid power, there was no functioning BMS to monitor and control battery temperatures. There was also no ongoing routine inspection or maintenance of the chargers while there were disconnected and stored. Although the chargers are designed for outdoor use, it is possible that due to conditions during removal and transport along with lack of ongoing routine maintenance or inspections, water from rainfall may have entered the charger past the factory seals and reached the charger battery pack, cells, and connections. Around 11:40 on the day of the incident, a fire started in one of the disconnected chargers stored in the yard. A local city employee was traveling on the road next to the storage yard and noticed the fire and notified the storage yard owner who was in the yard office. The fire department was quickly dispatched and arrived minutes later. The fire in the charger was extinguished using water and foam, but the battery continued to off-gas, smoke and reignite three times over the next 90-minutes requiring repeated suppression actions from the fire department. Even after flames were put out, the battery remained unstable. Due to the risk of further ignition, 24-hour security was put in place overnight to monitor the unit.
Facts and evidence	<u>Statements</u> **Charging facility representatives** • Five Freewire chargers were removed from the Hope location and swapped with direct to grid chargers without integrated battery packs. • The units were transported from Hope to the storage yard in Langley on July 2nd/3rd 2025. • The chargers were stored uncovered, but the units are weather rated and meant to be outside. • When the units were stored, they were not connected to any power supply, but the battery packs still held some electrical charge. They believe they were somewhere in between 70-80% when transported and stored. • They were notified that one of the units in the storage yard was on fire and it was adjacent to other units stored beside it. • The fire department put the fire out and stayed on scene. • The storage yard is private and secure. There were no immediate signs of vandalism or theft. • They are in the process of removing all the Freewire boost chargers on there network and are replacing them with direct to grid chargers as they have had incidents involving the Freewire ones. It’s an upgrade and a better charger with newer technology and are more reliable. • Speed charge is a surviving entity from the Freewire bankruptcy and provides service for the Freewire chargers and troubleshoots remotely and creates work orders for repairs and maintenance.

Incident Summary #II-1998184-2025 (#59269) (FINAL)

Storage yard owner

- He was onsite and at approximately 11:45, a Langley City employee knocked on the office door and said there was a fire in the yard.
- Shortly after he got to the bottom of the yard where the fire was the fire engine had arrived.
- He took video and pictures of the fire.

Fire department

- They arrived at the scene at 11:50 and used water and foam to suppress the fire.
- The fire was extinguished at 12:05 but it reignited 2-3 times and after multiple attempts to suppress it, it kept smoking and reignited again about 1.5 hours later. They remained on scene until a representative from the charging facility arrived and they recommended overnight security to monitor for additional ignitions.

EV Charger technicians

- The charging units each have eight battery packs with a total of 193 cells at 100 Volts Direct Current (VDC) each totaling up to 800-V when fully charged.
- The battery packs in the chargers were not discharged when they were transported, and after the incident, the packs in the undamaged chargers were found to be at around 75% charge capacity when stored.
- Discharging of the batteries in one charger can take up to eight hours and longer if there are damaged cells because they need to reduce the current to keep the batteries from getting too hot.
- Even when the units are discharged, they still carry around 75-volts.
- Heat damages the battery cells and if they get too hot the cells can swell and leak electrolyte.
- In their experience with the Freewire chargers they have found a history of the internal HVAC units on all of them initially had undersized overcurrent protection inside the units. The HVAC units installed in the chargers were protected by breakers rated for only 6-amps and they would occasionally trip. Some of the units had incorrect wiring to the HVAC units from the factory and would not even start until the wiring was fixed that sometimes required swapping the hot and neutral pins on the connector.
- The factory then had them upgrade the overcurrent protection first to 8-amps then to 16-amps and the units seemed to operate reliably without tripping the overcurrent protection.
- The temperature sensors in the battery packs reads in the mid point of the cell packs and in their opinion, the sensors might not read the highest temps that the cells are experiencing on the ends possibly leading to damaged cells.

Representative from the certification body

- Freewire chargers were originally certified by the certification body (MET Labs) for a specific model configuration and component set, based on a formal certification report that identified critical components (e.g., breakers, power supplies, protective devices) and their approved ratings.

Incident Summary #II-1998184-2025 (#59269) (FINAL)

	• Any changes to critical components (especially overcurrent protection, power electronics, insulation, or safety related parts) require prior approval from the certification body and may require partial or full retesting. • Certification markings are only valid if the product matches the certified design and model number. • Installed Freewire units did not match the model numbers listed in the certification report. • Upsizing breakers without approval is never permitted, as components are only evaluated and approved for specific overcurrent protection limits. • Freewire did not notify the certification body of these changes, meaning the products in the field no longer reflected the certified design.
Causes and contributing factors	It's possible that water was able to enter the charging units while they were stored damaging the battery packs and electrical connections which started a fire and thermal runaway in the charger while it was not connected to the electrical grid. Contributing factors to the incident include. • The disconnection, removal, transportation and storage of the chargers while maintaining an almost full charge in the battery packs allowed for enough stored electricity to create a thermal runaway and fire. • The storage of the chargers not connected to the grid or remote communications and without active monitoring and BMS did not allow for the control of the battery packs within a safe temperature range or the ability to issue alerts if set safety parameters were exceeded. • The stopping of routine maintenance and inspection of the chargers after they were disconnected, prevented identification of any possible issues with weatherproofing integrity and water ingress.

Image 1 – EV Charger on fire surrounded by other chargers in a storage yard.

Image 2 – EV charger lithium-ion battery off gassing after flame extinguished by the fire department.

Image 3 – EV charger destroyed by fire next to another charger damaged by the fire.

Image 4 – Damaged EV charger after fire extinguished.

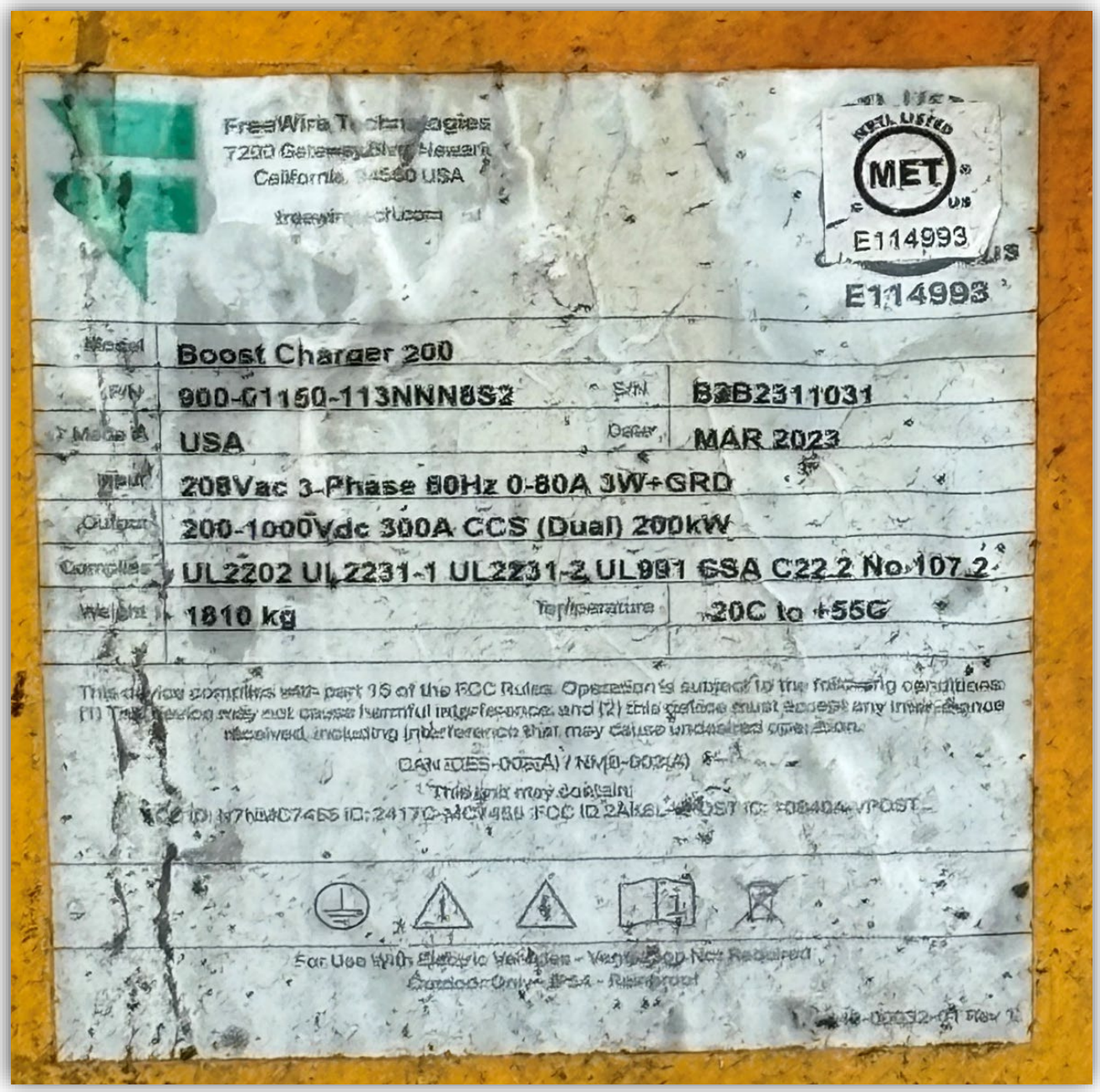

Image 5 – Data tag for EV charger that caught fire.

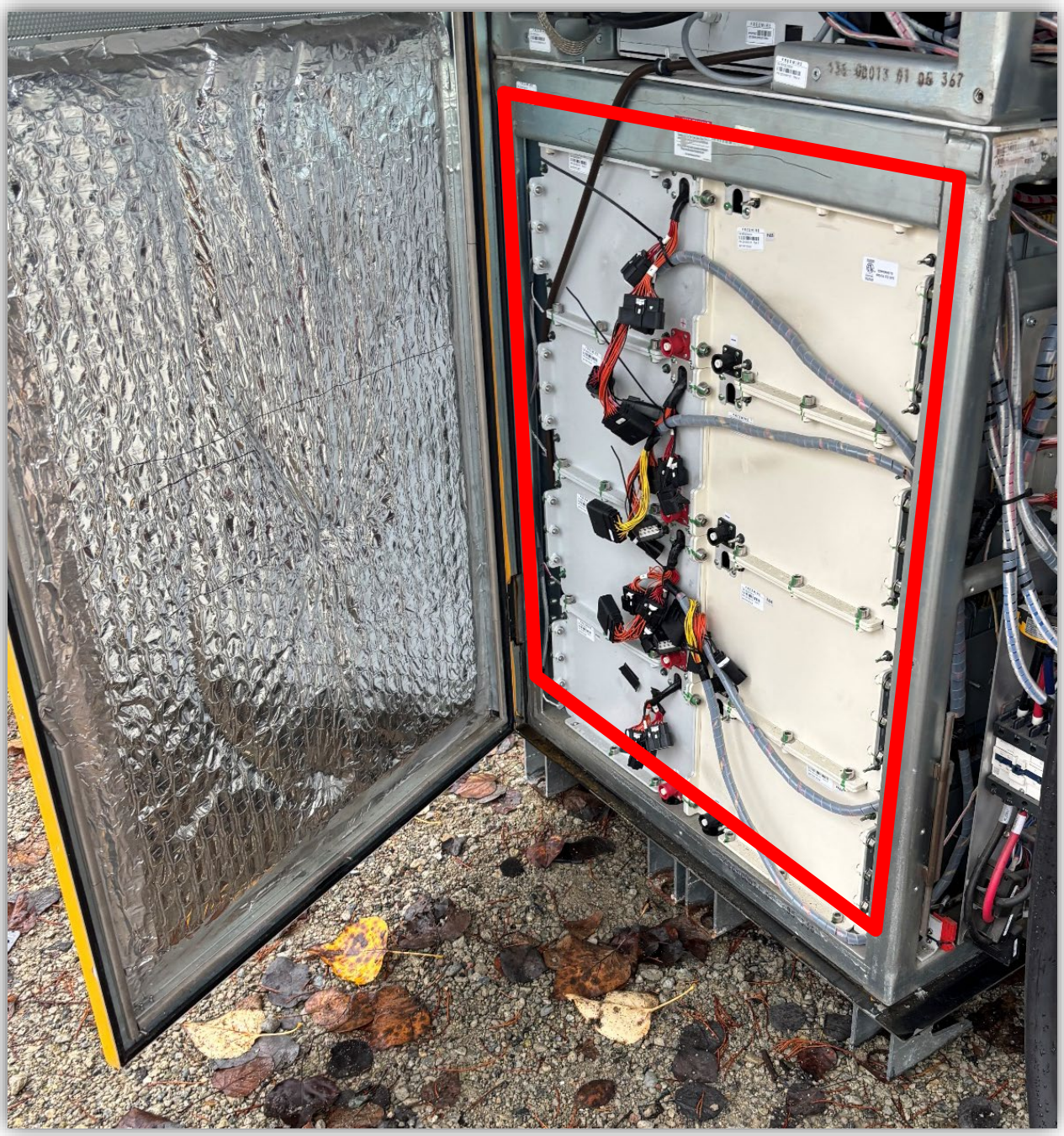

Image 6 – Example of a similar lithium-ion battery pack from another charger on site that was not damaged in the fire.