

## Incident Summary #II-1664306-2024 (#43678) (FINAL)

SUPPORTING INFORMATION	Incident Date	January 14, 2024	
	Location	Chilliwack	
	Regulated industry sector	Electrical - Low voltage electrical system (30V to 1000V)	
	Impact	Qty injuries	0
		Injury description	N/A
		Injury rating	None
	Damage	Damage description	The main residential combination panel and connected branch circuit wiring within approximately 1m of the panel were damaged by heat and fire beyond repair.
		Damage rating	Major
	Incident rating	Major	
	Incident overview	In the main residential combination panel, the main point of mechanical interconnection between the load side of the main circuit breaker and the panel bussing failed. This point of failure created electrical arcing, which caused heat and ignition of the surrounding combustible components of the electrical panel into a fire.	
INVESTIGATION CONCLUSIONS	Site, system and components	<p>A typical electrical combination panel found in most residential dwellings consists of a single metal enclosure consisting of two sections separated by a metal divider. The smaller section contains a main circuit breaker whose function is to disconnect or interrupt the flow of electricity to the distribution section located on the other side of the metal divider. This distribution section consists of a shared metal bussing which to it are connected individual circuit breakers. Individual branch circuits for the dwelling are entered into this section of the electrical combination panel and terminated to the associated equipment.</p> <p>The mechanical point of interconnection of the two sections is where the load side of the main circuit breaker is physically connected to the metal bussing, typically by screws or tabs dependant on the manufacturer design. The latter was the design used in this installation.</p>	
	Failure scenario(s)	<p>The electrical combination panel that was installed at the time of the incident was manufactured by Federal Pacific Electric (FPE). Examination of the panel after the incident identified that the origin of the fire was located at the mechanical point of interconnection between the load side of the main circuit breaker and the metal bussing by observing the discoloration of the metal enclosure directly behind the interconnection and the subsequent damage of the internal component expanding outward from that location. As the interconnection is static with no moving components, two possible failure scenarios are possible leading to the same outcome.</p> <p>Either the main circuit breaker was not secured to the metal bussing as per manufacturers specifications causing the failure or that the location experienced long-term degradation of the point of interconnection creating air gaps which created electrical arcing between components generating heat which eventually led to its failure.</p>	

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	<p>Inspection of the existing branch circuit wiring of the dwelling did not indicate the possibility of overloading of the 100a service size.</p>
<p>Facts and evidence</p>	<ul style="list-style-type: none"> <li>• There was no identified event prior to the fire indicating an external variable or mechanical failure of the electrical equipment.</li> <li>• Inspection of the damaged electrical combination panel and associated components clearly indicated the origin location of the fire within the panel directly behind the point of interconnection of the main circuit breaker and metal bussing.</li> <li>• Examination of existing branch circuits ruled out the possibility of the overloading of the ratings of the installed electrical equipment.</li> <li>• Examination of the main service breaker shows the plastic external housing largely intact with the primary damage to the load side interconnection tabs.</li> </ul>
<p>Causes and contributing factors</p>	<p>It is certain as to the origin location of the fire based on observable evidence identified in this report.</p> <p>It is very likely that either scenario presented could have caused the fire but damage to the evidence prevented a definitive conclusion as to the exact cause of the failure of the regulated electrical equipment.</p>



Image 1 – Main electrical panel within dwelling showing damage to panel and connected electrical equipment.



Image 2 - Close up image of Federal Pacific Electric (FPE) main combination panel.



Image 3 - Close up image of electrical main combination panel metal enclosure located directly behind where main circuit breaker and metal bussing mechanically interconnect.



Image 4 - Close up image of load side of main circuit breaker showing tab design of connection and damage to the tabs. Condition of circuit breaker plastic enclosure also shown.