

Incident Summary #II-1516573-2023 (#32891) (FINAL)

SUPPORTING INFORMATION	Incident Date	March 2, 2023	
	Location	Osoyoos	
	Regulated industry sector	Electrical - Low voltage electrical system (30V to 750V)	
	Impact	Qty injuries	0
		Injury description	N/A
		Injury rating	None
	Damage	Damage description	Electrical bus bars melted and burned where the fault occurred. Circuit breakers were wetted.
		Damage rating	Moderate
	Incident rating	Moderate	
	Incident overview	Pressure washing above dry type electrical panels results in water entering live electrical equipment causing a fault to occur.	
INVESTIGATION CONCLUSIONS	Site, system and components	<ul style="list-style-type: none"> • Electrical panels and equipment are available with different ratings depending on the environment they are installed in and if those locations are dry/wet/damp/dusty. • Electrical wiring methods and devices used to connect the electrical equipment are designed for use in various designated locations. • Qualified individuals select and install electrical equipment based on the area designation. • Designation type 1 electrical equipment is designed for a standard indoor dry location. • Designation type 3R electrical equipment is designed for outdoor and wet locations where the equipment may see water in forms of splashing and rain. • When the area has been assigned a designation, appropriate electrical equipment and wiring methods are selected and installed for the environment they are located in. 	
	Failure scenario(s)	<p>During a shut down at a plant, maintenance and custodial staff were cleaning equipment throughout the facility.</p> <p>One worker who was working with a pressure washer noticed some cobwebs on the ceiling directly above the energized 600-volt electrical equipment. This worker removed the cobwebs by spraying ceiling and cobwebs down with water.</p> <p>For approximately the next hour excess water on the ceiling continued to follow the wiring above the energized electrical panel which then entered the panel through the dry location type connectors. The water pooled on the top of the energized main breaker in the panel and eventually caused a phase-to-phase fault between the live electrical bus within the panel.</p> <p>When this phase-to-phase fault happened, the 200-amp rated main breaker in the electrical panel tripped into the open position which de-energized the electrical bus stopping the fault from continuing.</p>	

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Facts and evidence	<p>All electrical equipment and wiring methods located in this area were rated for type 1 designation and were not designed to seal out water.</p> <p>A maintenance worker with less than three months on the job in this facility was spraying water above the electrical equipment to clean the ceiling above.</p> <p>The damage to the electrical equipment shows obvious signs of a phase-to-phase fault as seen by the melting and charring of the electrical bussing.</p> <p>Water marks were evident on the electrical equipment.</p> <p>Various cables enter the top of the electrical equipment in this area providing a path for water to follow into the electrical panels.</p>
Causes and contributing factors	<p>It is likely that the excess water sprayed on the ceiling above the electrical panel was able to flow down the cables, entering the electrical panel through the connectors that are designed to be installed in dry location only. The water pooling on a breaker within a live electrical panel eventually contact multiple energized electrical busses causing a direct phase to phase fault.</p> <p>A key contributing factor is likely that the person who sprayed the water was unfamiliar with this electrical equipment and was unaware the electrical equipment was designated for dry locations only.</p>

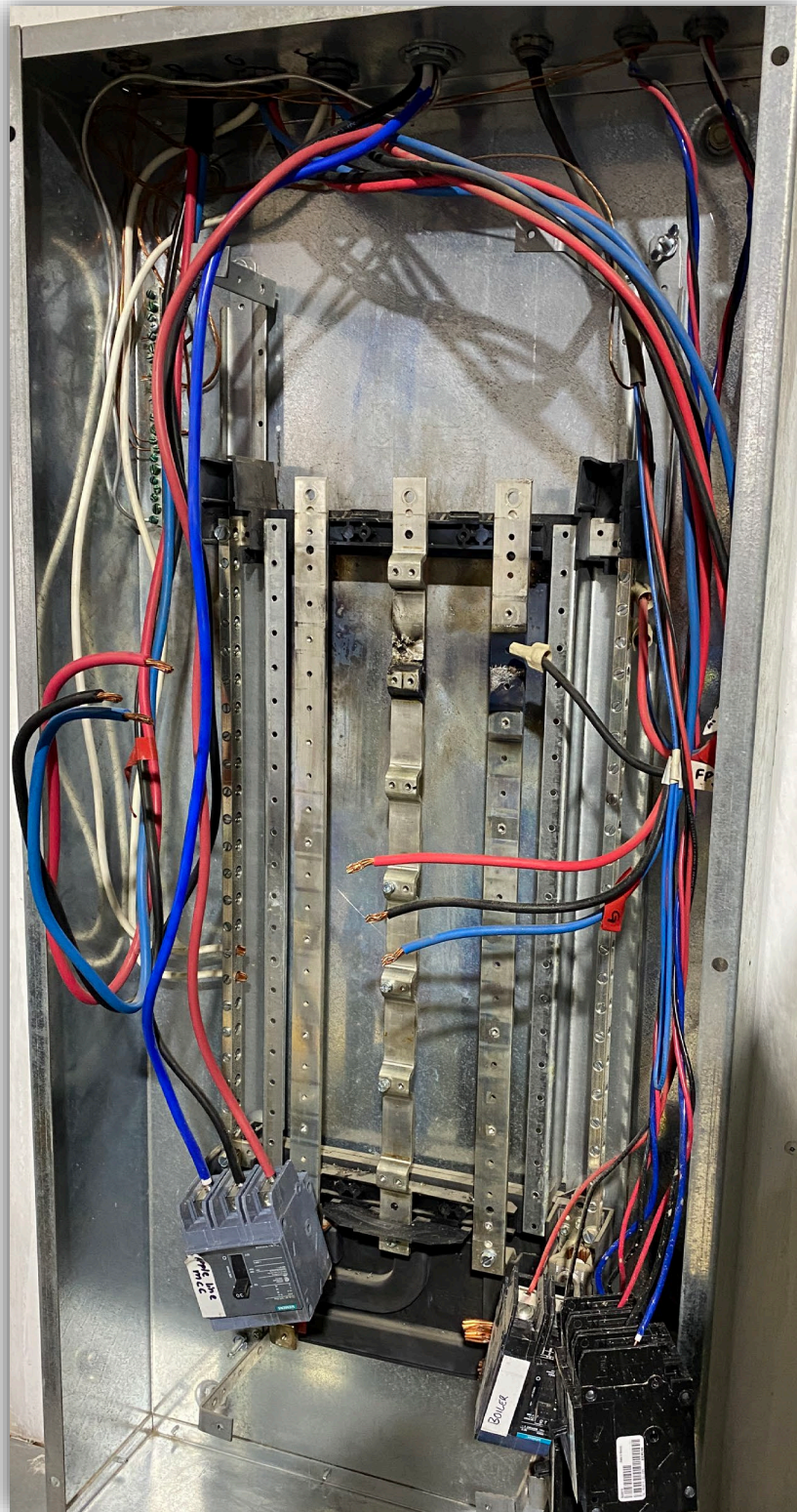


Image 1 - Electrical panel where fault occurred with all components removed.



Image 2 - Bus bars of electrical panel showing charring and melting of electrical bus.



Image 3 - Cover of electrical panel showing signs of charring on panel at location of the fault.

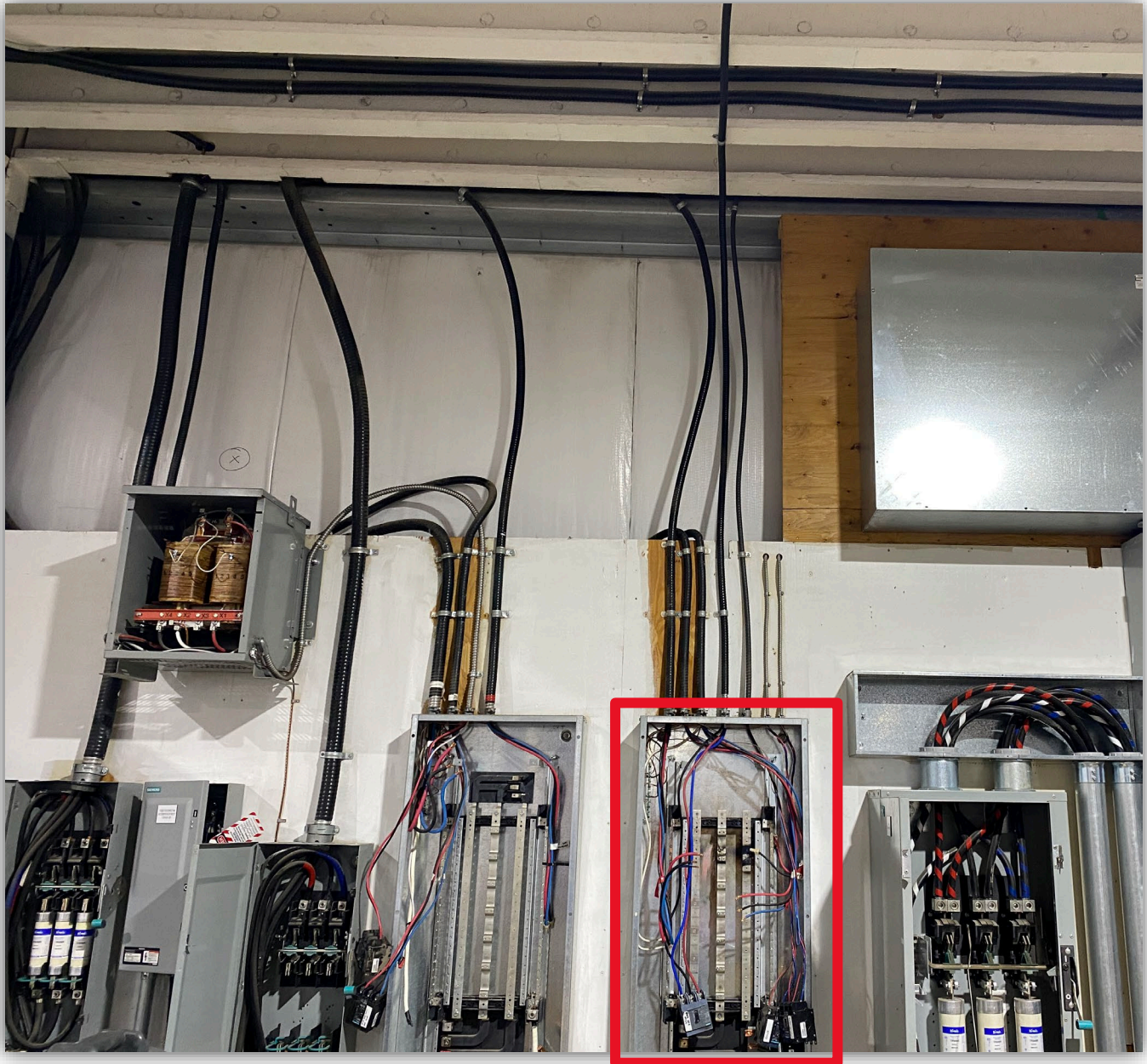


Image 4 - Electrical equipment and wetted ceiling area that was being washed. 600-volt electrical panel effected. All covers removed to allow for visual inspection of the electrical equipment after the incident occurred. In some panels circuit breakers were removed and replaced due to being wetted.



Image 5 - Main breaker that was previously installed in the electrical panel where the fault occurred. A light brown colour can be seen in this area where the fault occurred.