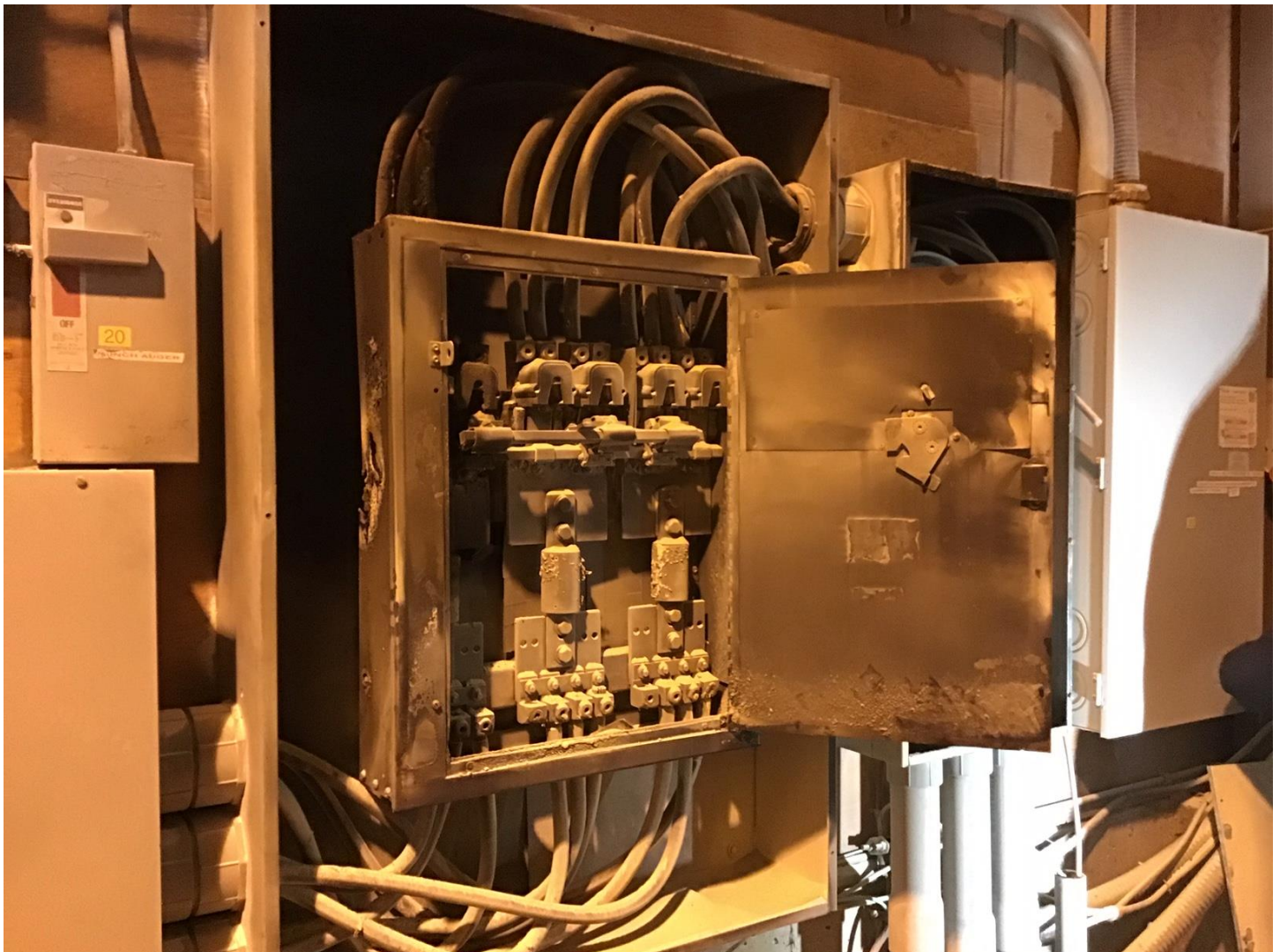


## Incident Summary #II-777672-2018 (#9805) (FINAL)

SUPPORTING INFORMATION	Incident Date	November 17, 2018	
	Location	Trail, BC	
	Regulated industry sector	Electrical - Low voltage electrical system (30V to 750V)	
	Impact	Qty injuries	0
		Injury description	None
		Injury rating	None
	Damage	Damage description	A 1200A 600V 3PH main fused disconnect, service conductors and adjacent subdistribution equipment sustained damage resulting from an arc blast from a fault to ground inside the main fused disconnect enclosure.
		Damage rating	Moderate
	Incident rating	Moderate	
Incident overview	A short circuit to ground between an ungrounded service conductor and the service equipment enclosure resulted in a sustained arc blast and arcing fault eventually damaging internal components, perforating the metal enclosure, damaging adjacent subdistribution equipment and igniting service conductor insulation. The arcing was sustained because the short circuit fault occurred on the 'line' side of the 1200A main fuses; the arcing continued until the fault current reached a value that opened the current limiting fuses in the primary section of the supply authority owned 1Mva transformer		
INVESTIGATION CONCLUSIONS	Site, system and components	Under normal operating conditions, the energized internal components of a fused disconnecting means are insulated from each other and from the bonded-to-ground equipment enclosure with both di-electric insulating material and an engineered air space eliminating the potential for any short circuit fault condition.	
	Failure scenario(s)	The damaged main fused disconnecting means is located in an area subject to airborne conductive dusts created by the grinding and crushing process of a battery recycling facility. Over time, conductive dusts accumulated on components installed inside the main fused disconnect. Eventually the accumulations reached a level where a conductive path was created between one line service conductor termination and the bonded-to-ground enclosure; effectively by-passing the insulating materials designed to prevent such a condition.	
	Facts and evidence	<p>Observations by the safety officer confirmed that regulated equipment had failed and contributed to the incident on site: an electrical arc blast between an ungrounded main service conductor termination and the metallic main service enclosure. Photographs of the damaged equipment and statements from the operations staff production managers were obtained by the safety officer.</p> <p>Observations by the safety officer and FSR revealed that the clearance between the main service switch conductor terminations and the service switch enclosure where the incident occurred is approximately 5mm. Additionally, it appears that the main switch conductor termination equipment had been modified: mechanical terminations added to the original equipment resulting in reduced clearance between energized equipment and equipment enclosure. General observations and survey of</p>	

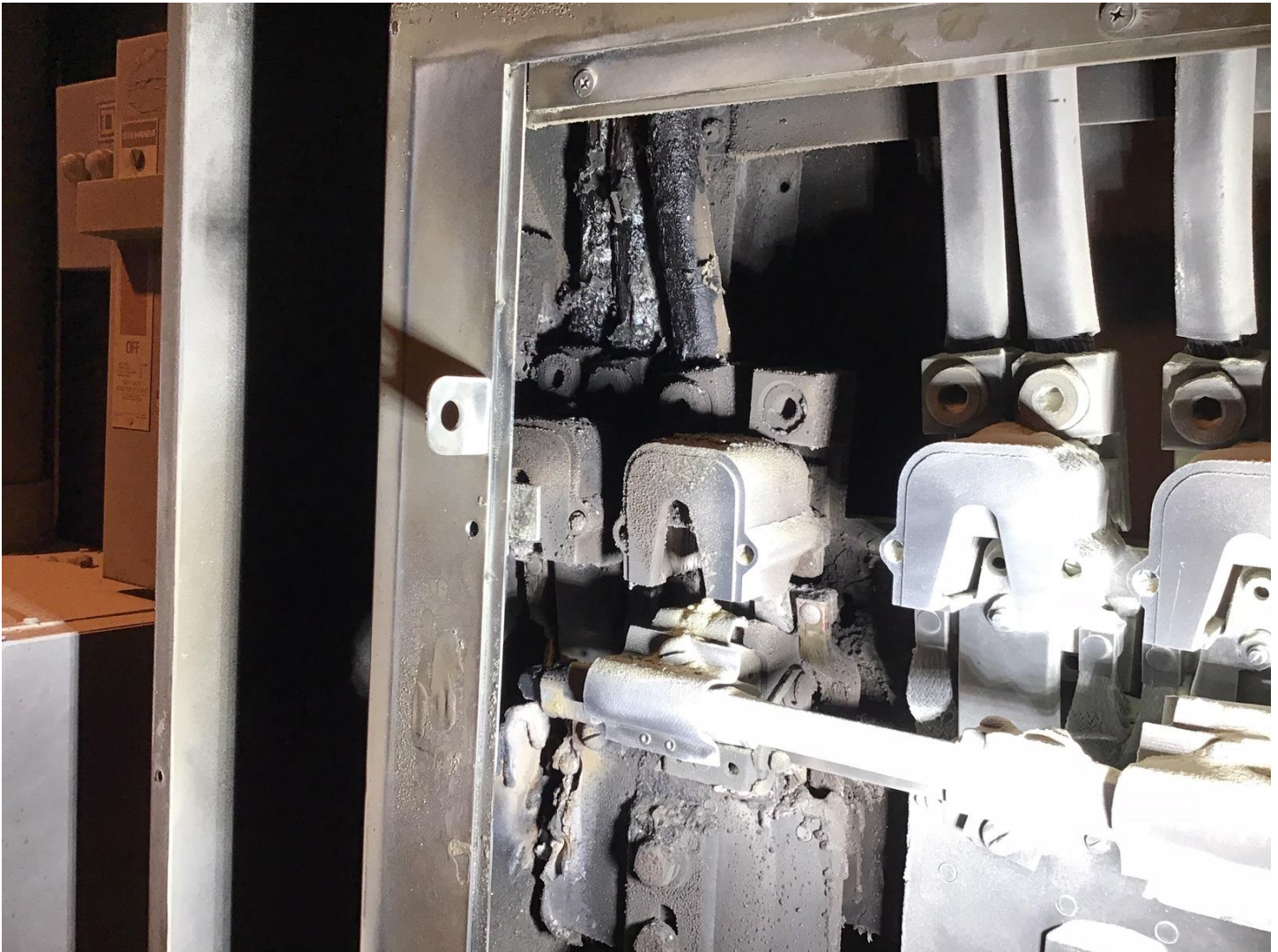
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	<p>the interior of the recycling facility revealed an elevated level of dust and debris; a result of the battery recycling process and lack of cleaning. Dust accumulations contain plastics and conductive materials (lead, aluminum, copper). The main electric service switch enclosure is rated as Type 1; enclosure rating does not require gaskets or sealing. Over time, process dusts had entered and settled inside the main service switch enclosure. The dust accumulations were not noted and had not been evacuated or cleaned out.</p>
<b>Causes and contributing factors</b>	<p>All evidence and observations conclude that the conductive metallic dusts created an unintended circuit between the main switch conductor termination and the bonded-to-ground enclosure.</p>





## 1200A 600V main service disconnect



'A' phase service conductor termination on left in photo: area of short circuit to ground; clearance between 'A' phase termination and equipment enclosure is less than 5mm; conductive debris accumulated between the termination and enclosure creating an unintended circuit to ground.



External damage, enclosure perforation