Incident Summary #II-1605845-2023 (#39097) (FINAL)

SUPPORTING INFORMATION	Incident Date		September 16, 2023
	Location		Rock Creek
	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	Feeder cable conductor insulation melted and discolored; cable exterior sheath discolored.
		Damage rating	Minor
	Incident rating		Minor
	Incident overview		Insulation around a mechanical conductor splice abraded and deteriorated over time eventually contacting the metallic equipment enclosure and created a ground-fault to the bonded-to-ground enclosure.
INVESTIGATION CONCLUSIONS	Site, system and components		A public festival/rodeo venue is supplied with single phase 120/240 volt and three phase 120/208-volt energy from the area electric supply authority. The site features a common electrical room housing the service equipment. The venue structures receive energy via underground cable routes and are fitted with sub distribution panel boards. Electrical features at each structure are supplied from their respective panel boards by a combination of armoured and non-metallic sheathed cables.
	Failure scenario(s)		Insulation around a mechanical conductor splice housed in a sub distribution disconnect switch abraded and deteriorated over time (Image 1). The deteriorated insulation exposed the energized split-bolt terminal, and the split-bolt contacted the metallic switch enclosure and created a short-circuit to the bonded-to-ground enclosure (Image 2). The disconnect switch enclosure bonding was completed with unapproved equipment and in an unsafe wiring method (wood screws securing the bonding terminal) which resulted in a high impedance bonding circuit (Image 3). The high impedance bonding termination prevented the short circuit fault current from actuating the overcurrent protection. Instead, the short-circuit fault-current routed through an alternate, unintentional bonding path via a 10AWG non-metallic-sheathed cable. The 10AWG supply conductor and 12AWG bonding conductor sizes of the non-metallic-sheathed cable did not have a minimum ampacity rating to safely route the fault current to ground which resulted in a conductor overtemperature and insulation failure (Image 4 and Image 5).
	Facts and evidence		The failure scenario was determined from evidence obtained on site and from further research completed by the annual electrical operating permit Field Safety Representative.

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Causes and contributing factors	The use of unapproved bonding termination likely caused the incident when it was installed in an unsafe wiring method created the high impedance bonding termination that prevented the overcurrent protection from actuating when the short circuit occurred.

Image 1 – Deteriorated split-bolt insulation.

Image 2 - Split-bolt contact with equipment enclosure.

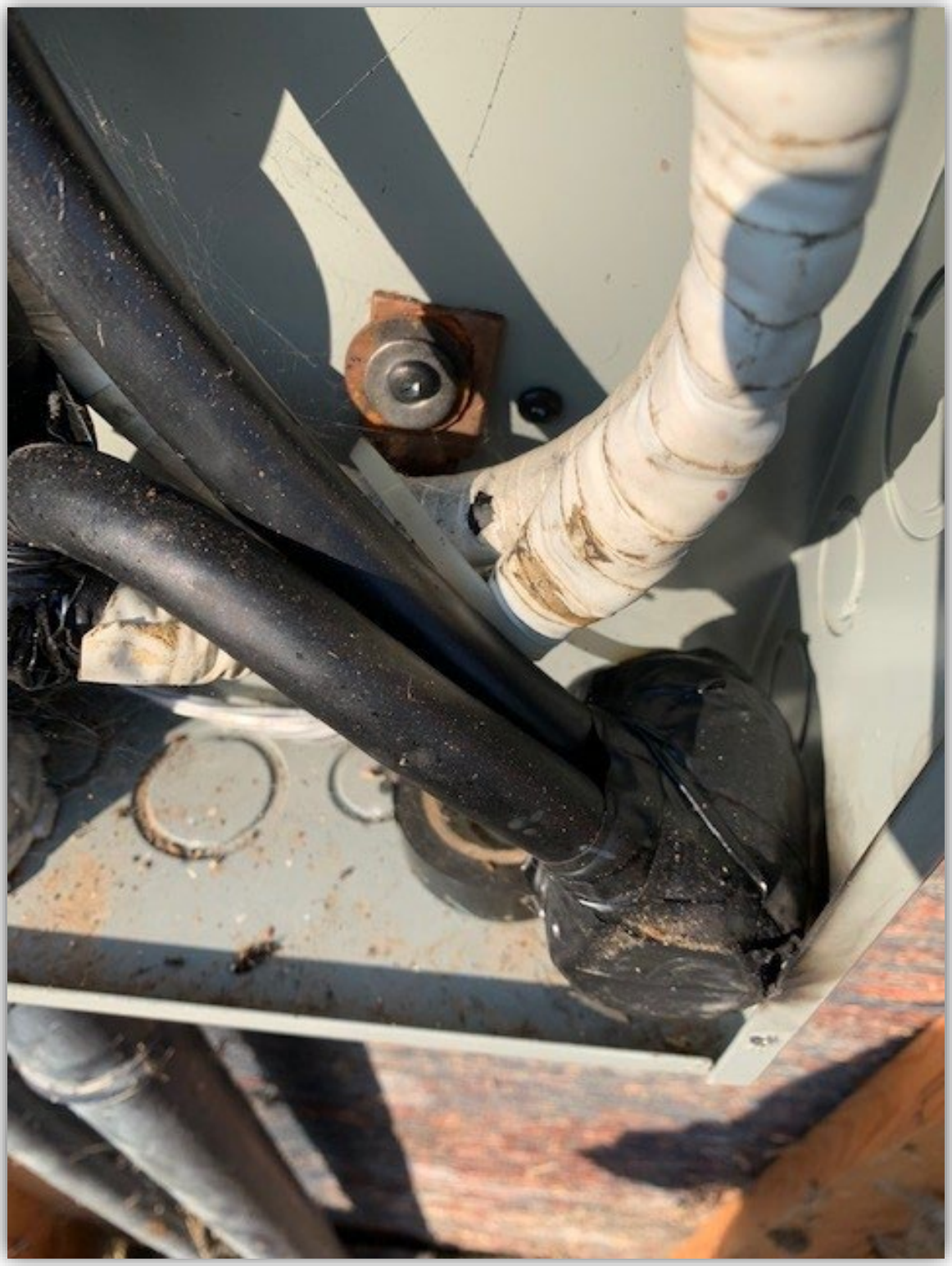

Image 3 - Unapproved equipment, unsafe wiring method, high impedance bonding termination.

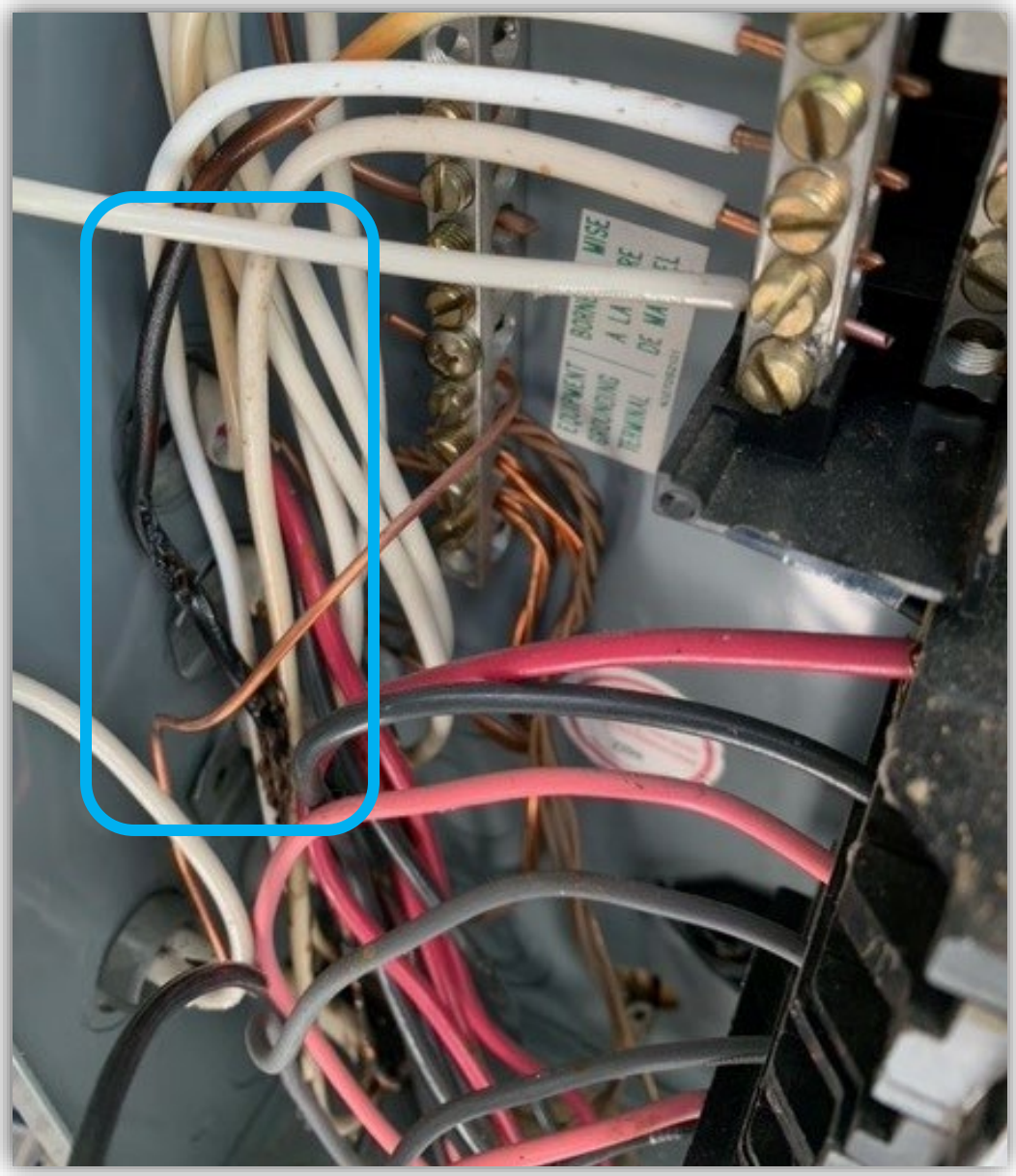

Image 4 – Overtemperature: Conductor insulation melting resulting from excessive current imposed on neutral conductor.

Image 5 – Overtemperature: Cable sheath discoloration resulting from excessive current imposed on neutral and bonding conductors.