

Incident Summary #II-1139526-2021 (#20647) (FINAL)

SUPPORTING INFORMATION	Incident Date	January 31, 2021	
	Location	Penticton, BC	
	Regulated industry sector	Gas - Natural gas system	
	Impact	Qty injuries	0
		Injury description	N/A
		Injury rating	None
	Damage	Damage description	Furnace and AC Coil, Total loss
		Damage rating	Moderate
	Incident rating	Moderate	
Incident overview	A furnace in a long-term care home was locking out on its high temperature safety. A decision was made to bypass the high limit safety. This allowed the furnace to overheat while in operation, causing the AC drip tray to ignite.		
INVESTIGATION CONCLUSIONS	Site, system and components	<p>Central heating furnaces are required to have a safety installed on them that shuts the appliance down if it begins to overheat, this is referred to as a high limit safety. When the high limit safety on a furnace, trips it causes the furnace burner to shut down, and allows the fan to keep running in an attempt to cool down the heat exchanger. After a high limit trips, it must be manually reset for the furnace to resume operation, and usually the running fan causes the space being heated by the furnace to cool down quite quickly.</p> <p>When Central heating furnace is equipped with air conditioning there is a drain pan located above the furnace heat exchanger. This pan is constructed of plastics which should withstand any heat generated by the furnace under normal operating conditions.</p>	
	Failure scenario(s)	<p>The furnace on site went off on high limit failure, causing the space occupied by the long-term residents to get cold. A service tech was called to site, they found and corrected an issue with the mounting bracket for the high limit safety. At this time the high limit safety was not changed, only the bracket was repaired. While on site the service tech confirmed the furnace was operating within parameters (in regard to, gas pressure, temperature rise, etc) and the furnace was run for 45 minutes.</p> <p>The next day the furnace once again shut down on high limit safety. Due to the checks performed the day before, the gas contractor determined that it may be a faulty high limit safety on the furnace. The gas contractor directed the maintenance person for the care home to bypass the high limit safety, as they could not get the part on a Sunday. The maintenance person (who was neither a certified gas fitter, nor a licensed gas contractor) bypassed the safety and restarted the appliance, then confirmed they had done so with the gas contractor.</p>	

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	<p>Shortly after the safety was bypassed, an unknown issue caused the furnace to overheat while it ran. Smoke began to emerge from the vents in the care home, and the building was evacuated. When the fire department attended, they found the smoke was coming from the air conditioning coil, on which all of the plastic parts had melted.</p>
<p>Facts and evidence</p>	<ul style="list-style-type: none"> -A statement from the gas contractor indicated that there were issues with the furnace high limit safety, and because the furnace appeared to be operating fine the day before; a decision was made to bypass the furnace high limit safety. -A statement from the Maintenance person indicated that they were directed by the gas contractor to bypass the high limit safety -After the incident occurred, the gas contractor removed the furnace and confirmed that the heat exchangers were intact, clear of debris, and free from damage. However due to the furnace being inoperable after the incident, it wasn't able to be run or tested. -An interview with a service tech who replaced the furnace after the incident confirmed that the duct work was clear, and the new furnace is operating within parameters.
<p>Causes and contributing factors</p>	<p>It is highly probable that the high limit safety being bypassed from the system, coupled with an unknown issue in the furnace caused the furnace to overheat while in operation, causing the air conditioning components to melt and ignite.</p>

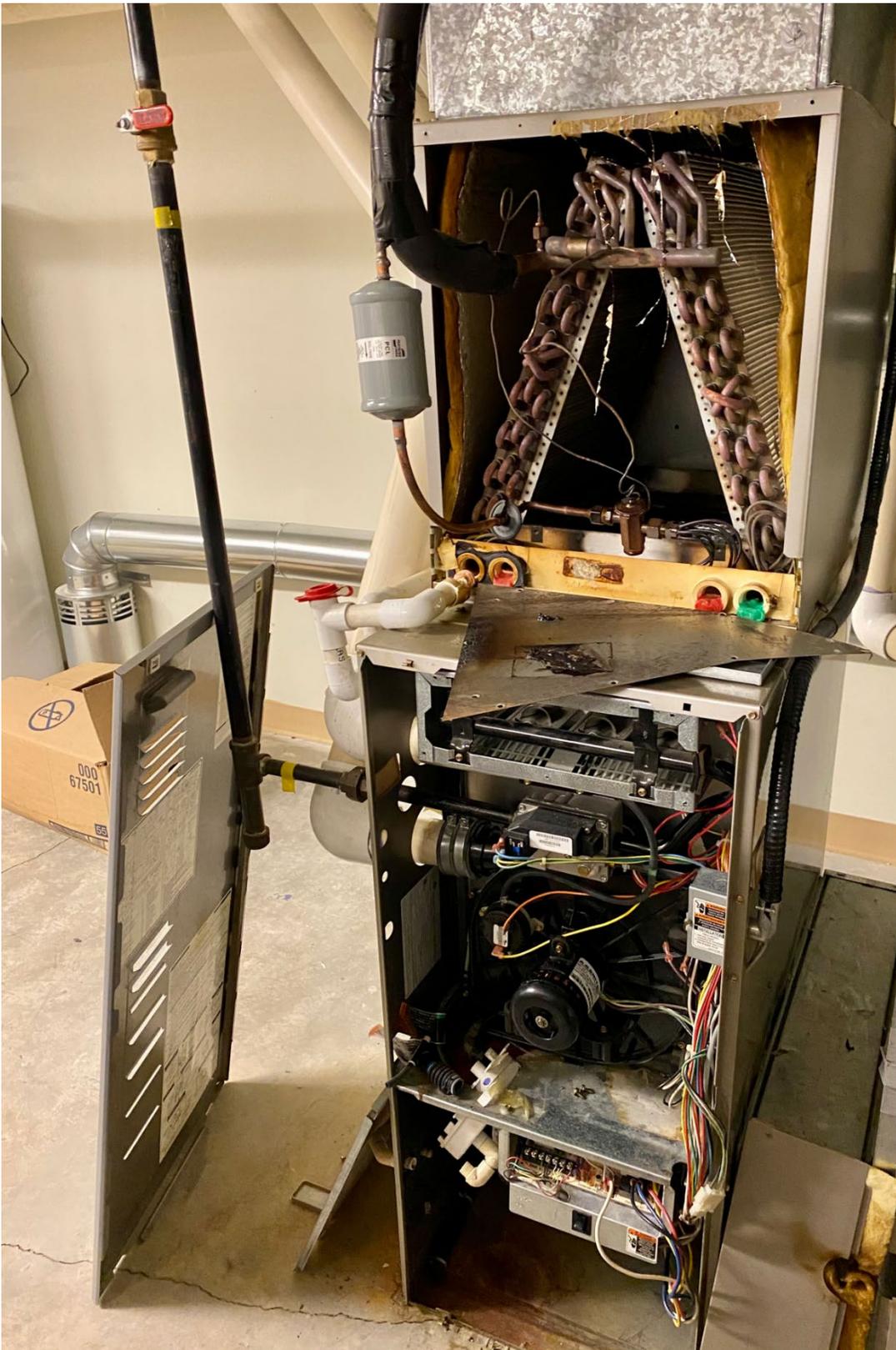


Image 1: Photo of the furnace as found by the safety officer at time of investigation

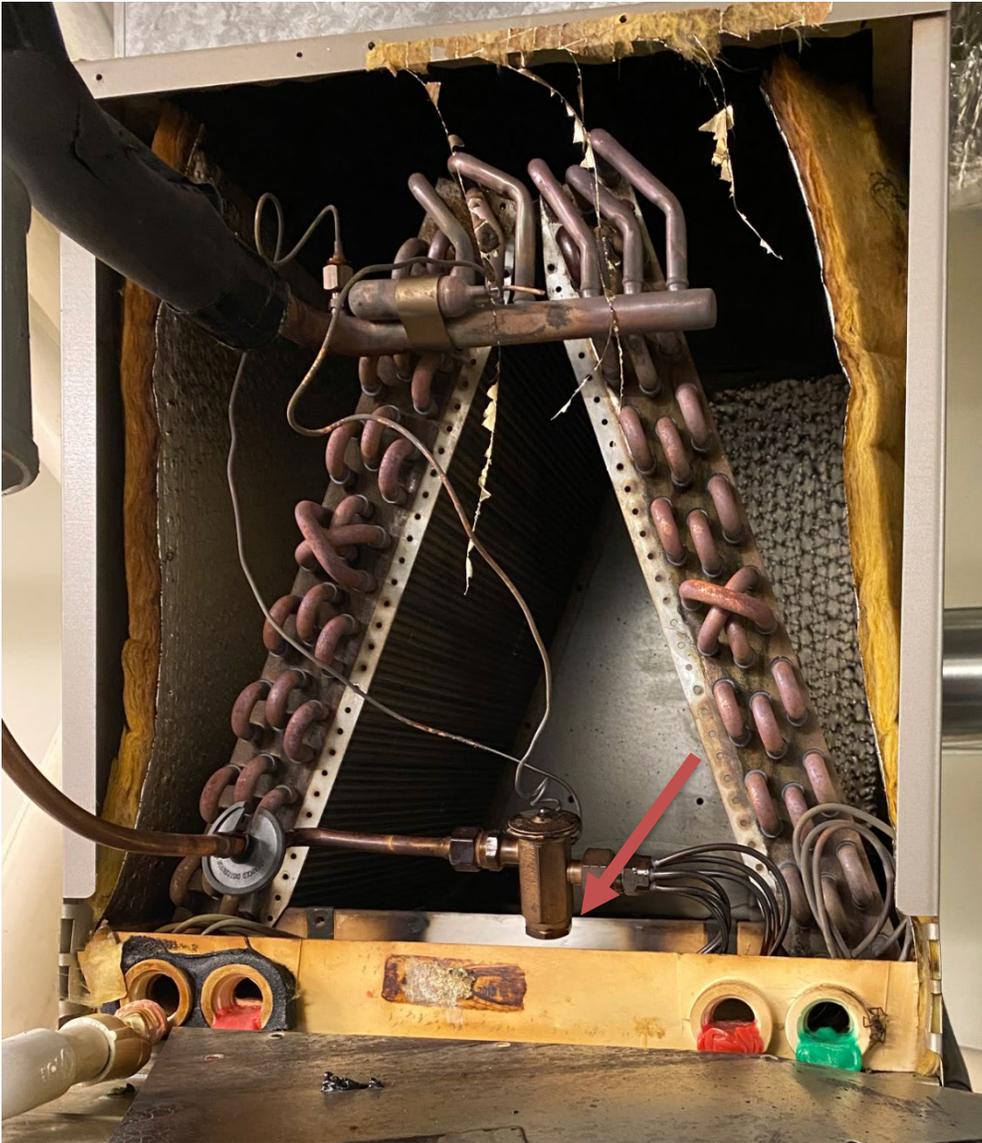


Image 2: Photo of the air conditioning coil, the red arrow shows the area of the drain pan which ignited.



Image 3: Close up of air conditioning coil after it was touched by the safety officer. The area indicated by the red arrow had been reduced to white ash in the incident.

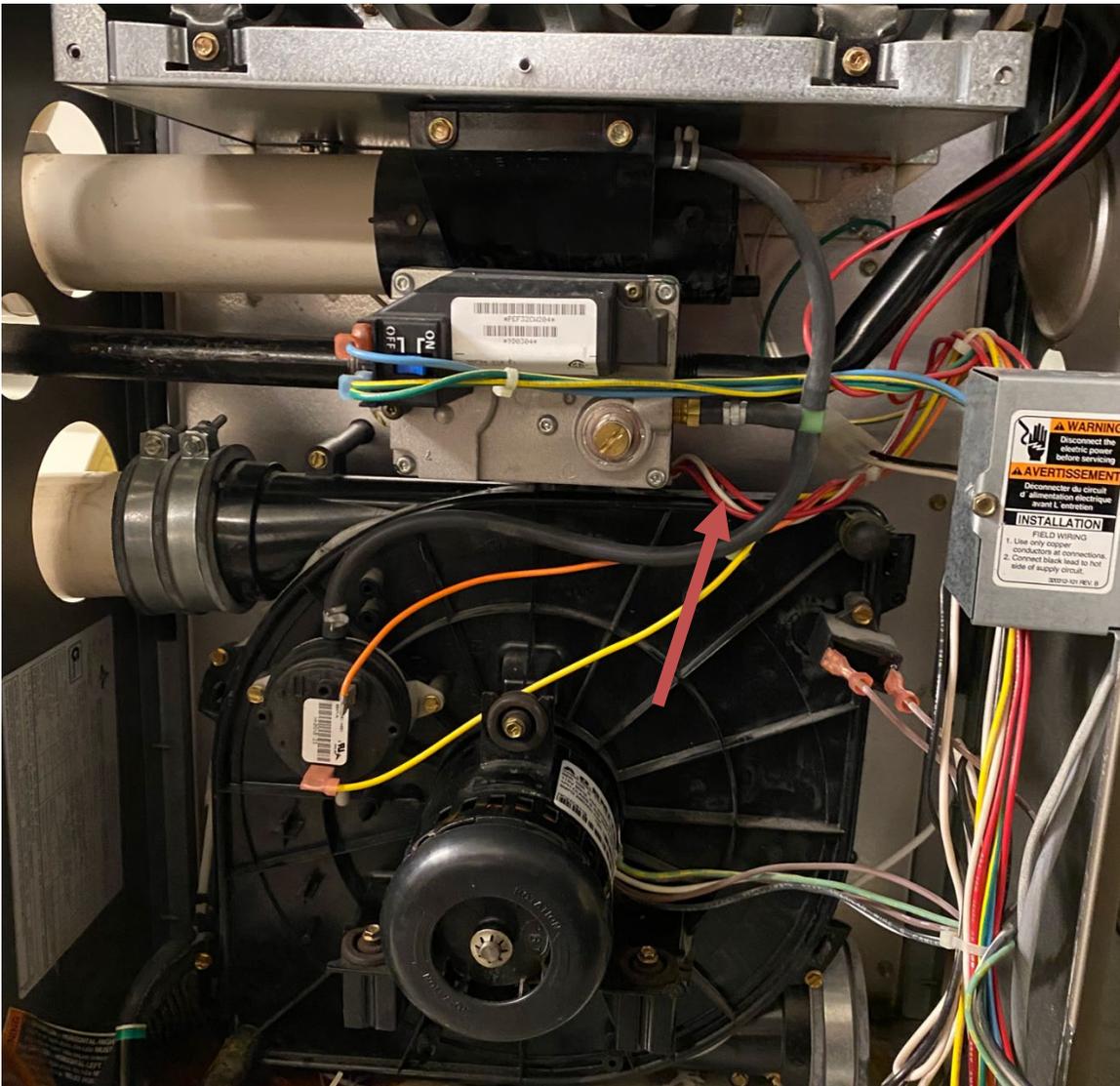


Image 4: Close up photo of the furnace venter assembly, the red arrow indicates the location of the wires for the high limit safety.

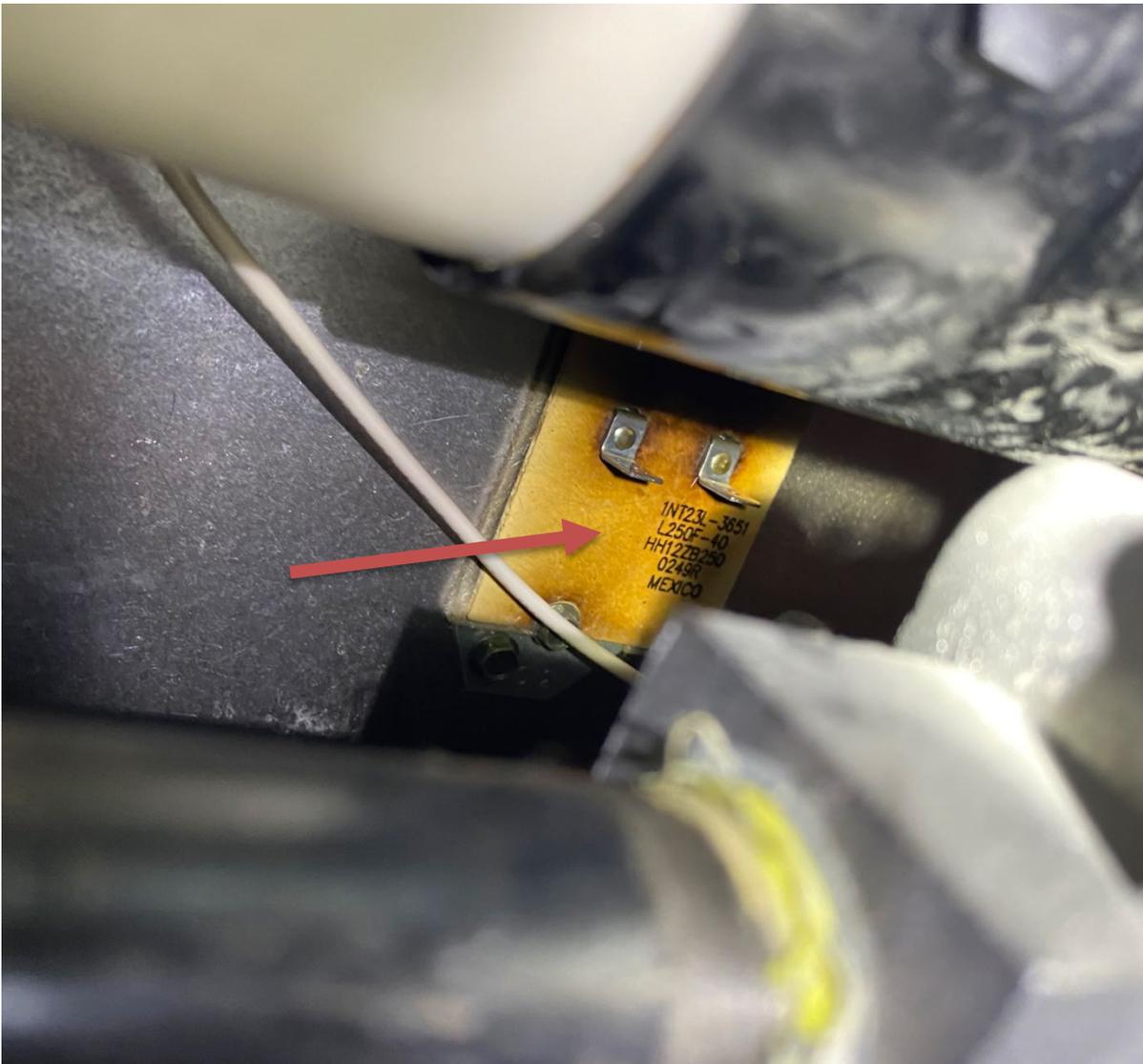


Image 5: Close up of the high limit safety. The wires had been removed, and the discoloration of the safety indicates that it was subjected to high temperatures.

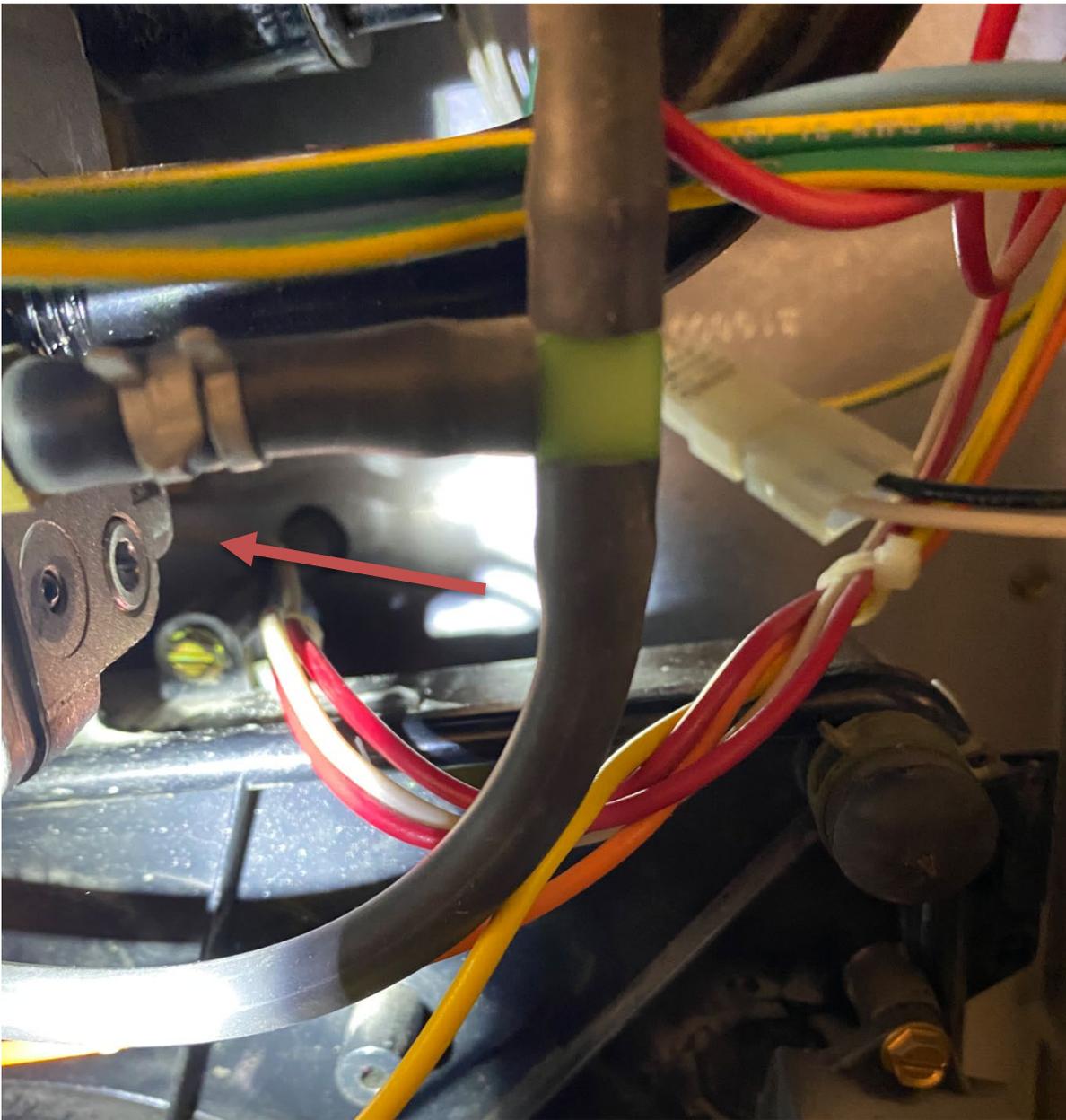


Image 6: Close up of the high limit safety wiring. The red arrow indicates where the bypassed high limit wiring was found.

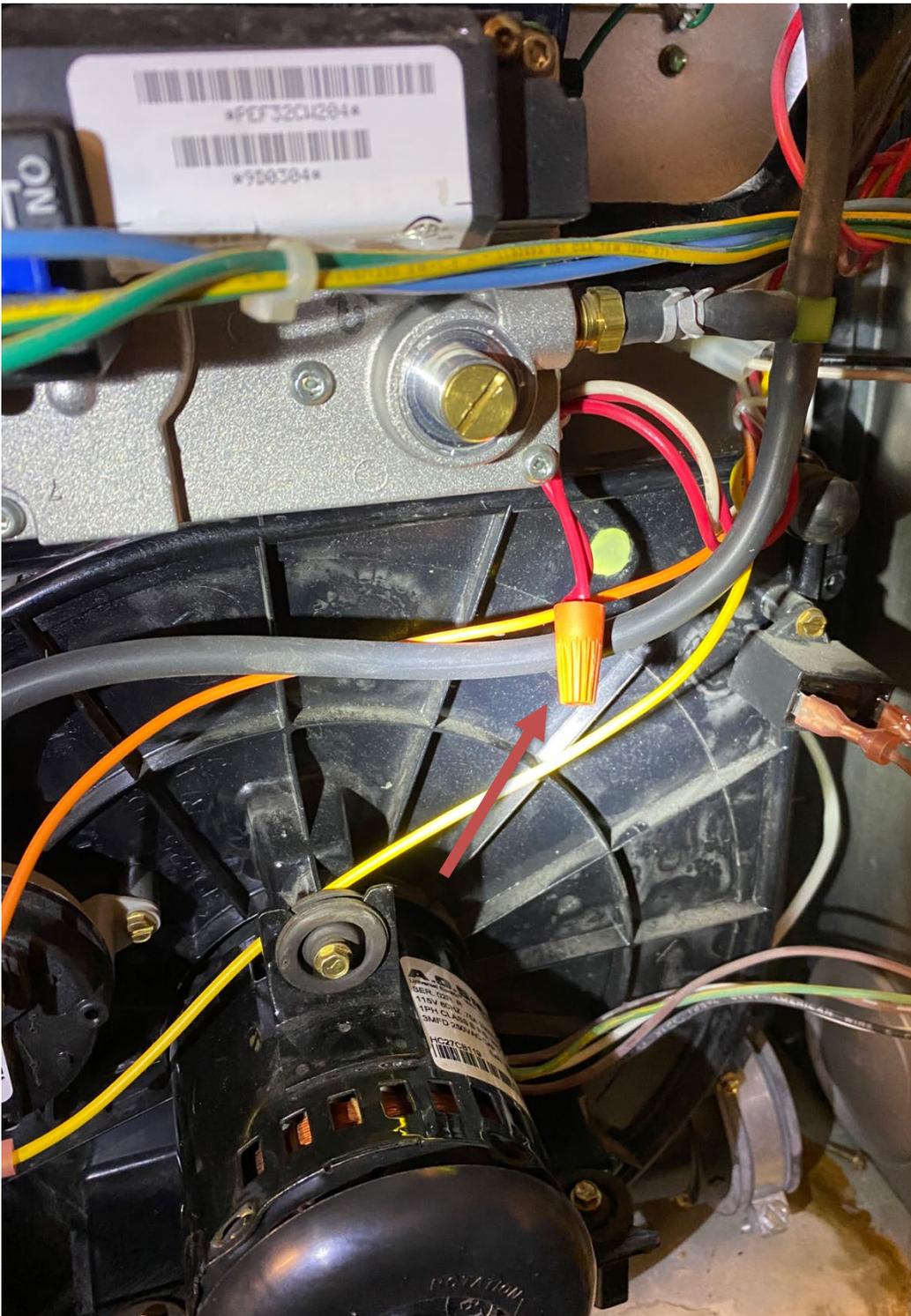


Image 7: The bypassed high limit safety wiring.