

Incident Summary #II-1622405-2023 (#40557) (FINAL)

SUPPORTING INFORMATION	Incident Date	October 21, 2023	
	Location	Fruitvale	
	Regulated industry sector	Electrical - Low voltage electrical system (30V to 1000V)	
	Impact	Qty injuries	0
		Injury description	N/A
	Damage	Injury rating	None
		Damage description	Fire, heat, smoke, and fire suppression damages to electrical and structural features in and around the area housing an air compressor located in a log de-barking section of a wood processing facility.
		Damage rating	Moderate
	Incident rating	Moderate	
Incident overview	A 150 horsepower, 3 phase, 480-volt air compressor suffered a bearing failure between the electric drive motor and the air compressing section. The volume of compressed air delivered demands an equipment cooling feature. The cooling feature employs cooling oil in a closed loop type piping system. The bearing failure resulted in cooling oil being introduced into the air tank and lines. The pressurized oil bypassed a backflow preventer on the air-cooling radiator/pressure regulator and sprayed into the surrounding atmosphere. An ignition source ignited the spraying atomized oil and created a local fire in and around the air compressor room.		
INVESTIGATION CONCLUSIONS	Site, system and components	A 150-horsepower air compressor is housed on the lower level of a log de-barking structure in a wood processing facility. The air compressor supplies compressed air to actuate and operate the multiple mechanical features required to de-bark logs. The size of the air compressor and volume of compressed air generates a substantial amount of heat at the compressor unit. The heated air compressor components are cooled to an acceptable temperature by closed loop oil cooling heat exchange system, driven by the air compressor. The air compressor prime mover is a 150 horsepower, 480 volts, 3 phase Totally Enclosed, Fan Cooled type motor. The air compressor operates continuously throughout the course of each wood processing facility day shift and afternoon shift; approximately sixteen hours per day.	
	Failure scenario(s)	The air compressor is coupled to the prime mover through a polymer coupling at the drive side bearing of the air compressor. During normal operation, the drive side bearing failed and began to seize. The polymer coupling separated allowing the electric motor to operate while the compressor slowed to stop. The closed loop oil cooling system is fitted with backflow preventor lobes which prevent hot oil from exiting the closed loop, however, the functionality of the backflow lobes is reliant on the operation of the air compressor. As the air compressor slowed, hot oil bypassed the backflow lobes and entered the compressed air tank, air compressor and air lines and blew out from the air-cooling radiator/pressure regulator into surrounding atmosphere as atomized oil under pressure. An unknown ignition source ignited the atomized oil.	

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Facts and evidence	The failure scenario description was paraphrased from the wood processing facility millwright while he performed an assessment and examination of the damaged air compressor.
Causes and contributing factors	The design of the system allowing the hot oil backflow preventer to be ineffective in the event of a drive coupling failure was likely the cause of the incident.



Image 1 - Air compressor location.



Image 2 - Air compressor manufacturer nameplate and approval certification mark.



Image 3 - Polymer coupling: couples the prime mover and air compressor.

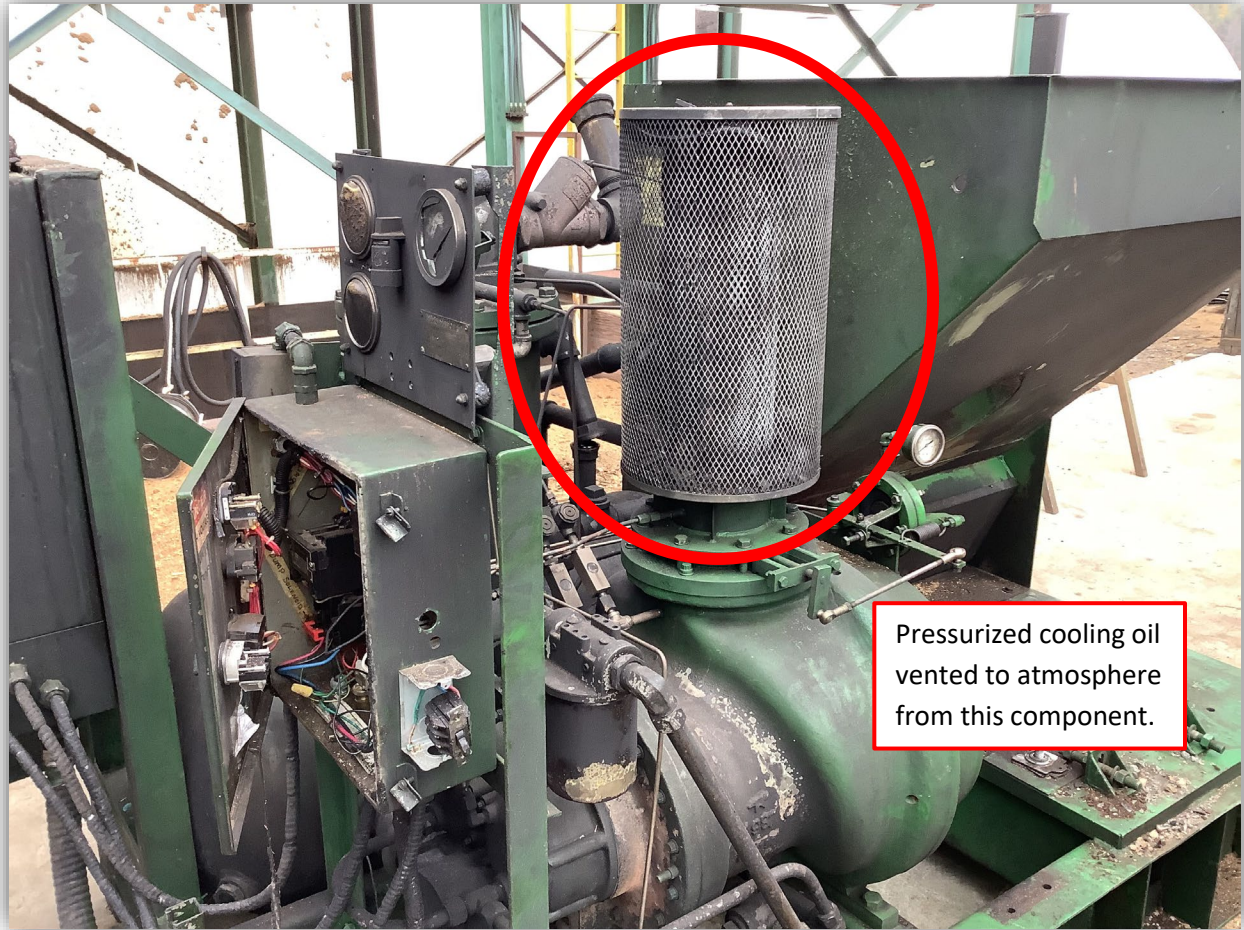


Image 4 - Air compressor and air-cooling radiator, pressure relief/regulator.



Image 5 - Air tank and cooling oil, heat exchange piping.