

Incident Summary #II-1347792-2022 (#26731) (FINAL)

SUPPORTING INFORMATION	Incident Date	March 22, 2022	
	Location	Port Coquitlam, BC	
	Regulated industry sector	Boilers, PV & refrigeration - Refrigeration system	
	Impact	Qty injuries	0
		Injury description	N/A
	Damage	Injury rating	None
		Damage description	Failure of shaft seal of oil transfer pump released ammonia vapour from the refrigeration system into machinery room
		Damage rating	Insignificant
	Incident rating	Insignificant	
Incident overview	There was a minor ammonia vapour leak from shaft seal, isolated to idle oil transfer pump.		
INVESTIGATION CONCLUSIONS	Site, system and components	<p>This relatively new ammonia refrigeration plant is equipped with a new oil transfer pump which transfers fresh refrigeration oil from a barrel to fill up the compressor oil separators to the operating oil level. However, the oil pump has been idle for a prolong period with the electrical power connection incomplete.</p> <p>Conversely, the associated piping system seems completed. One end of the oil distribution header is connected to the oil transfer pump discharge port while the other end is connected to an oil recovery vessel which is always under the ammonia vapour suction pressure at 28psi as per pressure gauge reading.</p> <p>The mechanical seal inside the oil pump is relatively dry and lack of oil lubrication to form a proper sealing. Therefore, ammonia vapor under pressure could easily escape through the tiny clearance between the stationary and rotating rings of the mechanical seal to the atmosphere into the machinery room.</p>	
	Failure scenario(s)	<p>March 22, 2022</p> <ol style="list-style-type: none"> 1) Around 12:30pm, shift engineer on duty took reading in the machinery room and noticed a mild ammonia smell. 2) The monitoring panel outside the room was flashing green and two ammonia gas detectors were showing below 10 parts per millions of ammonia concentration. 3) Shift engineer turned on emergency exhaust fan and attempted to locate the ammonia leak with litmus paper. Without any success, the shift engineer called in licensed refrigeration contractor for help. 	

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	<p>4) Around 2:00pm, licensed refrigeration contractor showed up. The ammonia leak from the shaft seal of the oil transfer pump was identified.</p> <p>5) The pump was isolated by shutting off the suction valve (#264) and discharge valve (#269). The pump remained mechanically depressurized.</p>
<p>Facts and evidence</p>	<ul style="list-style-type: none"> • Customer service report recommended to replace the shaft seal for the oil pump. • The oil pump was not isolated. It was idle for prolong period with the associated piping system under ammonia vapour suction pressure. • No Safe Operating Procedures for oil pump start-up and shut down were found. • No written training manual for the oil pump was provided to client's operating engineers.
<p>Causes and contributing factors</p>	<p>The new oil transfer pump with the associated piping system might have been left pressurized with ammonia vapour at suction pressure.</p> <p>It was likely that the new oil pump was never isolated from the pressurized piping system.</p> <p>It is possible that with Safe Operating Procedures for oil pump start-up and shut down, the leak from the shaft seal could have been prevented.</p>

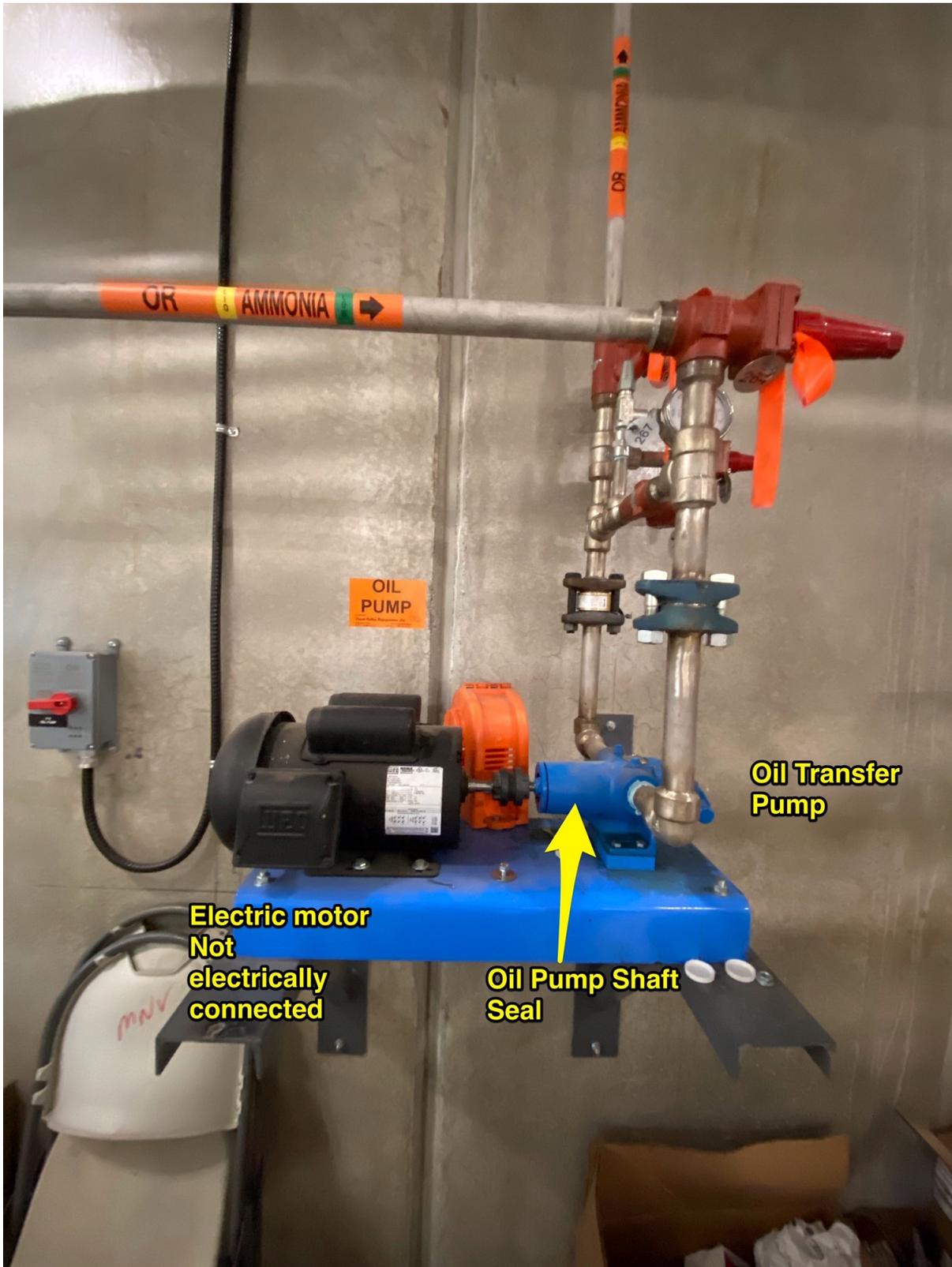


Image 1 - Oil Transfer Pump

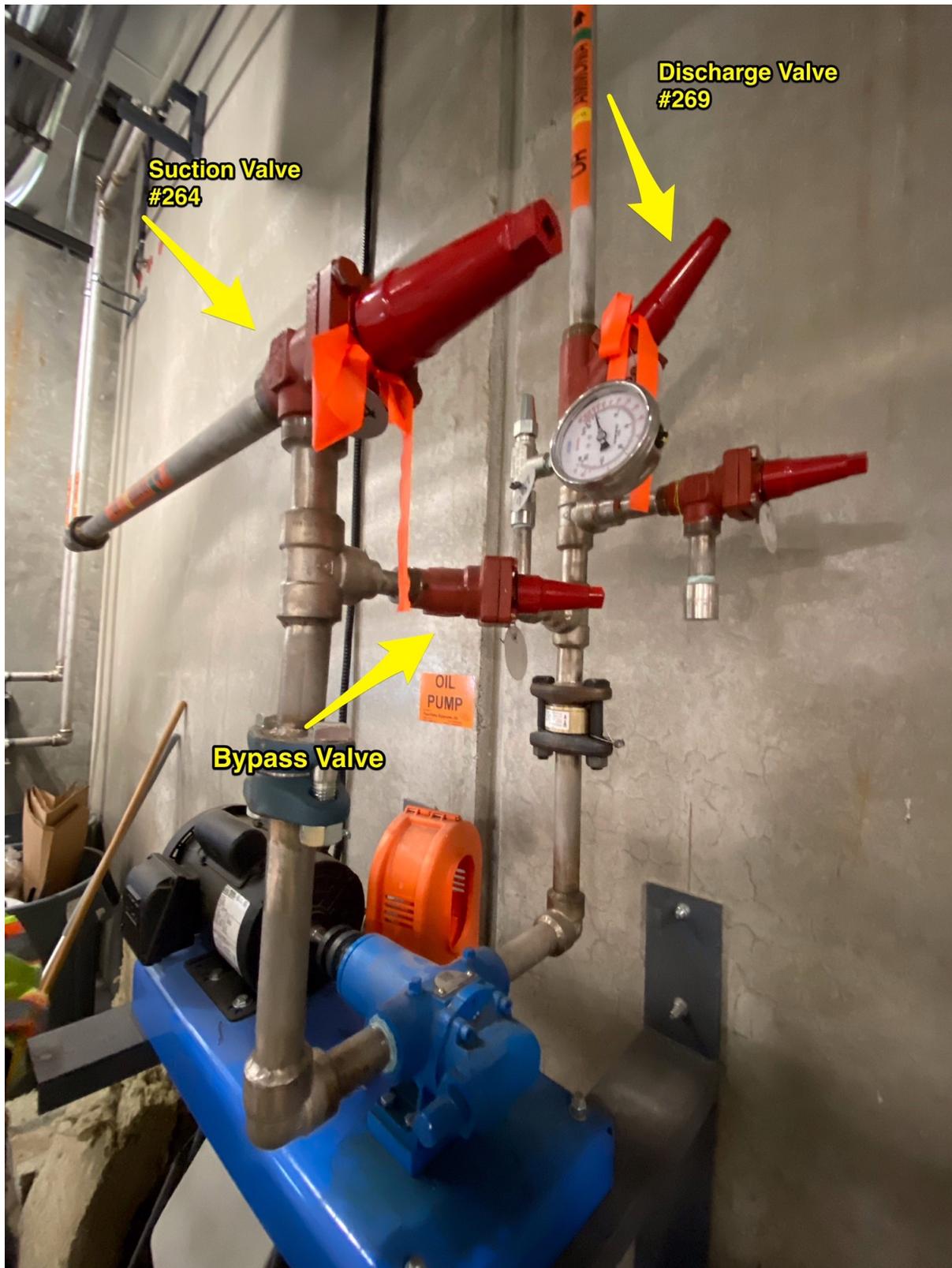


Image 2 - Oil Pump Valves Configuration

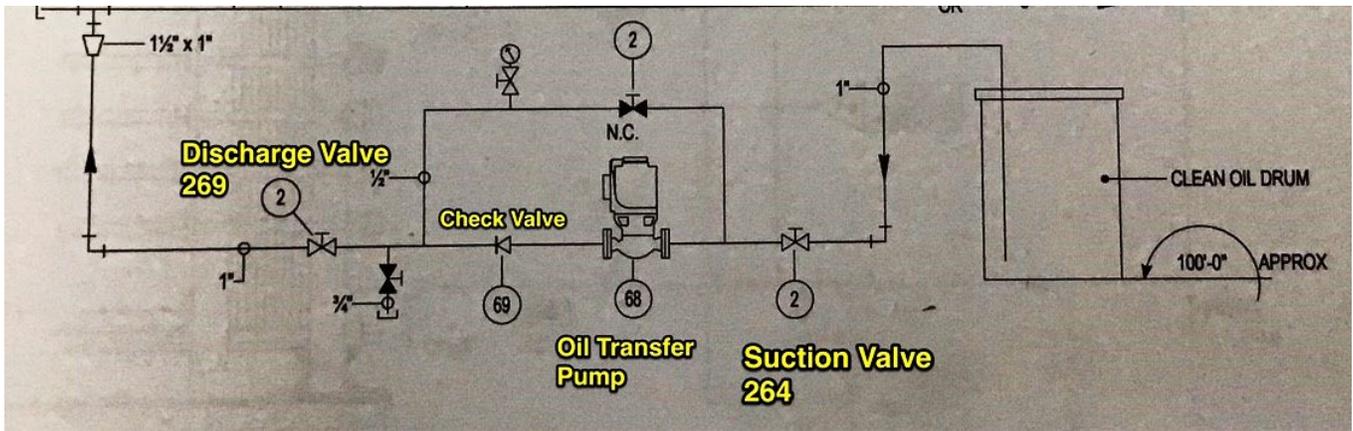


Image 3 - Oil Pump Piping and Instrumentation Diagram