

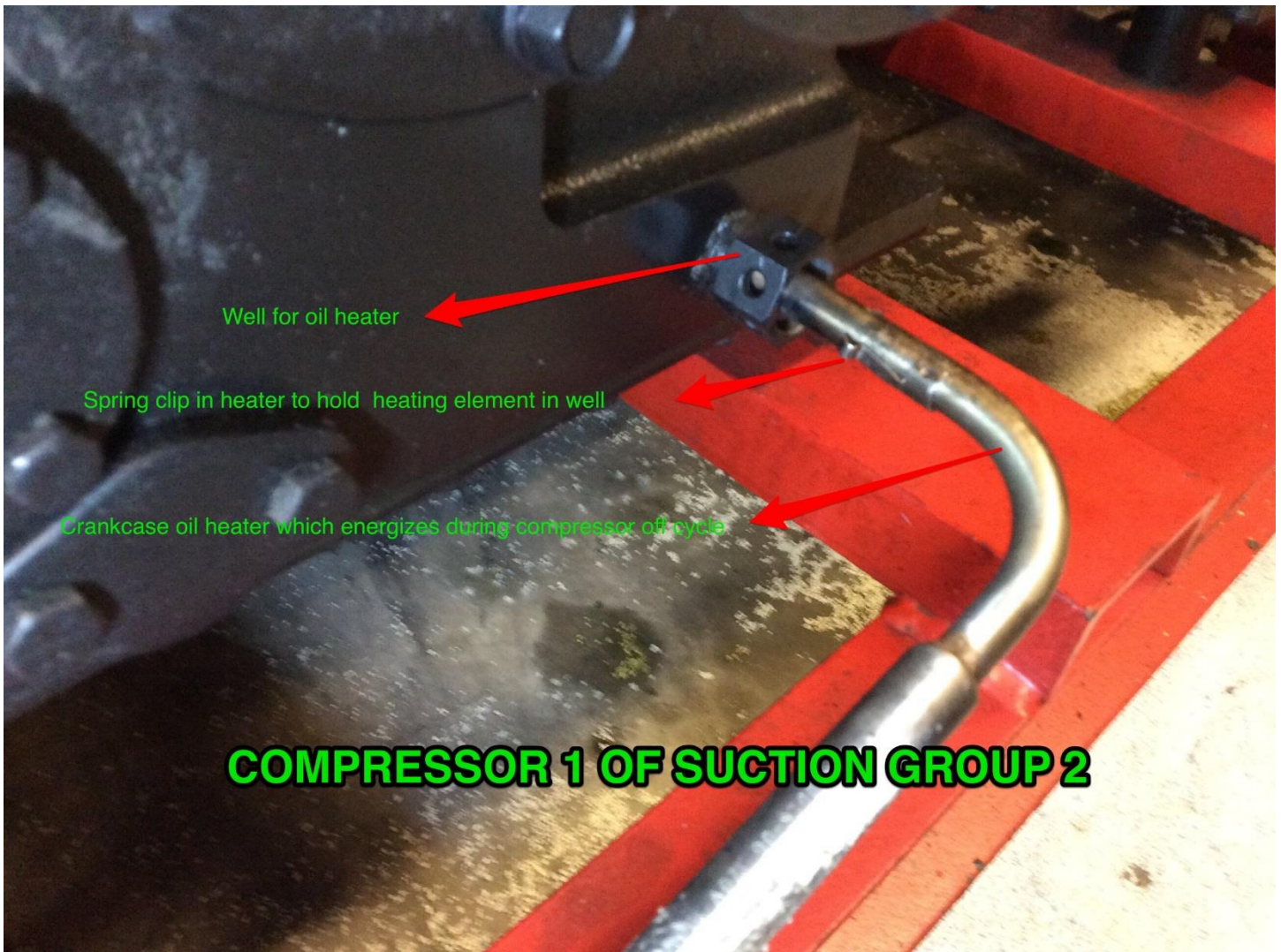
Incident Summary (Reference #5621455)

SUPPORTING INFORMATION	Incident Date	September 19, 2017	
	Location	North Vancouver	
	Regulated industry sector	Refrigeration System	
	Impact	Qty injuries	None
		Injury description	N/A
		Injury rating	N/A
	Damage	Damage description	Fire caused damaged to controls of the heat recovery part of the system and rendered heat recovery function of the system inoperable.
		Damage rating	Moderate
Incident rating	Moderate		
Incident overview	One of the employees noticed smoke coming out from machinery room (refrigeration compressor room) through shut door.		
INVESTIGATION CONCLUSIONS	Site, system and components	<p>The refrigeration unit is located in machine room of a commercial occupancy site. System has eight compressors with various nameplate ratings (largest one 39kW and smallest one 10kW nameplate rating), contains approximately 1500lbs of refrigerant R-507 and about 37 litres of lubricating oil for lubrication of compressors. Compressors are grouped into different suction groups to cater for different temperatures groups (Group 1 cater for Medium Temperature, group 2 and 3 cater for Low temperature). The system incorporates heat recovery system which transfer heat from compressed refrigerant to glycol circulating loop through heat exchanger and control.</p> <p>The system is monitored and controlled by Direct Digital Control (DDC in addition to control and safety devices for each compressor.</p>	
	Failure scenario(s)	Compressor crankcase oil heater is held in its well in the crankcase by spring clip and heater remains energized during compressor off cycle. Detached energized crankcase heater of Compressor 1 of suction group 2 came in contact with cardboard boxes stored in close proximity of the compressor and initiated the fire. Fire in cardboard boxes melted the flexible hose balancing the two oil separators resulting in lubricating oil and refrigerant spray. Sprayed oil propagated the fire in the directions and distances oil spread/travelled.	
	Facts and evidence	<p>There were two witness account.</p> <p>First was through one of the refrigeration technicians who attends the site and was also present that night as part of refrigeration technician team attending the incident. According to him, oil heater was out of the well and over burnt cardboard boxes and flexible hose balancing two oil separators, insulating materials and all controls of heat recovery system were burnt. Damaged to computer was by water from sprinkler system. System lost about 1100lbs R-507 and 12litres of lubricating oil. Managed to start up the system with heat recovery function isolated after recharging refrigerant and lubricating oil at 3:00am on September 20, 2017.</p> <p>The second account was from one of the management members of the site who was present at the site at 6:00pm onwards that night. He confirmed that fire was</p>	

Incident Summary (Reference #5621455)

	<p><i>contained in the machinery room and their emergency management protocol was followed.</i></p> <p><i>Witness one confirmed his company is responsible of maintenance of refrigeration system (Log book at site was soaked with water). No hot spot or indication of fire on compressors and electrical panel were noticed at the time of investigation and fire damaged was noted to be limited to the area that was sprayed with oil from burnt flexible hose.</i></p>
<p>Causes and contributing factors</p>	<p><i>Based on witness accounts and physical evidence present, likely cause of fire as follows:</i></p> <p><i>Oil heater was displaced from well either by vibration or inadvertently by individual storing cardboard boxes close to compressor 1 of group 2. Energized oil heater during off cycle of compressor was heat source, cardboard box material was hydrocarbon-fuel and air in the room was oxygen supplier to complete the fire triangle to initiate the fire. Heat of fire melted the flexible hose resulting in oil and refrigerant being sprayed. Sprayed oil propagated the fire in the directions and distances oil spread/travelled until fire was extinguished.</i></p> <p><i>Storage of combustible materials in machine room Is the main contributing factor. Code acceptance of material used in flexible hose could not be determined with certainty. Properly identified code accepted material will definitely reduce the possibility of material failure of component.</i></p>

Pictures are attached in the following pages





Compressor 1 Suction Group 2

Card boxes (indicated by blue color) were here at the time of incident

