

Incident Summary #II-744939-2018 (#8474) (FINAL)

SUPPORTING INFORMATION	Incident Date	September 4, 2018	
	Location	Prince George	
	Regulated industry sector	Elevating devices - Elevator	
	Impact	Qty injuries	1
		Injury description	Swelling bruising to right foot and ankle, fracture to fibula, possible fracture to right foot, scrape to right foot
		Injury rating	Moderate
	Damage	Damage description	N/A no damage to equipment
		Damage rating	None
	Incident rating	Moderate	
Incident overview	Elevator was called to a floor, when stepping into elevator the passenger tripped and fell due to the elevator not being level with the landing floor.		
INVESTIGATION CONCLUSIONS	Site, system and components	<p>A hydraulic elevator is lifted and lowered by a hydraulic cylinder utilizing hydraulic oil. In the up direction, the elevator is lifted by pressure created by an electric motor driven hydraulic pump. The weight of the elevator and gravity are used to send the elevator in the down direction. A hydraulic control valve is used to regulate the 3 speeds in both directions (fast speed, slow speed and leveling speed.)</p> <p>With hydraulic controlled elevators the control valve plays a key role in elevator levelling. Leveling is described as the accuracy of an elevator car coming to a stop in line with the intended floor's walking surface.</p> <p>The temperature of the hydraulic oil affects the viscosity of the oil. When hydraulic oil is more viscous (caused by a drop in temperature) it results in higher operating pressures of the system which results in the elevator overshooting floors.</p> <p>When a hall call button is pushed and the elevator is below floor level, the doors will open while the elevator levels up to floor level, this is the proper function of this product. If the control valve leaks, the elevator will sink below the floor level it is at to a maximum of 1 inch before the elevator automatically relevels.</p>	
	Failure scenario(s)	<p>Scenario 1: The elevator was stationary for an extended period over the weekend causing the hydraulic oil temperature to drop and therefore contract. The contraction of hydraulic oil caused the elevator to lower slightly below floor level. The temperature drop in the oil also caused an increase in the viscosity of the oil which will cause the elevator to over-shoot the floor when trying to relevel.</p> <p>Scenario 2: Oil was leaking through the control valve into the reservoir or the oil could be leaking from the piston into the recovery tank causing the elevator to drop below floor level.</p>	
	Facts and evidence	<p>Site Observation by Safety Officer and Certified Mechanic:</p> <ul style="list-style-type: none"> • Unit is a hydraulic controlled elevator • In testing of this elevator we recreated the mislevelling scenario multiple times 	

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	<ul style="list-style-type: none">• Adjustment of control valve had changed since original adjustment• A simple adjustment of the control valve corrected the levelling speed• Maintenance records indicate that this unit has been regularly maintained And all applicable tests are up to date• Incident report was provided by site personnel• Incident occurred first day after a holiday weekend, this elevator possibly had been parked over the weekend and not used.
Causes and contributing factors	The probable cause of this incident is the adjustment of the hydraulic control valve had changed since original adjustment. A contributing factor to this scenario is if the elevator had been parked at a floor for an extended period of time, the first day after a holiday weekend, causing a drop in temperature of the hydraulic oil which results in an increased viscosity of the oil. This change in viscosity results in mislevelling of the elevator.