

Incident Summary #II-680090-2018 (#7025) (FINAL)

SUPPORTING INFORMATION	Incident Date	April 21, 2018	
	Location	Fernie, BC	
	Regulated industry sector	Elevating devices - Elevator	
	Impact	Qty injuries	1
		Injury description	Muscle spasms
		Injury rating	Moderate
	Damage	Damage description	None
		Damage rating	None
	Incident rating	Moderate	
	Incident overview	A parent and their young child used the elevator to go from the second floor to the main level. The parent reported the elevator went past the main floor and hit the basement level with a substantial impact.	
INVESTIGATION CONCLUSIONS	Site, system and components	<p>A hydraulic elevator is lifted and lowered by a hydraulic cylinder. 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 speeds (fast and leveling) and stopping accuracy in both directions.</p> <p>With hydraulic controlled elevators the control valve plays a key role in elevator leveling. 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>If the control valve leaks or is not adjusted correctly the elevator will sink below or drive past the floor it is driving to. When a hall call button is pushed, doors will open and the elevator will level up to floor level.</p> <p>At the bottom of elevator shafts (in the "pit"), buffers are located. Buffers are used to retard the elevator if it drives to the bottom of the elevator shaft, decelerating the elevator instead of an immediate impact/stop.</p> <p>An elevator that has two hydraulic cylinders, one on each side of the elevator, and will "re-sync" the cylinders when they start operating out of alignment from each other (when one cylinder is slightly more extended than the other). This is accomplished by the elevator lowering itself until the cylinders are both fully retracted, resting the elevator on its buffers. The elevator then drives back up to a landing and goes back into normal operation.</p>	
	Failure scenario(s)	<p>Scenario 1:</p> <p>A cylinder re-sync occurred with the passengers in the car. The elevator lowering itself onto its buffers caused a more abrupt stop than is expected by passengers. After the re-sync the elevator drove up off the buffers to the bottom landing and the passengers exited.</p>	

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	<p>Scenario 2: The control valve was set with the down leveling speed slightly too fast, causing intermittent instances of the elevator driving past its intended floor. The elevator passed the bottom landing and stopped when it contacted the buffers causing a more abrupt stop than is normal.</p>
<p>Facts and evidence</p>	<p>Site observation by Safety Officer and Certified Mechanic:</p> <ul style="list-style-type: none"> •Passengers involved in this incident left the site, refusing to leave contact information. No direct observers of the incident were available for interview. •On-site staff reported that the elevator, when called to the second landing from the third landing, would intermittently drive past the second landing and continue to the bottom landing. •Safety Officer and Certified Mechanic tested the elevator by trying to recreate failure scenarios multiple times but they could not replicate a failure. •Maintenance records indicate that this unit has been regularly maintained by mechanics and no leveling issues were reported in the maintenance log. •The mechanic stated that, although they found the elevator was operating within its designed speeds, they found the down speeds (fast and leveling) could be reduced. After reducing the down leveling speed the elevator contractor ran the car at full capacity (weights in car) and tested for over 1.5 hours, no failures occurred in testing. •The mechanic emptied the hydraulic oil from the tank to check for debris, which could affect the control valve, no debris was found. •The car was run further the following day for 5 hours (witnessed by elevator the mechanic), no failures occurred.
<p>Causes and contributing factors</p>	<p>It is possible that the valve adjustments were not set correctly or had changed over time, allowing car to run past the floor level intermittently. It is possible the car ran past the bottom landing and struck the buffers.</p>