Incident Summary Report # II-657810-2018 - 6044 (Final)

SUPPORTING INFORMATION	Incident Date		March 2, 2018
	Location		Whistler
	Regulated industry sector		Above Surface Ropeway
	Impact – Injury	Qty injuries	0
		Injury description	NA
		Injury rating	None
	Impact – Damage	Damage description	Loose evacuation drive control cable sheath - minor signs of slippage on control cable sheath
		Damage rating	Minor
	Incident rating		Minor
	Incident overview		During public operations a control processor fault caused the stop of the ropeway. Passengers were evacuated from the ropeway by use of the evacuation drive. Due to some technical challenges the time frame in evacuating all passengers was excessive for the type of ropeway (approximately 2.5 hours).
INVESTIGATION CONCLUSIONS	Site, system and components		Detachable chair lift, slope length 1760 m. The ropeway is provided with a diesel driven hydraulic evacuation drive. One method of speed control of this drive is through a variable displacement hydraulic pump. Speed is controlled, in this method, through a control cable and swash plate configuration. Design rope speed with evacuation drive at 100% load uphill is .69 m/s. At that rope speed the ropeway is capable of evacuating all passengers on the lift line in approximately 45 minutes. Actual evacuation drive speed at load test, 100% load uphill .75 m/s. The safety system operates off of multiple processors which monitor numerous safety functions. The evacuation drive does not have a master bypass switch/s which allows all safeties to be bypassed.
	Failure scenario(s)		During public operation a safety fault in a processor caused the stop of the ropeway. Due to technical challenges in clearing the fault conditions and the precautionary measures implemented in ensured the ropeway line was being monitored (staff dispatched to visual monitor towers of the lift line) it was 87 minutes prior to the evacuation drive becoming operational. Due to control issues related to the evacuation drive, the rope speed during the evacuation was less than normal (less than design speed) and the evacuation of the last passenger was another 71 minutes. Total time from lift stopping to last person evacuated: 2 hours 38 minutes.

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Facts and evidence	Based on review of documentation submitted by the operator and discussions had with maintenance staff and manufacturer's representatives the following narrative was determined. • The ropeway, operating with passengers on the lift line, initial stopped, reportedly by a processor fault. Initially staff were unable to start evacuation drive as they were unable to clear or bypass the fault. • Electrical staff with the assistance of a manufacturer's representative via phone and an online link discovered 2 faults (one related to a tower safety circuit relay/contact and a second related to emergency stop function relay/contact). Both these circuits were by passed, by bridging the applicable circuits, at which time the processor was rebooted (via online link) and the fault cleared. Thus it became possible to start the evacuation drive. • Because safety circuits had been by passed, as a precautionary measure, staff members with radio communications were dispatched to multiple locations along the lift line so as to visually monitor tower rope positions. • As an additional safety measure, electrical staff monitored safety circuit relay conditions (i.e. open or closed) where they would be able to initiate a stop if any change in the condition to the relays occurred. • Staff began the process of running passenger of the ropeway lift line by the use of the evacuation drive. • During the evacuation process staff realized the drive was running significantly slower than normal. It was determined by staff that this was due to the control cable sheath of the hydraulic pump being loose and slipping in its holder. This in turn prevented the actuator (swash plate) from being fully articulated. Monthly preventative maintenance work orders indicate the ropeway had been run monthly by use of the evacuation drive, however the work orders give no indication that running speed was verified. Ski resort dispatch records indicate that the time of which the lift stopped to the point that the ropeway was running by the evacuation drive was 87 minutes. The time of the last passenger being removed from the lift line was another 71 minutes. Diagnostic reports authored by manufacturer's representative indicate no clear cause of the faults.
Causes and contributing factors	It is unknown what actually caused the processor to fault. A likely reason that timeliness was effected in the evacuation was that maintenance staff were unsure as to how to bypass the faults that prevented the diesel from being able to start. Another certain cause that effected timeliness of the evacuation was that the evacuation drive pump control cable sheath had become loose in its holder, resulting in slippage, thus effecting the speed at which the ropeway could operate.