

Incident Summary #II-899455-2019 (#14987) (FINAL)

SUPPORTING INFORMATION	Incident Date	August 27, 2019		
	Location	Aldergrove, BC		
	Regulated industry sector	Amusement Devices - Amusement ride		
	Impact	Qty injuries	0	
		Injury	Injury description	Not Applicable
			Injury rating	None
	Damage	Damage description	<ul style="list-style-type: none"> • A Derailment of the train locomotive. • A wheel axle of the locomotive was bent 	
		Damage rating	Moderate	
	Incident rating	Moderate		
	Incident overview	The locomotive of a miniature train derailed as it was travelling through a curved section of track. The train stopped and the passengers were allowed to disembark from the train (the terrain at the site of the incident allowed for passenger to easily and safely disembark from the train). – II 899455		
INVESTIGATION CONCLUSIONS	Site, system and components	<p>A 24" gauge miniature steam train replica. The locomotive is powered by an internal combustion engine and an automatic transmission which powers drive shafts to the front and rear trucks (locomotive is configured with a forward and rear truck with two pairs of steel wheels per truck). The train is a configuration of a locomotive and two coaches.</p> <p>The track is a continuous loop configuration consisting of multiple curves and straight sections.</p> <p>The track is of a traditional configuration. 2 sets of parallel steel ASCE rails spiked into wood ties laid into a gravel ballast. The lengths of ASCE rail are connected to each other by a pair of splice bars (short sections of steel) which sandwich the joined ends of the rails with a set of nuts and bolts that run through the splice bars at the end of the rail sections (see diagram). The splice bars, under the normal configuration, are situated between the face of the ball and the base. The outward facing surface of the splice bar is normally approximately flush with the surface of the face of the ball.</p>		
	Failure scenario(s)	While train was travelling through a curved section of the track the locomotive's rear truck wheels derailed.		

Incident Summary #II-899455-2019 (#14987) (FINAL)

<p>Facts and evidence</p>	<p>Manufacturer's specified maximum speed is 12 mi/h or 19.3 km/h. The operator's training and operations manual indicates maximum speed of 6 km/h or 3.7 mi/h</p> <p>Narrative of events based on reports provide by the operating contractor:</p> <ul style="list-style-type: none"> The locomotive was progressing slowly through the curve when the locomotive began to shake. The operator stopped the train to investigate cause and observed that a derailment had occurred. After the incident occurred the train was moved back from original location of derailment. <p>Onsite incident inspection observations:</p> <ul style="list-style-type: none"> Observed witness marks (gouging) in the railway ties. These appear to be consistent with the impression that a derailed wheel would cause. (see photo 1) At the curve, wear was noticed on the line rail (outside rail) gauge side (inside of rail) of the ball face. (see diagram and photo 2) A gauge side splice bar in the line rail, located approximately .75 m before (direction of travel of the train) the first rail tie derail witness marks, was observed to have a significant impact marking on its leading and top edge. Impact marking appeared fairly recent (no oxidization of steel at impact marking). It was also observed that the splice bar was significantly proud of the ball face in comparison to other splices located along the track. (see photo 1 and 2) Observed that the locomotive's left side wheel axle of the rear truck was bent.
<p>Causes and contributing factors</p>	<p>An impact to the leading wheel of the truck was the very likely cause of the bent axle. It is not certain if the cause of the impact was due to a hard impact with the line rail gauge side splice bar or a resulting impact of the derailment.</p> <p>Speed was very likely not a contributing factor as the operators policy regarding max speed was significantly lower than that of the manufacturer's specified maximum speed.</p> <p>A contributing factor to the derailment may have been due to the wear of the line rail, gauge side ball face. This wear may have resulted in a condition that the splice bar was situated proud in relation to the ball face.</p>

Cross Section of ASCE Rail with Splice Bars, Bolt and Nut

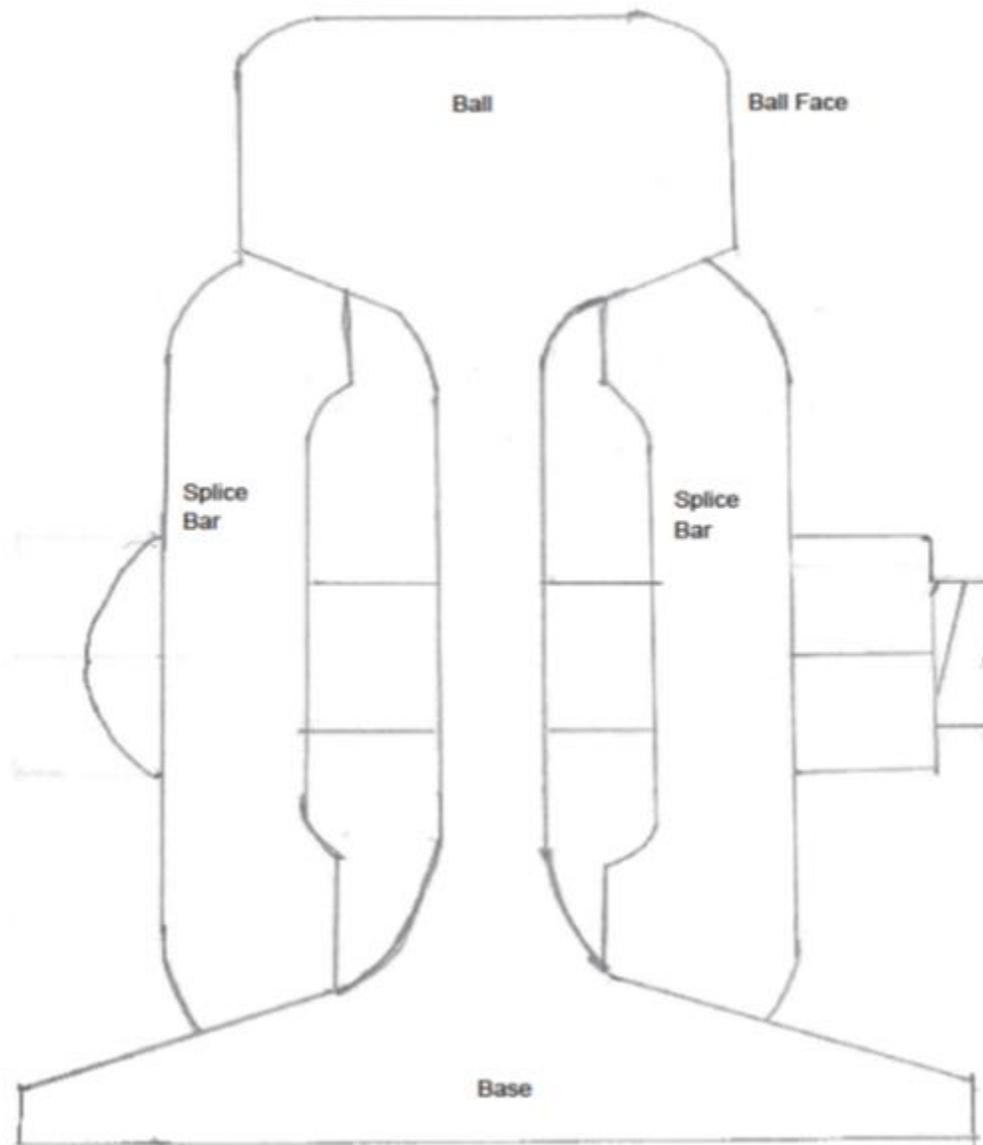


Diagram 1

End View of Rail Cross Section

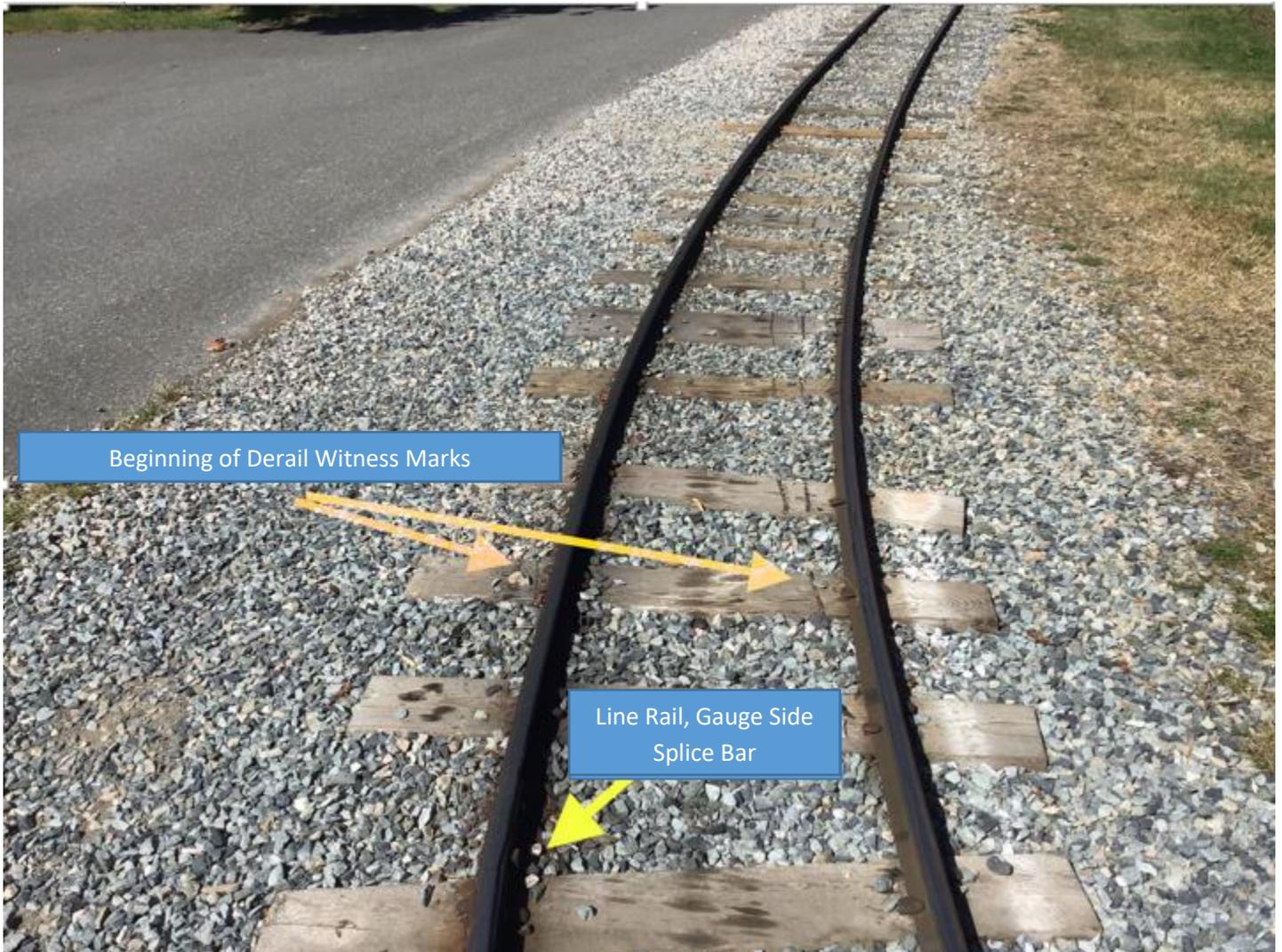


Photo 1

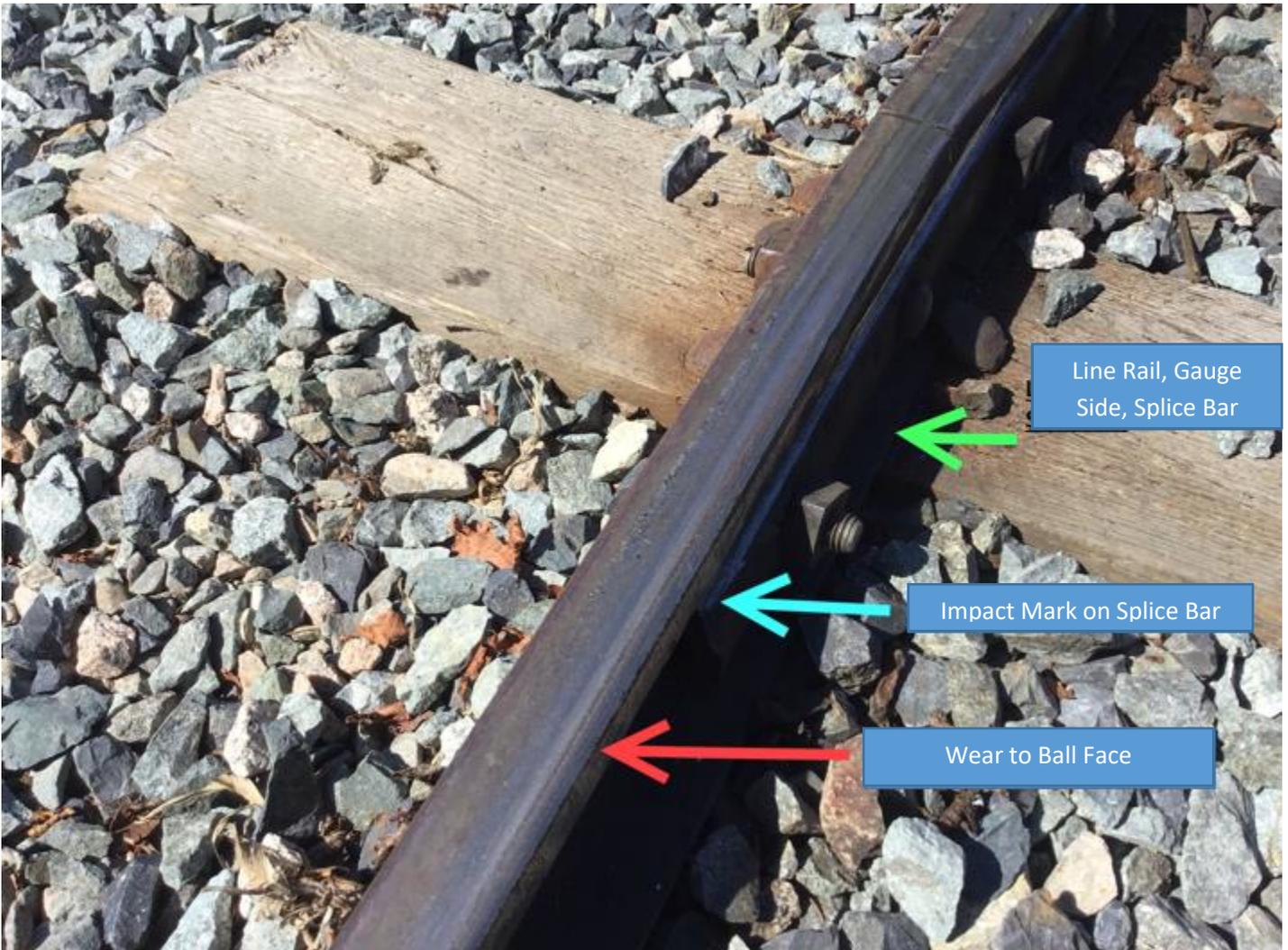


Photo 2