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### 1 Subject

Risk of uncontrolled movements associated with direct drive hydraulic pumps installed on Road Rail Vehicles (RRVs).

### 2 Issue

The uncontrolled movement of a Manco RRV truck mounted EWP (Elevated Work Platform) on 16 December 2023 was outlined in ONRSR's Safety Alert RSA-2023-0002 dated 21 December 2023. The truck that referred to is pictured below.

The RRV is driven on rail through its front wheels by a hydraulic pump directly connected to the truck engine (direct drive). The hydraulic pump in this type of drive system generates hydraulic pressure while the engine is running. A controller spool valve determines how much of this available hydraulic flow and pressure is transmitted to the rail wheels, which in turn controls the speed and torque at the rail wheels.

The RRV was reversing in EWP working mode at the time of the incident, meaning it was under the control of an operator in the EWP bucket. The operator moved the joystick to neutral to slow down, but due to the pump controller spool being jammed, instead of slowing down the RRV, reversing speed increased. The operator applied the emergency-stop function, which did not cut off drive to the front wheels and arrest acceleration. Movement was eventually brought under control only by the truck being switched off in the driving cab.



Investigation reports by Manco and the Rail Infrastructure Manager, Sydney Trains, revealed that:

- Reports from the hydraulic pump manufacturer indicate that the controller spool valve had jammed likely due to contamination entering into the hydraulic fluid.
- The emergency-stop function's failure to cut off drive was likely due to its incompatibility with a novel drive configuration on the Mercedes donor truck.
- The emergency-stop function correctly applied brakes. However, in EWP working mode, only the rear wheels are braked. The rear wheels are lightly loaded due to the weight distribution of the RRV, and it is thus likely that they skidded and lost their braking efficacy.

Manco and Sydney Trains have reported to ONRSR that they, and the hydraulic pump supplier, are introducing both improved operator awareness and E Stop functionality along with a secondary back up control system in the event of a controller spool jamming again on direct drive engine couplings.

While the incident is still under formal investigation by ONRSR, this safety alert stresses that on these types of direct drive hydraulic systems, suppliers and operators of RRV's, and the Rail Infrastructure Managers for the infrastructure on which they are operating must ensure that there is:

- a) Adequate design rigour and risk management associated with hydraulic pump characteristics and with novel drive configurations on donor trucks.
- b) Enough emergency braking effort to overcome driving force under all circumstances.
- c) Identification and control of all possible malfunctions causing uncontrolled movement during the overall certification process.

The above information is provided to alert suppliers and operators of RRVs, and the Rail Infrastructure Managers for the infrastructure on which they are operating, to the circumstances of the incident so that they can examine their procedures and equipment to prevent occurrence of a similar incident.

Rail Transport Operators should examine all risks associated with operating RRVs. Examinations should cover all types of road rail vehicles, trailers, trolleys, and any other rolling stock coupled to them and not be limited to the specific type of equipment involved in this incident.

**This advice is effective immediately.**

Peter Doggett

**Chief Operating Officer**