

# LAING O'ROURKE PRESENTATION

A short, white diagonal line pointing downwards and to the right, positioned below the main title.

ROAD RAIL VEHICLES FROM THEN TILL NOW

SYDNEY 30 & 31 OCTOBER 2012

A short, white diagonal line pointing downwards and to the right, positioned below the date.

# HI RAILS WERE INSTALLED TO VARIOUS TYPES OF MACHINES



# WITH DIFFERENT HI-RAIL SET UPS AND CONTROLS



## THEY ALSO INCLUDED MOBILE CRANES AND EWP'S



THERE WAS THE LARGE --- AND THE SMALL



# THERE WERE MORE RECENT ADDITIONS THAT COULD BE USED FOR MULTIPLE TASKS



# AS WELL AS HI RAILS FOR OTHER THAN TRACK WORK



# HOWEVER DURING THE PERIOD ALERTS WERE ISSUED AND DOCUMENTS DEVELOPED

 Government of South Australia Department for Transport, Energy and Infrastructure	<b>RAIL SAFETY ALERT</b>	RSA, No. <i>2005-05</i> Page 1 of 1
---	--------------------------	---

## SUBJECT: SAFETY ALERT TO ALL OPERATORS OF ROAD / RAIL VEHICLES

The following information is provided in the interest of improving rail industry safety performance, and is based on best available information.

### BACKGROUND

On 20 October 2006, a Toyota Land Cruiser roadrail vehicle's rear track guidance system self-operated and lifted the rear rail wheels off of the track and into the road, gravel position.

There were no persons in the vehicle at the time and the vehicle was stationary with the engine turned off.

While no injuries or damage occurred the incident had the potential to cause a serious accident.

### INVESTIGATION

While the formal investigation process into all aspects of the incident is yet to be fully completed, a significant finding to date is that a primary cause of the incident has been attributed to the inappropriate mounting of a relay enclosure. In this instance the relay enclosure was mounted outside of the vehicle cabin on the left hand (passenger side) chassis rail, midway along the vehicle.

The relay enclosure, protection rated to IP56, has failed in service, possibly from rocks or other material striking the enclosure during operation of the vehicle. This allowed ingress of moisture and dust within the enclosure. Those contaminants appear to have shorted one electrical relay, allowing the supply of electrical current to the rear track guidance mechanism motor. This enabled the guidance mechanism to lift off the rail.

There is sufficient concern regarding safety issues to warrant notification to all operators of such equipment.

In this instance the H-rail equipment was manufactured by Aries Equipment and Engineering and fitted by a third party provider. Similarly designed and installed equipment may also be subject to similar defects.

### SUGGESTED ACTIONS

Operators are requested to inspect all roadrail vehicles and ensure the manufacturer's fitted instructions have been followed.

In particular Aries fitted vehicles should be inspected to ensure the wiring system installation complies with manufacturers requirements, and ensure all relay enclosures are mounted in protected positions within the cabin of the vehicle.

All relay enclosures should be inspected to ensure there are no fractures or cracks in the enclosure and removal of any enclosure covers is recommended to ensure no contaminants have entered the enclosure.

For operators of Aries equipment further information may be obtained by contacting them by telephone on (08) 9249 9511 or fax (08) 9249 6599.

This notice is effective from: 19 / November / 2005	
Approved: 	
Derek Heneker Acting Manager, Rail Safety	Date: 19 / 11 / 2005

FILED COMMUNICATIONS DIVISION INFORMATION SAFETY ALERT 2005-05 11 10A, ELECTRIC, TUGBOAT, SAFETY ALERT 2005-05 11 10A, FORWARD, FORWARD FOR PAGE 1 OF 1



## AUSTRALIAN CODE OF PRACTICE

Roll 41-1  
(Ver 1.0)

## Guideline for the Safe Operation of Road-Rail Vehicles



### Daily Road-Rail vehicle checks by End User

Location		Team	
Date		Vehicle ID No	
		End user (please print)	
Description		Signed: Week Ending:	
Kilometers	Start	End	TOTAL
Last serviced		Next Service due	

Item Ref#	Vehicle Check	M	T	W	T	F	S	S
29	Engine oil check for correct levels							
30	Radiator coolant check for correct levels							
31, 32, 13	Fluids and fuel check for correct levels							
58	Tyre pressures correct							
	Initial							

Item Ref#	Daily Check Road-Rail (✓ if OK X if requires attention)	M	T	W	T	F	S	S
57	Tyres, check for damage, tread and wear pattern							
59,55	Tyres, rims wheels check for security, cracks, signs of fatigue							
56	Wheel studs and nuts, check for security or damage							
52,47	Rail wheel check for profile and condition, including sandwich rubber for separation							
51	Rail wheel bearings check for play or noise							
46	Rail wheel studs and nuts check for security or damage							
73,74,75	Mechanical safety locks, rail kits locks, front axle lockout (where fitted) check for correct function damage and wear							
76	Anti deraill frame, check for condition							
78	Over centre condition check it is maintained							
83	Rail guidance frame assemblies check for wear, cracks, structural damage and lubrication							
44	Rail sweeps (where fitted) check are in place and correctly adjusted							
34	Hydraulics, check for correct function or damage							
36	Emergency hand pump, check for presence							
17	Electrical controls, check for correct function, (both) batteries OK.							
18, 20	Head, tail, flashing, reversing, spot, hazard lights for correct function and damage							
21	Warning devices, horns and sirens check for correct function							

# THE REGISTRATION PROCES CONTINUES FOR ALL TRACK MACHINES BUT CHANGESTO RECERTIFICATION PROCESS MAY APPLY

102-219

Rolling Stock Engineering  
Phone: 02-8762 1903 (internal 2 1903)  
Fax: 02-47 62 1905 (internal 2 1905)

**TOC Waiver**

**Registered ID No.:** 102-219

**To:** Manager Train Control Sydney, Supervisor Network Control, Operations Control

**From:** Michael Uhlig

**Requested by:** Danny McEwen, Barclay Mowlem

**Date:** 20<sup>th</sup> January, 2015

**Subject:** Operation of JLG Boomlift Road/Rail Vehicle on the RailCorp Network.

20th January 2005 until 14th April, 2005. Pending Publication.

A waiver to the published conditions in the RailCorp Train Operating Conditions Manual is granted for the operation of JLG BoomLife Road/Rail Vehicles on the RailCorp network.

The following conditions shall apply to the operation of these vehicles:

Reg. Number	Plant Number	Description of Vehicle	Max. Speed (km/h)	Loaded Mass (t)	Length (m)	Notes	Remarks
A0101015	JLG BoomLife 34 HA	6	5,500	6,400			Slowing pln. must be engaged etc. fully retracted when travelling

**BRYAN TURNBULL**  
Principal Engineer Rolling Stock Engineering

**Per:** *Michael Uhlig*

**MICHAEL UHLIG**  
Technical Specialist, Rolling Stock Standards

Page: 1 of 1  
File: 102-219.DOC

**RAIL INDUSTRY**  
**INFRASTRUCTURE MAINTENANCE VEHICLE**  
**REGISTRATION CERTIFICATE**

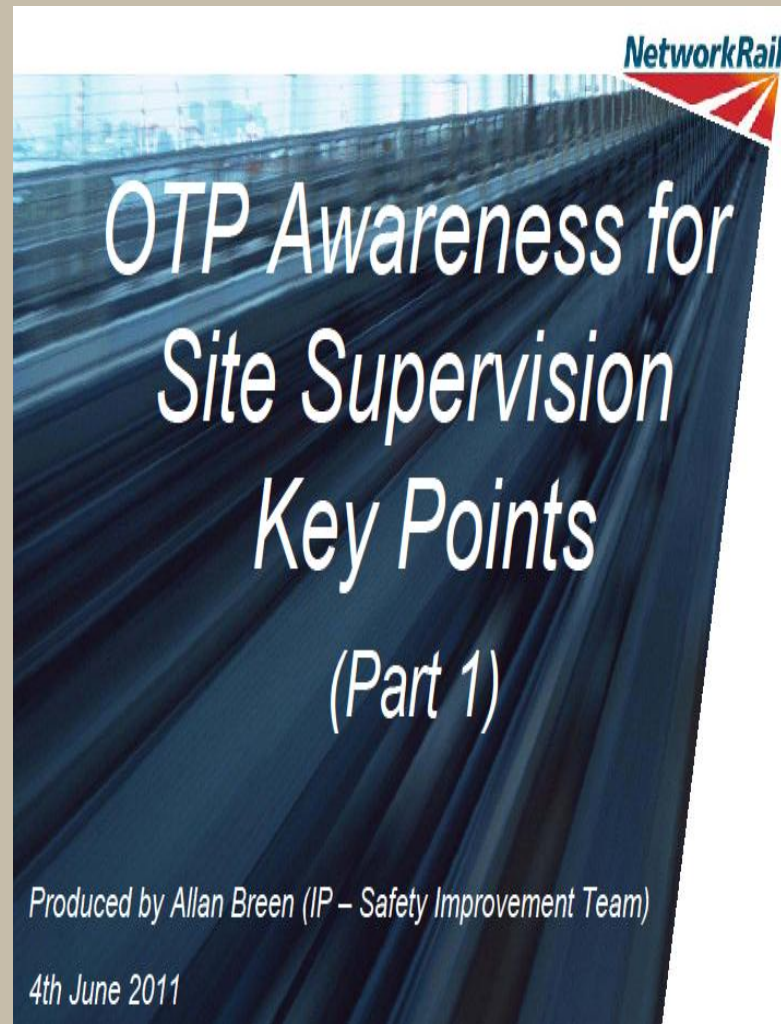
Previous Label No: 1041  
New Label No: 1135  
R.I.V.R. No: 1734134  
Road Rego No:  
Plant No: BOOM 004  
Max. Speed: 6 km/h  
Gross Vehicle Mass: 5.50 tonnes

Notes: T14 T21

Expiry Date: 3 June 2012  
Label No: 1135  
R.I.V.R. No: 1734134  
Road Rego No:  
VIN/Serial No: 0300055834  
Plant No: BOOM 004  
Max. Speed: 6 km/h  
GVM (t): 5.50

Certification Date: Day 3, Month June, Year 2011  
Road/Rail Vehicle or Trailer/Trolley: ☒ YES ☐ No  
Vehicle Owner: Select Plant Hire  
Vehicle Description: JLG Knuckleboom 34 HA  
VIN/Serial No: 0300055834  
Certifying Company: Arrow Rail & Plant Equipment  
Certifier's Name: Les Lennox  
Certifier's Signature: *Les Lennox*  
Date: 3.6.2011

# TRAINING WAS PART OF A PROGRAM FOR NETWORK RAIL MORE ALIGNED TO OPERATIONS





ate:

### RRV Safety Improvement Programme, Projects update:



Assign Group's	
Dev Deliverables	
Sig Group Appro	
Finalize Deliverables	
Sig Group Appro	
Timesheet vs. Priorities	
Sig Group Appro	
Progress	
Implement	
Post-Project Review	

[illegible]

- 01: Radio Comm's equipment trial-tested on Great Western with positive feedback. Article included in June - monthly Focus. Costing and delivery lead times in progress. CDF-I notice issued and responses received. Gateway paper approved. Draft Function Area Specification in place - 2nd SSG submission 16/06/2011. Tender enquiry issued to 12 companies, 2 responses rec'd - 17/06/2011. Tender review panel 04/07/2011; contract award forecast mid/late July; forecast delivery to DU's Sep/Oct 2011.
- 02: Initial Mtg with R&S - team held 18/05/2011 with invites to meetings in place; next mtg 20/07/2011. Wider stakeholder group to be established.
- 03: Progress update meeting held with GKD, Electronics & antenna development; completed. Initial TAG trials completed. Discussions underway with a further potential supplier with a view to incorporating an additional system into the concept trials. This follows the viewing of a system trial at an industry demonstration event. Internal mtg 04/07/2011 (will also include RRV under 1.6a CDF).
- 04: Meeting held 16/03/2011 to review Ashby Recommendation J1.7 - identified that there was no simple solution. Several actions agreed - next meeting to be held 01/08/2011.
- 05: Initial Working Group Meeting held 18/03/2011 with all RPSDs to review current Machine Controller / COSS competencies profile. Further meeting to be arranged with greater stakeholder participation to identify suitable testing.
- 06: Mtg held with Professional Delivery and Training 08/06/11. Due to additional training requirements (eg communications, line clear/vacation process, Advanced line Open working, COSS changes, working under live DLE, etc) there is a need for an industry working group to review the MC/CC training material. Cross-industry working group (including members from COSS programme) to be set up.
- 08: Lift Planner - return date for feedback on the single lift, lift planner core module 18/06/2011. Final core module for lift planner single lift to be written (inc' feedback from stakeholders); 29th-30th June - continue with OTP single lift module.
- 09: Mtg with Maint training (link up approved trainers) & reviewed their Banksmen compliance course material. Agreed with Professional Development & Training (PD&T) to carry out a Business Needs Analysis (BNA) proves cost effective PD&T will work with Maint training on adding additional 'real in' task/scene content (eg: PTS related information) to their Banksmen course content. Maint training confirmed a charge of £286 for a ½ day course with a max of 4 candidates.
- 10: Biannual Reviews have taken place in readiness for the June rule book amendments. A review of NR/L2/CTM/025 (Competence and Training in the control and operation of On Track Pant) is in progress.
- 13: RGM Duty Charts standardisation - initial meeting held with Profcon on the 01/08/2011; Profcon agreed to develop a 'showman' template for review and July Mtg with GKD 19/07/2011 to review progress.
- 14: TLWG are in development to produce a guidance instruction that will identify the range of machines that can comply to our standards for random lifting. Draft document to be reviewed at TLWG 23rd June - Good Practice Guide to be produced. National Workshop to be held 08/09/2011 @ Westwood.
- 15: I.C. 211 signed-off; Compliance date for use of spreader beam 30/06/2011
- 16: Review completed with legal & investment paper updated accordingly. Paper is being reviewed at NUS CAP&X review 29/05 in preparation for July investment panel. Supplier design proposals have been received & are undergoing assessment.
- 17: Investment paper prepared for review. Submission will follow rail wheel breaking paper.
- 18: 16/05/2011 review of existing & future MDWP requirements. Project Manager to be appointed
- 17 & 18: Maintenance review to be undertaken of needs.
- 22: Outline agreed for poster campaign; photo shoot completed 15/06/2011 at Quattro Brownhills depot.
- 23: Follow up mtg with UKR 14/06/2011 further extension agreed. Internal mtg 24/06/2011, info ORR 19/07/2011

# LAING O'ROURKE MEANTIME WERE ANALYSING THE ROLLING STOCK STANDARDS FOR TRACK MACHINES

AS7505.4 Signalling Detection Interface									
Sect	CI	Requirement	Type	ML		Poss		R/R	
				N	E	N	E	N	E
1.4		<b>PURPOSE</b>							
	1	This document describes requirements for compatibility with signalling detection systems.	SUP						
	2	The main purpose of the requirements is to prevent collisions.	SUP						
1.5		<b>SCOPE</b>							
	1	This document applies to new and modified infrastructure maintenance rolling stock, and existing infrastructure maintenance rolling stock being proposed for operation in another network.	SUP						
	4	The document covers the design, construction and maintenance of rolling stock.	SUP						
4.1		<b>TRACK CIRCUIT SHUNTING</b>							
4.1.1		<b>General</b>							
	1	UIC Code 737-2 and RSSB Guidance Note GM/GN2576 contain general discussions on track circuit shunting.	SUP						
	2	Infrastructure Maintenance rolling stock that travel outside work closures <b>shall be either detectable or non-detectable in regards to track circuit shunting.</b>	MAN						
	6	Infrastructure maintenance rolling stock when in travel mode shall not leave insulating materials deposited on the rail contact surface to an extent which prevents trains from being detected by the signalling system.	MAN						
	7	Where, in working mode, material is unavoidably deposited on the rail then procedures may need to be put in place to remove the material before the track is released to general traffic.	SUP						
4.1.2		<b>Detectable Rolling Stock</b>							
	1	Detectable infrastructure maintenance rolling stock shall have a dc electrical resistance between rail contact surfaces of wheels on the same axle of not greater than 10 mΩ, measured with a voltage source no greater than 300mV.	MAN						
	2	Detectable infrastructure maintenance rolling stock should provide the leading and trailing wheelset (the extremity axles) of each vehicle with a means to remove surface contaminants from wheel tread surfaces.	REC						
	4	Detectable infrastructure maintenance rolling stock shall meet the axle load requirements of Table 8.	MAN						
4.1.3		<b>Non-Detectable Rolling Stock</b>							
	1	Non-detectable infrastructure maintenance rolling stock shall have a dc electrical resistance between rail contact surfaces of wheels on the same axle of greater than 20,000 Ω.	MAN						
4.2		<b>VEHICLE DIMENSIONS</b>							
4.2.1		<b>Overhang</b>							
	1	The extremities of detectable infrastructure maintenance rolling stock shall not extend longitudinally past the outermost detectable axles by the amount defined in Table 9.	MAN						
4.2.2		<b>Axle Spacing</b>							
	1	The distance between the inner axles of adjacent bogies on detectable infrastructure maintenance rolling stock shall not exceed that defined in Table 10.	MAN						
6.3		<b>LONGITUDINAL VOLTAGE</b>							
	1	New or modified infrastructure maintenance rolling stock operating over any network utilising DC track circuits shall not be able to cause a longitudinal voltage along a rail between any two wheels exceeding 200 mV rms between 0 and 2.4 Hz.	MAN						
	2	New or modified infrastructure maintenance rolling stock operating over any network utilising AF track circuits shall not be able to cause a longitudinal voltage along a rail between any two wheels exceeding 173mV rms at any of the specific operating frequencies of AF track circuits.	MAN						
	3	New or modified infrastructure maintenance rolling stock operating over any network utilising 50Hz vane relay track circuits shall not be able to cause a longitudinal voltage along a rail between any two wheels exceeding 150mV rms at 50Hz.	MAN						
7		<b>TESTING</b>							

ML = train control working, Poss = Possession working  
N = new/modified, E = existing rolling stock

Recommend early attention

Recommend medium term action

Other action

Note

Note

All items highlighted under New rolling stock should be

All items highlighted under Existing rolling stock should

RailCorp Standard RSU 717 requires compliance with the

Maintenance/Operating Procedure required to maintain

Maintenance Procedure required to maintain compliance

See Section 4.1.2.6 of AS 7504.4 for Table

Maintenance Procedure required to maintain compliance

See Section 4.2.1.2 of AS 7504.4 for Table

See Section 4.2.2.2 of AS 7504.4 for Table

# FINDINGS

- STANDARDS FOR ROLLING STOCK LARGELY CENTRED AROUND LOCO'S AND WAGONS
- A NUMBER OF TRACK MACHINE STANDARDS (PART 4) WERE ALIGNED TO THE ABOVE
- STANDARDS RELATING TO HI-RAIL VEHICLES WERE NOT AS CLEARLY DEFINED OR NOT DEFINED AT ALL
- A NUMBER OF ROLLING STOCK STANDARDS WERE STILL IN DRAFT
- THE MAIN ONE IN DRAFT WAS THE STANDARD FOR BRAKING SYSTEMS (AS 7510)
- ALTHOUGH A NUMBER OF DRAFT STANDARDS ADOPTED OTHER STANDARDS WERE ALSO REFERENCED E.G. RAILCORP RSU OR THE ROA MANUAL
- LAING O'ROURKE KEEN TO WORK WITH INDUSTRY TO DEVELOP STANDARDS / GUIDELINES TO SUPPLEMENT OTHER MATERIAL

# ROLLING STOCK PROCEDURES WERE DEVELOPED OR REVISED

P0916A – PROCUREMENT OF ROLLING STOCK

P0917 – GENERAL ENGINEERING AND OPERATIONAL SYSTEMS

P0917A – COMMISSIONING OF ROLLING STOCK

P0917B – MONITORING, REPAIR AND MAINTENANCE OF ROLLING STOCK

P0917C – MODIFICATION OF ROLLING STOCK

P0917D – DECOMMISSIONING OF ROLLING STOCK

P0917E – INCIDENT MANAGEMENT OF ROLLING STOCK

P0917F – DESIGN MANAGEMENT OF ROLLING STOCK

P0917G – OPERATION OF EVENT AND DISTANCE RECORDERS

P0917H – RAIL WHEEL INSPECTION

P0917I – TRAVELLING OF TRACK MACHINES


P0917J – REGISTRATION OF ROLLING STOCK

P0917K – RAILWAY TRACK SIGNALS

P0917L – ROLLING STOCK PLANT AND EQUIPMENT SAFETY

P0919A – ASSET MANAGEMENT OF ROLLING STOCK

# SUPPORTING DOCUMENTS WERE DEVELOPED

	Procedure Title	Plant and Machinery Compliance Annual Inspection
	Document No.	Plant
	Issue	04
	Date	April 2012
	Page	1 of 6

## MACHINE ASSESSMENT REPORT – (To be carried out on request)

All checks should include a general examination for security, integrity, and safety and should be considered from a maintenance and operational view against maintenance standards.

Any signs of damage or wear should be noted, along with any missing components and added to the maintenance sheet.

Machine No. -	Location
Contract -	Date

No	System	Applicable Standard or Procedure	Non conformance	Comments
1.	Engine + Protection (Check all hoses and wires for damage and check for any other loose or damaged components)	.visual check	•	
	Engine No.		•	
	Engine Hours		•	
2.	Hydraulics (Include pumps, motors etc...)	visual check & function test / pressure test	•	
	Hydraulic Hoses (Check hoses and fittings for leaks and filters leaks)	visual check	•	
3.	Pneumatic Air System (Include valves & pipes, compressor etc...)	visual check & function test	•	

# WHICH ALIGNED TO THE RISSB STANDARDS

4.	Brake System (includes brake shoes, rigging, cylinders, brake hoses etc...)	AS7510.4(Draft) RSU 712 (Rail mounted vehicles) RSU 722 (Road/trail vehicles)	<ul style="list-style-type: none"> <li>• Brake system function test required</li> <li>• Brake rigging/securing devices incorrect</li> <li>• Safety straps missing/broken</li> <li>• Stopping distances incorrect</li> </ul>	
5.	Emergency Equipment	Section 9 of RailCorp TOC AS7523.4	<ul style="list-style-type: none"> <li>• Emergency equipment missing</li> <li>• Equipment stored incorrectly</li> <li>• Spares missing</li> </ul>	
6.	Wheel-sets for Rail Bound Plant (Frames, axles, axle bearings, bolts etc.)	AS7508.4 AS7514.4/ESR 0330 AS7515.4 AS7516.4 AS7517.4/RSU711 RSMS Procedure PC0917H; RSMS Procedure PC0917E;	<ul style="list-style-type: none"> <li>• Wheel profile defective</li> <li>• Wheel defective</li> <li>• Axle defective</li> <li>• Bearing defective</li> <li>• Back to back measurement incorrect</li> <li>• Wheel/set ex derailment</li> </ul>	
6A	Wheel sets for Hi Rail	CEM's	<ul style="list-style-type: none"> <li>•</li> </ul>	
6B	Bogies	AS7519.4 RSMS Procedure PC0917H; RSMS Procedure PC0917E;	<ul style="list-style-type: none"> <li>• Bogie structure defective</li> <li>• Bogie ex derailment</li> <li>• Bogie due scheduled service</li> </ul>	
7.	Transmission/Power Take-Off	Oil sampling / function test	<ul style="list-style-type: none"> <li>•</li> </ul>	
8.	Electrical (Including wiring, relays batteries, battery isolation etc...) Lights, Siren & Horn (Operation, cleanliness etc ...)	Visual and function test  AS7531.4	<ul style="list-style-type: none"> <li>•</li> <li>• Headlights/marker lights defective</li> </ul>	

F 0917B(1)

# A HIRE OUT PROCESS WAS APPLIED TO PROJECT SUPPLIED ITEMS OF ROLLING STOCK

**LAING O'ROURKE**

## PRE-HIRE / OFF HIRE ROLLING STOCK CHECKLIST

Make & Model: \_\_\_\_\_

Date: \_\_\_\_\_

Hours/km: \_\_\_\_\_

Registration No: \_\_\_\_\_

	Notes:	√ - Item OK	X - Item Requires Attention.	NA - Not Applicable
ITEMS TO BE CHECKED	STANDARD	RSMS	Complete	Supporting Procedures Required
Hour-meter working				Visual check
Walk Around Inspection [Loose bolts, nuts, connections, etc] out of gauge items and signage/reflective delineators	AS7507.4 AS7531.4	917B		Visual check
Engine Oil Level				Visual check
Radiator / Coolant Level				Visual check
Fuel tank is to be filled if check is at Maitland				Visual check
Hydraulic Oil Level - top up as required				Visual check (see operators manual)
Hoses - condition & leaks				Visual check
Belts - condition & tension				Visual check & operators manual
Grease - if applicable				Visual check & lube chart
Cable Connections - tight & no damage				Visual check
Battery[s] - condition, levels, terminals, etc.				Visual check
Leaks - oil, fuel, water, air, etc.				Visual check
Exhaust - noise & emissions	AS7513.4	917B		Interior noise – OH&S issue. External noise is a RIM issue.
Gauges - operation & condition	AS7533.4	917B		A list of gauges/functions will be required for each vehicle type
Guards in place - secure & good condition	LORAC	917B		Visual check
Fire Extinguisher charged and in date	LORAC	917B		A list of fire extinguishers/types will be required for each vehicle type
Machine functions correctly				Function test
Alarms & shutdowns	LORAC	917B		A list of alarms/functions will be required for each vehicle type
Road Wheels / Tyres - condition, pressure, wheel nuts, etc.	LORAC	917H		LORAC standards for each vehicle type Note 2
Rail wheels/bogies/suspension	AS7509.4 AS7514.4 AS7515.4 AS7516.4 AS7517.4 AS7518.4 AS7519.4	917H		Fouling of wheels/bogies: visual check Wheels – profile, tread damage: gauges + Wheel Manual (PO917H) Axles – damage: visual check Bearings – loss of securing/grease: visual check Back to back after derailment: visual check + gauge (PO917H) Suspension – springs/dampers damage or missing: visual check Bogies – damage: visual check

**LAING O'ROURKE**

# FINALLY THE OPERATOR CONDUCTS THEIR CHECKS

Notes: (v) Item OK (X) Requires Attention. (NA) Not Applicable

LAING O'ROURKE		PRE-START GENERAL PLANT CHECKLIST Trucks, Loaders, Fork lifts, Excavators, Compressors								Location							
Plant No: _____		Make & Model: _____		Project: _____		Contact No: _____											
Registration No: _____		Week Ending: _____															
ITEMS TO BE CHECKED	MON	TUE	WED	THU	FRI	SAT	SUN	ITEMS TO BE CHECKED	MON	TUE	WED	THU	FRI	SAT	SUN		
Hour or Km Reading								Plant Security [locks & Guards]									
Drain Air Tanks								ROPS or FOPS									
Operators Manual & Log Book (if applic.)								Compulsory Signage [warnings, etc]									
Engine Oil - Top Up as required								<b>Compressors</b>									
Radiator / Coolant Level – Top Up as req'd								Air intake vacuum indicator									
Hydraulic Oil Level – Top Up as Req'd								Oil level in Air oil separator reservoir									
Fuel & Fluid Levels [brakes, p/steer, etc]								Air pressure regulator functioning									
Grease Machine [as per Lube Specs.]								Air supply free from oil contamination									
Battery, Belts [levels, terminals, cond.]								Air lines, safety clips, sealing rubbers									
Leaks [Oil, Water, Fuel, Air, etc]								<b>DEFECTS</b>	DAY	REPORTED to	Cleared by	Date					
Cabin, seat, seatbelts, levers & controls																	
Windows, Wipers, Gauges & Horn																	
Lights, Indicators – operation & damage																	
Fire Extinguisher & First Aid kit																	
Neutral Start – Reversing alarm																	
UHF Radio, A/cond., accessories, etc								<b>Defects to be Reported to &amp; Cleared by :- Supervisor / Foreman</b>									
Foot & Park Brake Operation,								<b>IMPORTANT NOTE:</b>									
Amber Light fitted & operational								<b>If Defect is a Safety Hazard or requires Immediate repair : PARK UP MACHINE</b>									
Wheels, Tyres or Tracks, Wheel Chocks								Attach an <b>OUT of SERVICE</b> tag, contact Supervisor & don't use until Supervisor									
Panel Damage & Light Damage								signs <b>Cleared by &amp; Date columns</b>									
Exhaust: noise & emissions								<b>COMMENTS:</b>									
Hi Rail Equipment, operation, wear																	
<b>TRUCKS / HIAB type CRANE TRUCKS - extra checks</b>																	
Ropes, Tie Down Strap & Chains, etc.																	
Tipper / Tailgate : operation & condition								<b>NEXT SERVICE DUE at : .....hours on .....[date]</b>									
133a Electrical Warning Plate								<b>Operator to Fill in Below &amp; mark applicable boxes for each day used</b>									
Lifting Gear- as supplied								Mon. Operator (print) [sign]									
Tare, GVM, & S.W.L. clear								Tue. Operator (print) [sign]									
Any Damage to components								Wed. Operator (print) [sign]									
<b>Loader, Forklift, Roller, Excavators, etc - extra checks</b>								Thu. Operator (print) [sign]									
Buckets, Teeth, Forks, etc								Fri. Operator (print) [sign]									
General Operations								Sat. Operator (print) [sign]									
Articulated Joint / Linkages								Sun. Operator (print) [sign]									

Distribution: White – Select Depot Yellow – Site Office Green – Book

Supervisor Checked & Received [sign] \_\_\_\_\_

F 0501 [S] 05/12

LAING O'ROURKE

**LAING O'ROURKE**

```

graph TD
    A[At 1st technical version of the rail vehicle...]  

    A --> B[Review of rail drive system definitions]
    B --> C[Self-propelled]
    B --> D[Rail guidance system]
    B --> E[Friction drive]
    C --> F[All vehicle road wheels are raised above the rail head during rail operation. Traction is provided by a hydraulic drive system. Braking is provided by rail brakes.]
    D --> G[Vehicle road wheels remain in contact with the rail head during rail operation to provide traction and braking. The rail head is sealed to apply the rail wheels in some cases.]
    E --> H[All vehicle road wheels are raised above the rail head during rail operation. Traction is provided by rail tyres contacting the rail head. The rail head is sealed to prevent the mounting of the rail wheel hub, or the bearing surface of the rail wheel is sealed to provide by friction between road tyres and spigot / rail wheels. Additional braking is provided by the rail wheels in some cases.]
  
```

At 1st technical version of the rail vehicle a representative of mechanical trades qualified respectively of the mechanical trades (mechanic, welder, fitter, electrician, etc.) will be approved for use by Project Manager in conjunction with the social Plant Manager for Rail.

Review of rail drive system definitions

**Self-propelled**

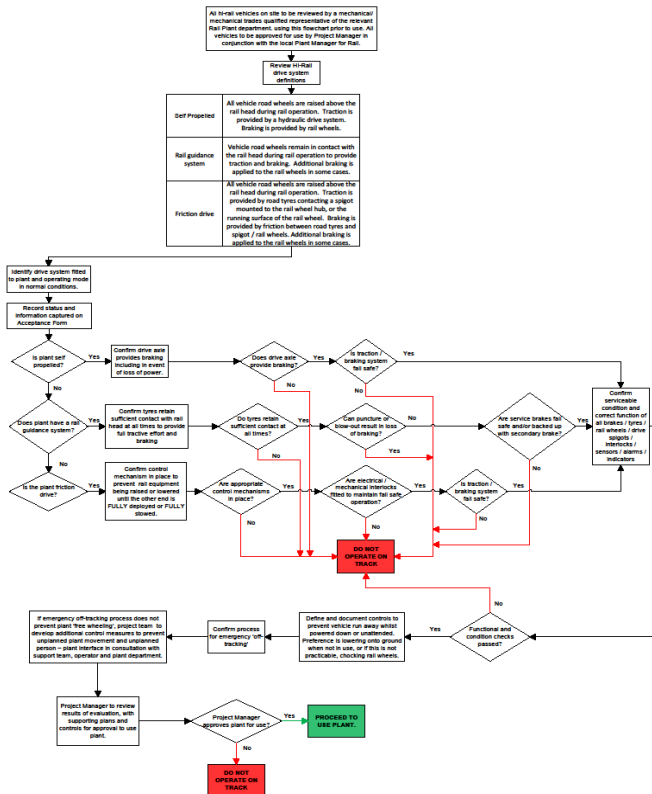
All vehicle road wheels are raised above the rail head during rail operation. Traction is provided by a hydraulic drive system. Braking is provided by rail brakes.

**Rail guidance system**

Vehicle road wheels remain in contact with the rail head during rail operation to provide traction and braking. The rail head is sealed to apply the rail wheels in some cases.

**Friction drive**

All vehicle road wheels are raised above the rail head during rail operation. Traction is provided by rail tyres contacting the rail head. The rail head is sealed to prevent the mounting of the rail wheel hub, or the bearing surface of the rail wheel is sealed to provide by friction between road tyres and spigot / rail wheels. Additional braking is provided by the rail wheels in some cases.



Page 1 of 1

<b>Owner name:</b> 	<b>Signature:</b> 	<b>Approved for operation on track?</b> (Circle response)	<b>YES</b>	<b>NO</b>
<b>Representative name:</b> (Must have mechanical / mechanical trade qualification)	<b>Signature:</b> 	<b>Approved for operation on track?</b> (Circle response)	<b>YES</b>	<b>NO</b>

**Assessment:** **Key:** H – Hold, W – Witness

description		Vehicle year of manufacture		Vehicle serial or registration number	
Unit Number		Overall Length		Overall Width	
Weight		Number of Axles		Vehicle Tare Mass at Rail	
Rating		Maximum Travelling Speed		Vehicle owner	

**The maximum speed for any vehicle operating or travelling within a worksite is 15 km/h.**

Activity	Criteria	Key	Witness (initial)	Sign	Remarks/Records (e.g. Reports, Cert.)
1. the necessary inspection)					
ire vehicle has been assessed against chart.	Decisions made in accordance with process flowchart.	H			
e of operation of traction / braking m confirmed as fail safe.	Failure of power source or system pressure does not put vehicle into 'free wheel' condition.	H			
condition and ability to provide sient traction and braking during ation confirmed.	Tyres provide contact in accordance with design condition.	W			

# HOWEVER ALERTS WERE STILL BEING ISSUED

Issued by Chief Engineers Division

## Rolling Stock Technical Note

### Safety Alert – Road Rail Vehicles with Hydraulic Drive Motors and Park Brake Systems

APPLICABLE TO ALL ROAD / RAIL VEHICLES OPERATING ON RAILCORP

A recent incident involving a runaway road rail hydraulic excavator has identified certain characteristics and potential failure modes associated with vehicle equipped with hydraulic drive motors and hydraulically activated braking

On the 28.10.2011 on the Richmond line on a 1:50 grade a 7 tonne excavator away after being secured on rail in the elevated position. The runaway occurred several minutes after the vehicle was secured. The vehicle was equipped with hydraulic drive motors for traction and braking and a fail safe spring applied hydraulic release park brake.

Contributing factors to the runaway include the suppression of the fail safe hydraulic park brake due to contamination (and blockage) within the hydraulic circuit, normal leakage characteristic within the hydraulic drive motors all drive motor rotation and securing of the vehicle in an elevated condition; minimum attachment anchoring to the ground has lead to the runaway.

In this particular incident the fail safe park braking systems which applies pressure to release the spring applied brake on the drive motor was supplied with contamination in the hydraulic circuit located at a bypass valve leading to this resulted in the hydraulic pressure not being able to release and the park brakes were maintained in the "off" state.

Leakage within the hydraulic motors between the case and rotor pistons characteristic which needs to be taken into account. After a period of time external torque (as experienced when on a grade) the hydraulic oil will be out of the motor. Once this has occurred the drive motor will be able to rotate relatively freely. This characteristic needs to be taken into account in the design and operation of hydraulically driven road rail vehicles.

With the above incident taken into account, the following details should be considered in road rail vehicles which operate hydraulic drive motor hydraulic park brake systems:

1. Hydraulic motor designs to take into account case leakage and the possibility of free rotation after hydraulic oil has been squeezed from the wheels.
2. Spring applied / hydraulically released park brakes and other hydraulic braking devices to take into account the effect of contamination in the circuit (including any valving) leading to the brake system.

#### Disclaimer

This document was prepared for use on the RailCorp Network only.

RailCorp makes no warranty, express or implied, that compliance with the contents of this document shall be sufficient to ensure safe systems or work or operation. It is the document responsibility to ensure that the copy of the document it is viewing is the current version as in use by RailCorp.

RailCorp accepts no liability whatsoever in relation to the use of this document by RailCorp or any third party which arises in any manner by the use of this document.

#### Copyright

The information in this document is protected by Copyright and no part of this document may be reproduced, stored or transmitted by any person without the prior consent of RailCorp.

RTN 012

21/02/2012

Expires

### Safety Alert – Road Rail Vehicle Runaway Conditions When Raising and Lowering on Rail

APPLICABLE TO ALL ROAD / RAIL VEHICLES OPERATING ON RAILCORP

Due to recent incidents involving road rail vehicle runaways on the RailCorp network Technical Note and operation of rail

## Safety First

### Road Rail (Hi-Rail) Vehicle Runaway Issues

27/02/2012

Target audience: All Staff working with and around Plant

Recently there have been several incidents involving runaway Hi-Rail vehicles. Some have occurred on RailCorp lines, others further afield and interstate. A feature common to many of these incidents is the disengagement of the drive from the rail wheels resulting in free rolling runaway of the vehicle.

It is important that this issue is highlighted immediately across RailCorp's work sites to prevent further incidents while a longer term solution is sought.

The Main Types of Hi-rail Drives are: (See Attached Photos of Drive Types)

- 1) **Powered rail wheels** – these vehicles have rail wheels that are powered and braked by a permanent hydraulic or mechanical drive.
- 2) **Rail guide wheels** – these vehicles use the rail wheel as guidance not traction and rely predominantly on the road wheels or crawler tracks in contact with rails for movement and braking.
- 3) **Friction drive** – these vehicles use an arrangement that lifts the vehicle by bringing the rail wheels to the rail and at the same time putting them in contact with the road wheels. Drive is by direct contact with the rail wheel surface or by an extended axle or spigot.

Rolling Stock Technical Note RS013 explains that when transferring from road to rail the hydraulic system must be appropriately sequenced and interlocked so at least one braked axle is in contact with the rail at all times while raising or lowering the rail wheels.

Further to this note, it is now required that to maintain safety

- All interlocks are tested regularly to prove they are operating safely and correctly
- Where an interlock is suspected as faulty the plant is not used until proved safe
- Ability to drive and brake is tested and assured to provide sufficient traction before every work shift

If the rail head or driving wheels become wet or contaminated, work must stop and the drive's traction must be re-proved before continuing work.

Ken Prestwidge

General Manager, Safety Support Services, Safety and Environment

Safety First Ref No: 2012/1/05

Revised: 27/02/2012

Valid until: 27/02/2013

Issued by Chief Engineers Division

## Rolling Stock Technical Note

RTN 013

21/02/2012

Expires

Not applicable

### Audience

- Road / Rail Vehicle Owners, Operators, Maintainers, Designers, Manufacturers, & Recertifying Companies

### Main Points

- Runaway of Road Rail vehicles when raising and lowering on rail.
- Adequate braking at all times during raising or lowering of guidance gear.
- Adequate and reliable interlocking system.
- Consideration of failure modes of interlocking.
- Consideration of emergency procedure or operation in the event of a runaway situation.

### Contact

Michael Uhlig  
02-8922 1963  
Jakub Zawada  
02-8922 1968

### Distribution

Open

Last Open Distribution

Nil

contents of this document  
the document user's sole  
ent version of the document

document by any party, and  
document.

of this document may be  
sent of RailCorp.



INDEPENDENT  
TRANSPORT  
SAFETY  
REGULATOR

Safe transport for NSW

## Transport safety alert

Transport safety alerts are published by ITSIR under section 42L(2) of the Transport Administration Act 1988 to promote the safe operation of transport services.  
Transport safety alerts are intended to provide information only and must be read in connection with obligations under relevant legislation.

22 March 2012 | TSA no. 39

### Effective operation and management of hi-rail equipment

Road/Rail Vehicles are to have effective

- systems for securing during transitioning between travel modes or stowage
- braking capacity during rail movements, and
- management of rail guidance equipment.


### Background

In the past, manufacturers (including OEMs) and ancillary equipment suppliers have developed road rail vehicles (RRVs), essentially, in response to market opportunities. Furthermore, Rail Infrastructure Managers (RIMs) have provided only minimal input into the management of the different stages of an RRV's life cycle starting from defining the concept design requirements through to the decommissioning process. As a result, there has been a proliferation of different types of rail plant and in some cases, this has been compounded by modifications to the RRVs, that may not have been optimised for the tasks intended to be carried out, or specified to a level that would have ensured an acceptable degree of safety.

A number of recent RRV incidents have resulted in either runaways and/or derailments due to the loss of braking capacity, the application of an insufficient braking force or the failure of the rail guidance equipment. In addition to issues concerning the inadequacy of the training and competency assessment process for RRV operators, these incidents have also highlighted the following safety concerns (grouped by category), namely:

- absence of sufficient braking force (whilst transitioning or during stowage)
  - hydraulically operated spring park brakes (or handbrakes) may lose their braking capacity as a result of blockages in the hydraulic system (due to the ingress of debris, particularly when changing attachments);
  - hydraulically driven motors may exhibit sufficient oil leakage to allow the pistons to retract and the motors to then free wheel;
- RRVs that (through modification or otherwise) incorporate an inappropriate wiring (electrical) arrangement, may, negate any traction interlocking function and allow the vehicle to free wheel whilst transitioning between travel modes; and
- RRVs in which the hi-rail wheels are driven and braked by friction forces transmitted through the road (rubber) tyres, such as via hub extensions to the rail wheels, have experienced unintended movement on rail when transitioning between road and rail modes due to the application of an insufficient braking force.

# DISC BRAKES WERE ORDERED FOR RRV HI-RAIL



INDEPENDENT  
TRANSPORT  
SAFETY  
REGULATOR  
[www.transportregulator.nsw.gov.au](http://www.transportregulator.nsw.gov.au)

## Notification form

### Change to railway operations


**Note:** A notification under clause 22(2) of the *Rail Safety (General) Regulation 2008* is a condition of accreditation. Accredited persons are bound by the *Rail Safety Act 2008* to comply with the conditions of their accreditation.

<sup>1</sup> An extract of clause 22 of the regulation is on page 3 of this form.

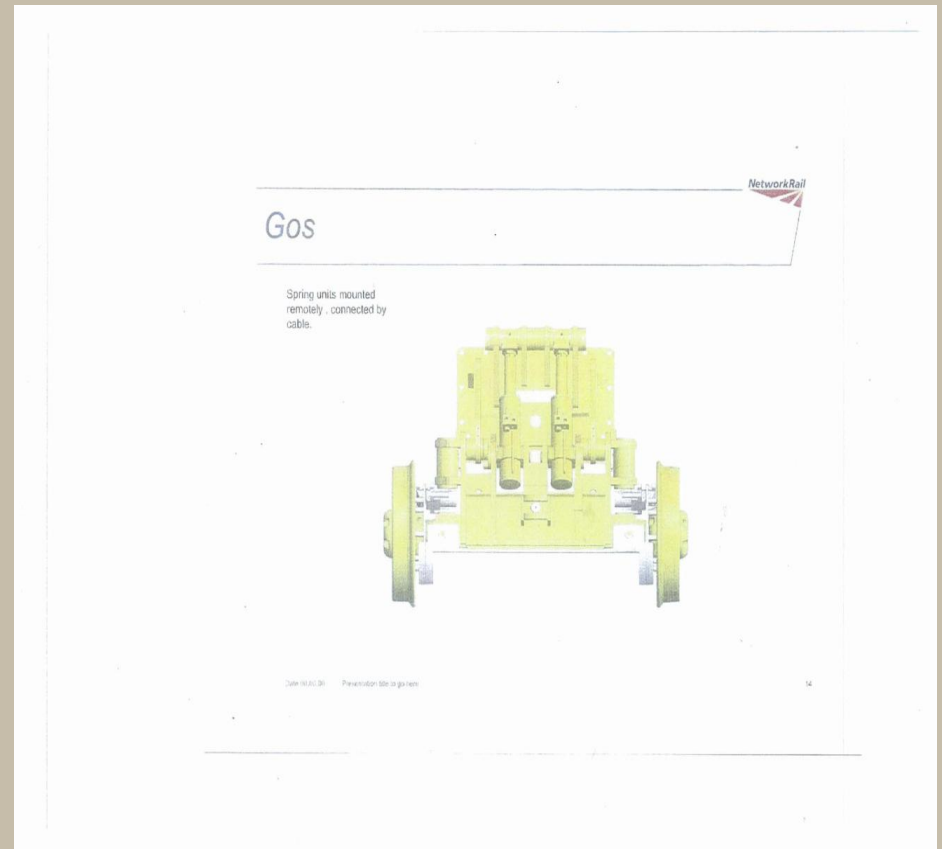
#### Instructions

- Completed forms can be forwarded to TSM either by **email:** [certified@transportregulator.nsw.gov.au](mailto:certified@transportregulator.nsw.gov.au) or **fax:** 02 8763 7700.
- Identify the notification type. The notification type is a reference to the decision, event or change. Refer to clause 2 of the table at clause 22(2) of the Regulation. For example, enter "1" if notification refers to a notification of a decision to design or construct, or to commence the design or construction of, or the stop or new railway tracks.
- Provide a short description of the decision, event or change, eg. "Decision to construct a new railway track at X location".
- Provide the proposed commencement date of the decision, event or change.
- Provide details of the consultation (as taken) in relation to the decision, event or change. Please note clause 22(3) of the Regulation requires that you:
  - (a) the person consulted;
  - (b) when and how they were consulted;
  - (c) the results of the consultation.
- The certified person under clause 22(3)(c) of the Regulation signs the notification form.
- Significant information within the required timeframes set down in clause 22(2) of the Regulation for the applicable decision, event or change should fit in column 2 of the table.

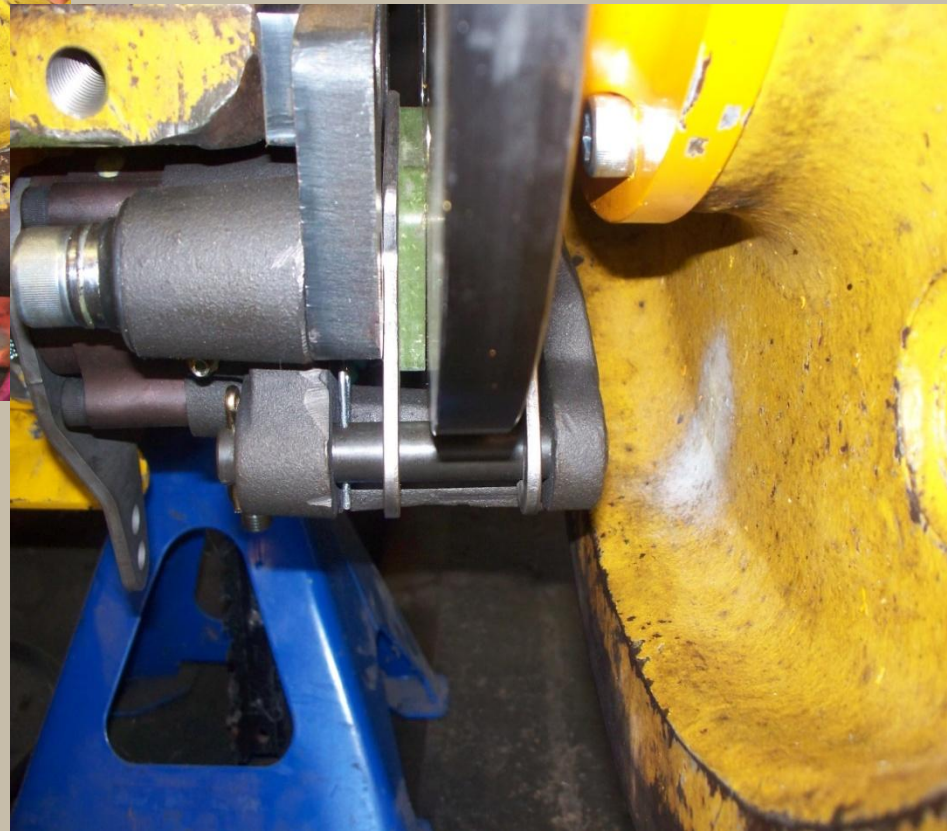
<sup>2</sup> It is not possible to complete this table for the first time because of an emergency you must provide the required information as soon as reasonably practicable after the decision is made on the event or change occurs, so the time requires.



CHANGING THE WAY WE THINK ABOUT RAIL SAFETY



**ON RECEIPT AND FOLLOWING SOME ISSUES THEY  
WERE PROGRESSIVELY FITTED**



# HOWEVER CHANGES / REVIEWS ARE STILL BEING RECEIVED

THE WA REGULATOR REQUIRES ENGINEERING ASSESSMENTS TO BE CONDUCTED ON ALL HI RAIL VEHICLES INCLUDING:

- DESIGN SPECIFICATIONS CLEARLY IDENTIFIED
- DESIGN TO INCLUDE INTERLOCKING SYSTEM
- PROVISION OF ADEQUATE VISUAL DISPLAYS
- ADVICE OF CONTROLS TO OPERATORS
- HORN FITTED APPROPRIATE TO ENVIRONMENT

MEANWHILE THE SOUTH AUSTRALIAN REGULATOR WAS ALSO DETERMINING CONTROLS FOR ROAD RAIL VEHICLES



PUBLIC TRANSPORT SERVICES

REQUIREMENTS FOR ROAD – RAIL VEHICLES ACCESSING AND  
OPERATING ON THE ADELAIDE RAIL AND TRAM NETWORK

PTS-XX-10-EG-XXX-00NNNNNN



# WHERE TO FROM HERE FOR LAING O'ROURKE

A REVIEW OF ALL DOCUMENTS DEVELOPED TO INCORPORATE RECENT CHANGES

ASSESS DEVICES REQUIRED TO BE FITTED TO HI-RAIL VEHICLES AND APPLY HIGHEST STANDARD

CONDUCT RIDE STABILITY TESTS FOR ANY ITEM TRAVELLING OVER 30KPH

A PROCEDURE DEVELOPED FOR THE MANAGEMENT AND MAINTENANCE OF HI-RAIL BRAKING SYSTEMS

A PROCEDURE DEVELOPED FOR HI – RAIL VEHICLES SETTING OUT CRITERIA APPLICABLE TO THEIR USE NATIONALLY

REGULAR MONITORING TO ENSURE THE SYSTEMS DEVELOPED ARE BEING APPLIED

# THANK YOU



© Laing O'Rourke 2012, all rights reserved.

No part of this presentation may be reproduced, stored on a retrieval system, disclosed or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior permission of the copyright owner.

LAING O'ROURKE