

LNG Tanker Incident – Nanutarra Jan 2018





Wesfarmers Chemicals, Energy & Fertilisers



Ammonia/
Ammonium Nitrate



Sodium
Cyanide



PVC and
Specialty Chemicals



Wood composite products



Ammonium Nitrate



LPG, natural gas and electricity



LNG



Fertilisers



Agricultural technology

Note: Interests of less than 100% are held in AGR (75%) and QNP (50%)

Incident Overview

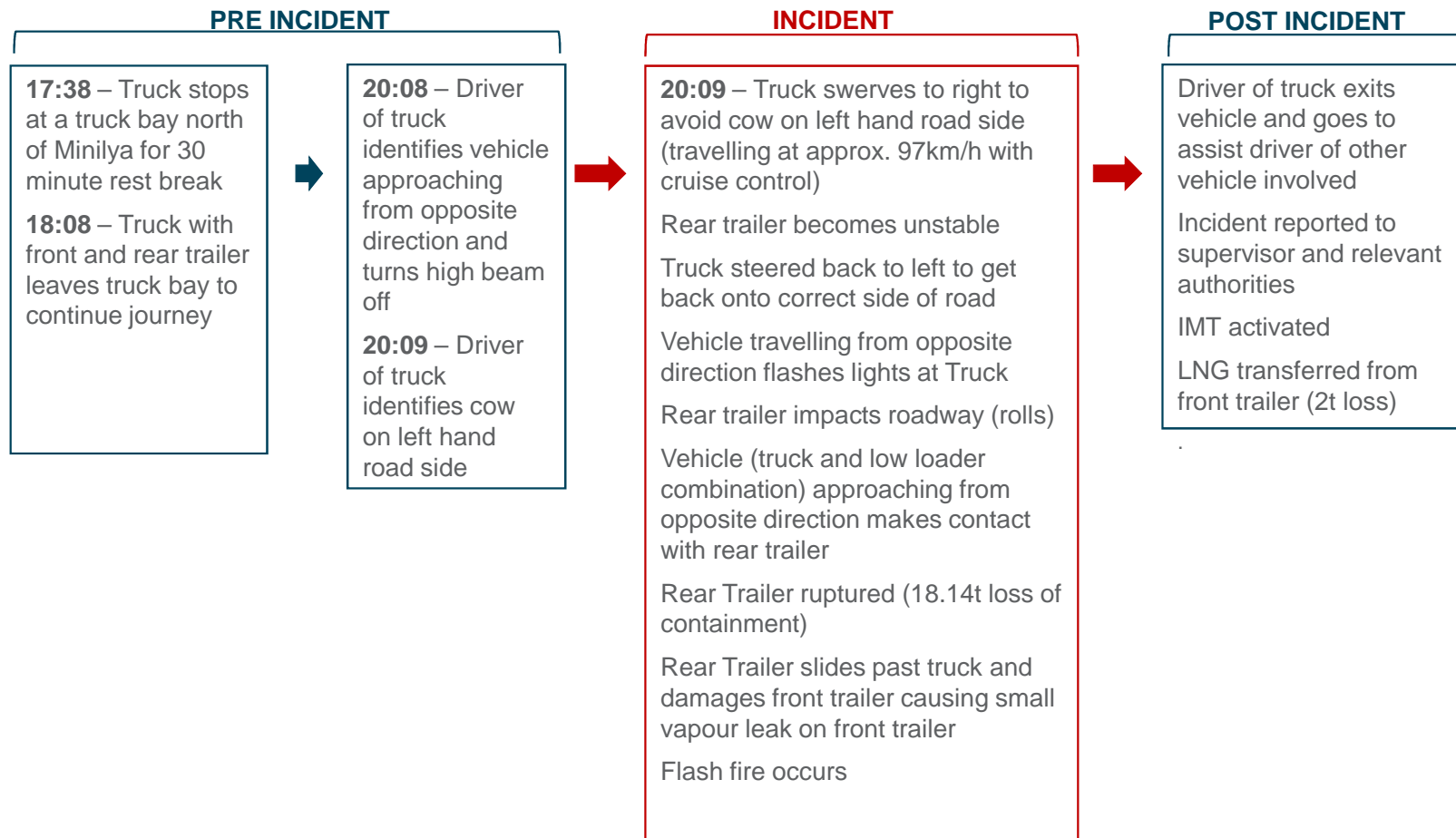
Incident Title	LNG Trailer Roll Over
Location	North West Coastal Highway, 20km south of Nanutarra Roadhouse, 1330km North of Perth
Date & Time of Incident	8/01/2018 ~ 20:10
Type of Incident	Motor Vehicle Incident, loss of containment and fire
Incident Summary	EVOL LNG tanker combination involved in traffic incident. Rear LNG trailer loss of containment resulting in localised fire. Lead LNG tanker impacted with resultant minor leak. Secondary vehicle (prime mover and low loader) impacted by collision and resultant fire.
Actual Consequence	Equipment Damage / Loss of Containment (18.14t)
Potential Consequence	Permanent Disability / Fatality Larger Stock Loss / Larger Fire

Location of Incident



Timeline

The following timeline captures the events surrounding the incident.



Remote incident scene

- Accurate information from scene overnight was sketchy until contact with individuals next morning
- Time taken for emergency service attendance – fortunate nearby bush fire had DFES personnel in attendance
- Technical Expertise from Kleenheat left Kwinana around 10pm, arrived midday
- Additional LNG tanker support on route back to Kwinana from Karratha
- Additional Kleenheat staff flew following morning, borrowing EDL support trailer from Karratha
- Road blocks 20km from scene, blocked arterial road for North west

Re-Creation of Incident



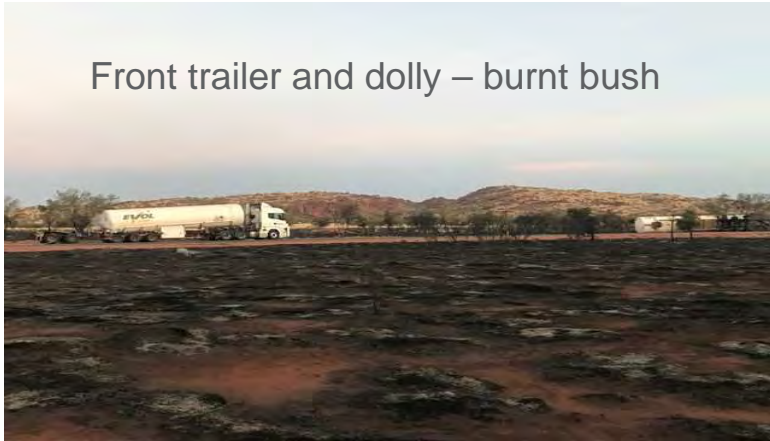
[Open video](#)

Incident Site at Night



Incident Site during Day

Front trailer and dolly – burnt bush



End cap – burnt bush



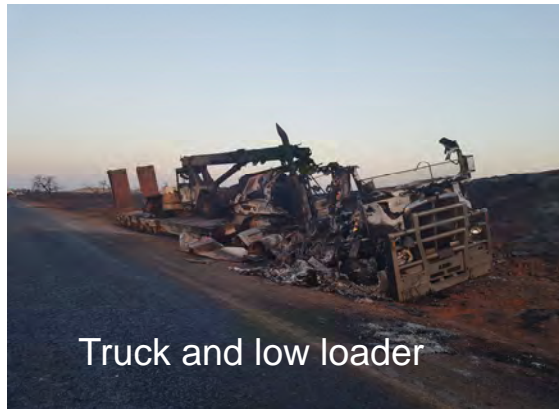
Truck, front trailer and rear trailer



Truck, front trailer, dolly and rear trailer



Equipment Damage



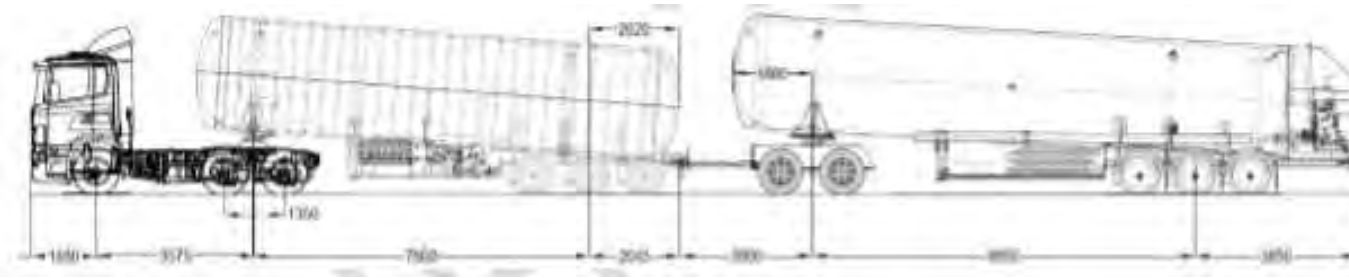
Drivers

Both drivers were taken to hospital and released the same day

Low Loader driver – minor burns to his arms &
scratches from moving through bush

LNG Driver – observation check up and released

Vehicle Arrangement



All weight and length dimensions were compliant

Road Conditions

- 8th January 2018
- 20:10
- Clear night, no fog or rain to impair visibility
- Sealed NW Coastal highway
- Speed limit 110km/h, combination speed 97km/h (100km/h for heavy vehicles)
- Visible road marks on the middle and road edges
- Medium to high probability of livestock on road

Vehicle Stability

- Performance Based Standards Scheme – The Standards and Vehicle Assessment Rules.
- The modelling assessed the following parameters:
 - Tracking Ability on a Straight Path
 - Static Rollover Threshold (Worst)
 - Static Rollover Threshold of last unit
 - Rearward Amplification
 - High-Speed transient Off-Tracking
 - Yaw Damping Coefficient.
- Level 4 PBS performance requirements – criteria met for normal driving conditions and normal lane changing activities.

Computer Modelling Analysis

Drawbar length

- Questions raised about 3m versus 5m drawbar and the effect on stability
- Analysis showed using a 5m drawbar would not eliminate the collision, but under the same condition contact would have been in a different position on the oncoming vehicle.
- However, with the combination of a 5m drawbar at 90km/h, the rear trailer behaviour would have been different (rolls to other side) avoiding the collision.

Avoidance Maneuver

- Different steering inputs were modelled to represent alternative evasive strategies
- A reduction of 50% steering input is enough to avoid rollover and reduce risk of colliding with cow

Speed reduction

- Slower speeds and subsequent reaction times were considered to attempt to quantify if a lower speed limit would help avoid cow, subsequent rollover and collision.
- Results indicated a 5km/h speed reduction and 25% reduction in steering input, the trailer rollover may have been avoided. Less likely to occur at 10km/h speed reduction

Metallurgical Analysis

Contact point was 30cm in front of weld, shaped like the culvert on a pole vault track, with the perpendicular shear occurring 5cm from the weld

Samples taken from ruptured vessel and analysed by optical emission spectroscopy and x-ray fluorescence

Chemical Analysis (XRF)

Confirmed vessel material type 304 stainless steel

Spectral Analysis (OES)

- Under high magnification confirmed slight deformation of the microstructure indicating a ductile fracture
- And indications the grains had been sensitized by significant force

Primary Cause / Contributing Factors

Primary Cause:

- The primary cause for the incident was the rapid movement of the LNG road train out of its normal driving lane because of the obstacle (cow) on the road, and the rapid return to its normal lane due to the proximity of the oncoming low loader.
- This rapid change in direction caused a shift in the centre of gravity resulting in the rear trailer rolling and sliding into the path of the oncoming low loader.

Contributory Factors:

- Oncoming traffic requiring driver to turn off high beam
- Night time driving with reduced visibility especially when headlights on low beam
- Cruise control activated and speed maintained at 100km/h when high beam turned off for oncoming traffic
- No formal guideline/instruction for drivers to reduce risk of unexpected objects (e.g. wildlife, night time)
- Limited fencing along roadway to restrict cattle access

Corrective Actions

- **Immediate interim action:** Contractor dropped night time driving speed to 80km/h in cattle prone areas.
- Contractor procedure amended for night time operations. When lights dipped cruise control disengaged and reduce speed by 10km/h.
- Completed a Post Incident Analysis for ER and IMT systems
- Completed incident modelling and metallurgical report
- Kleenheat developed night time driving procedure
- Complete additional modelling and risk assessment on reduced speed and deviation. Implement any required actions/follow up, including adding information to WesCEF learning materials.

Corrective Actions

- WesCEF developed learning materials to communicate incident findings within WesCEF and applicable WesCEF contractor transport companies. Has been included in Kleenheat training modules.
- Kleenheat developed a driver training package which will assist drivers to make better decisions when faced with potential collision situations. Package has been included in driver on-boarding training.
- Kleenheat to consider requirement for Infra-Red Cameras. Implement any required actions.

Improvement Opportunities

- Kleenheat to review application of Electronic Braking System to existing dolly's.
- Implemented 5m convertor dollies for road train combinations.
- WESCEF transport contractor group being setup to ensure consistencies in operations and vehicle configurations

Positive Outcomes

- No significant physical injuries
- Kleenheat Emergency Response and Incident Management Team (IMT) tested and found to work well, post event review identified a number of improvement opportunities.
- Focused attention on night travel
- Contractor was a positive contributor to the post incident response and recovery process
- Monitoring systems provided accurate and compelling records

Infra Red Camera



Infra Red Camera trial

- Ongoing as we speak
- First trial provided very negative comments from driver group, all about the screen display and its setup.
- Re-aligned configuration now in place
- Indications are the sensitivity needs adjusting as the images being seen are not as clear as other drivers from different companies seem to describe
- Expect feedback from Drivers by Oct

Questions

