# Wet Weather High Visibility Line Marking Trial (in Queensland)

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# BACKGROUND

- Visibility of conventional markings is reduced in wet conditions
- Assumed: this makes driving task more difficult - increases crash risk
- Crash data analysis for Queensland showed 20% of total crashes in 5 year period occurred on sealed roads in wet conditions.
- Of these, 16% when it was raining and 9% during dark conditions
- A priority action in Queensland RS Action Plan 2013-2015 was to identify & trial innovative treatments to increase visibility of markings in heavy rain
- QDTMR commissioned ARRB and trial commenced in 2014

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# PRODUCT SELECTION

- QDTMR consulted with the industry to investigate new products and capability to undertake the trial works
- Three products were selected based on the good initial trial results worldwide and feedback

- In reality ended up being 2 x line marking systems, 1 x delineation system
- Delineation system not primary focus of this paper

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# PRODUCT SELECTION 1

**Retroreflective raised pavement markers (RRPMs) with shorter than normal spacing (12m)**

Research showed a reduction on encroachment into other lanes in wet weather with shorter spacings

Opportunity to trial at wet weather crash black spots

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# PRODUCT SELECTION 2

**Cold Applied Plastic (CAP)**

Extensively used throughout Europe & NZ but less common usage in Australia for longitudinal lines

Marketed as having high wear resistance and providing high retro-reflectivity

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# PRODUCT SELECTION 3

**RainLine (Thermoplastic)**

Positive feedback received from UK HA
Extensively used in the UK

Potential to reduce 'side-swipe' crashes

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# SAFETY ANALYSIS

- The effectiveness of the trial products are measured in terms of wet weather retro-reflectivity in the short term
- It is assumed that as the retro-reflectivity improves there is a corresponding reduction in the number and severity of crashes over time
- As the crash data becomes available (minimum 3 years) for the trial sites, the before and after crash comparison will be performed
- Comparison (control) sites identified where conventional line markings were present are established

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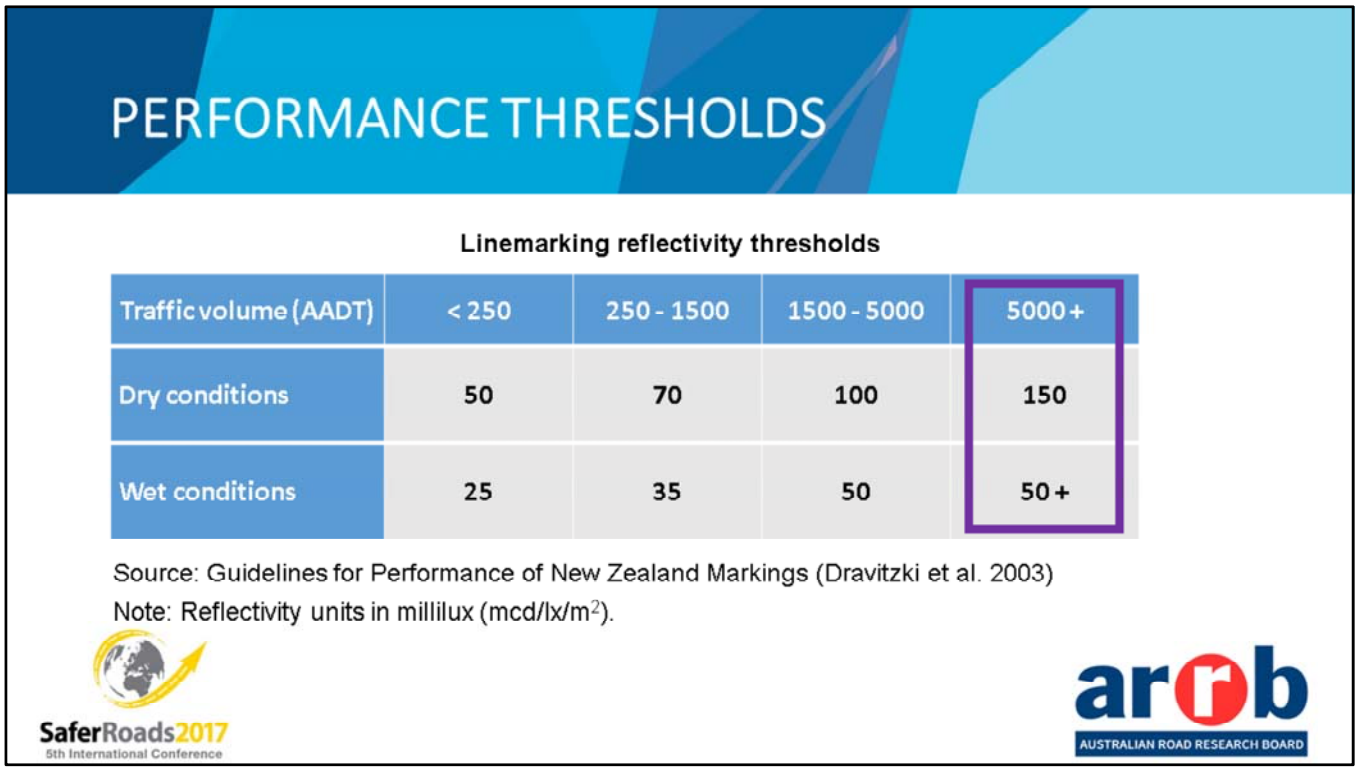


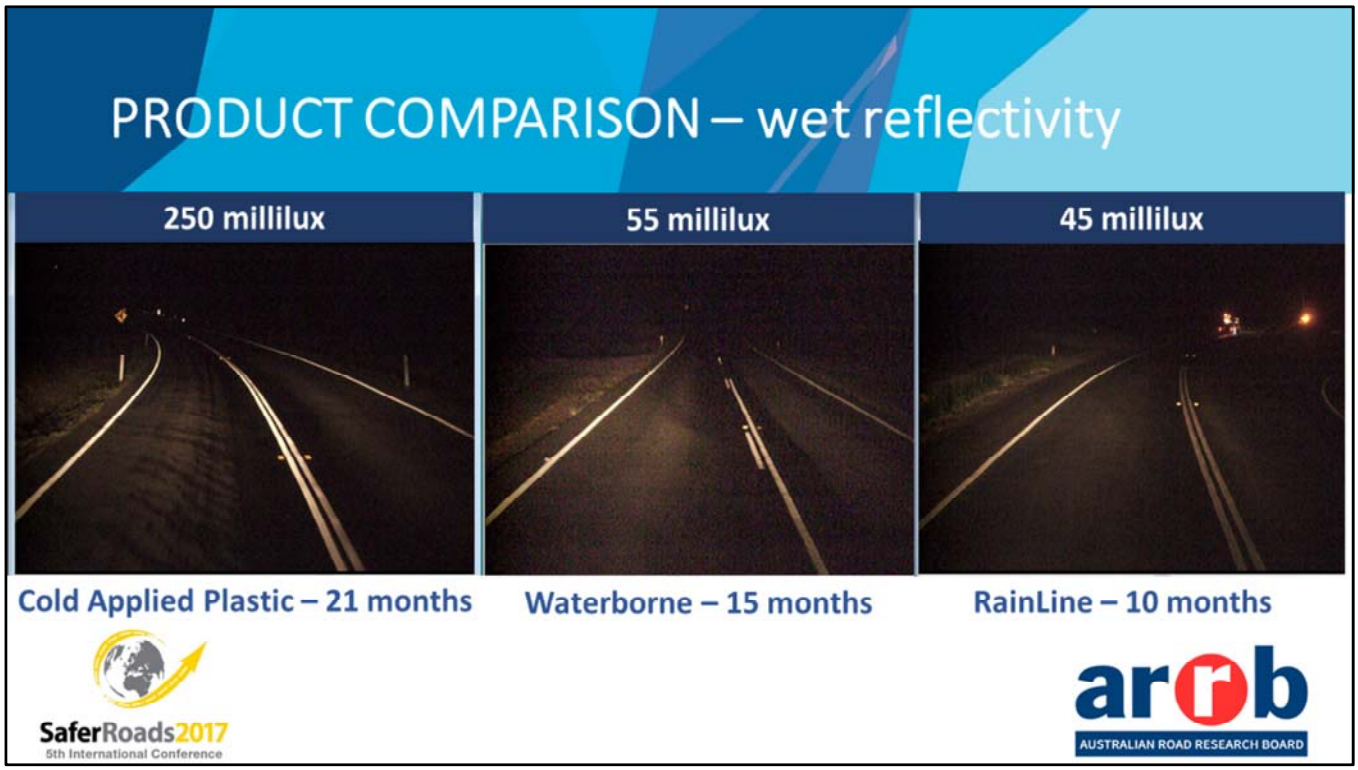

Once the products had been selected and installed ARRB was engaged to monitor the reflectivity and determine when the reflectivity on each site dropped below the threshold.
As the AADT at each of the sites was greater than 5,000 the thresholds selected were 150 millilux in dry conditions and 50 millilux in wet conditions.


The data was collected at each of the 6 test sites and 3 control sites when the road was dry and wet. The data was collected at 3 month intervals.

During the data collection at each site the dry and wet reflectivity of each centreline was measured 4 times to establish an average reflectivity reading.

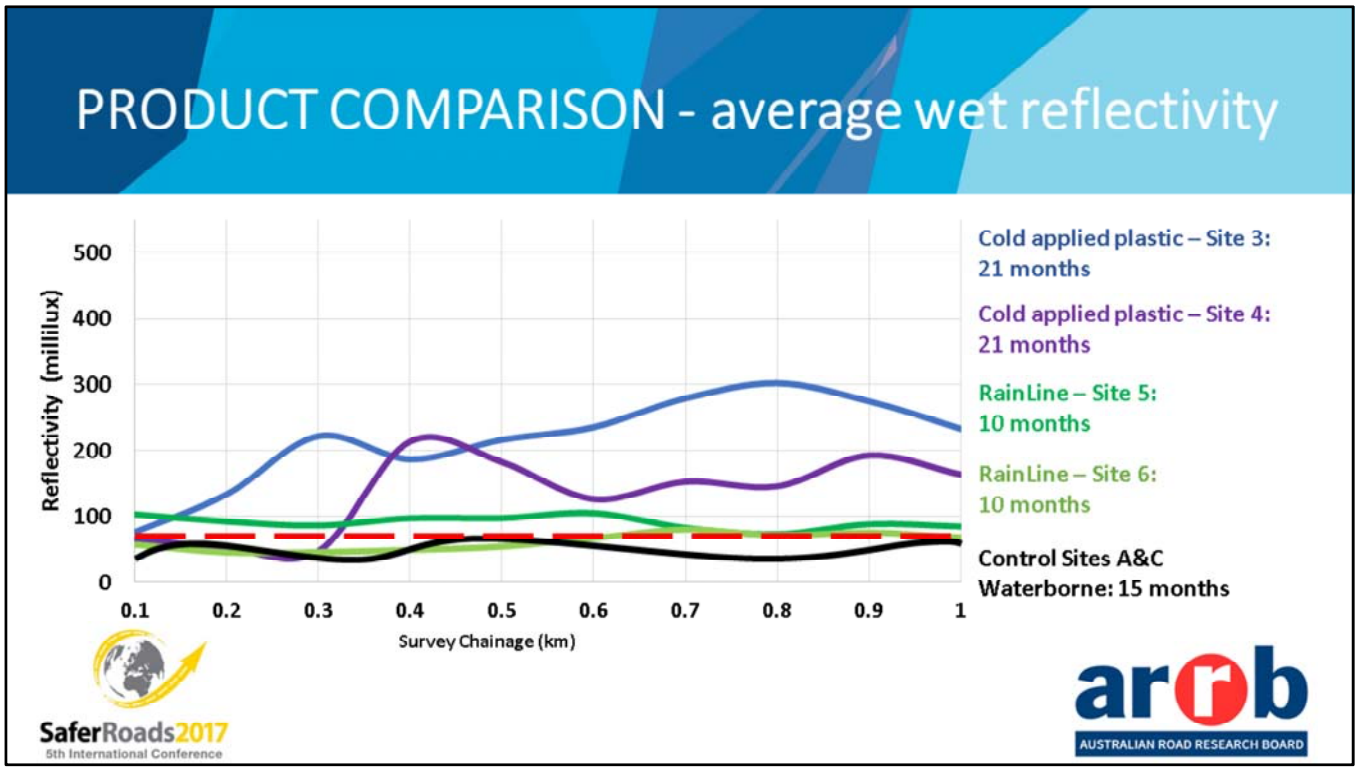
As the depth of water on the surface affects the wet reflectivity, It was crucial to place the same amount of water on the surface for each of the 4 data collection runs and to also apply that same amount of water on the road surface during each of the 3 monthly data collections. This created the best possible environment to ensure repeatability of the wet reflectivity data.

This was achieved by simulating approximately 6mm per hour of rainfall with a water truck.




During the data collection we also captured video.
These images are representative of the **average** WET reflectivity at some sites for each of these products.
You can see the difference in 250 millilux on the left to 45 millilux on the right.
Remembering that 50 millilux is the wet reflectivity threshold.

CLICK
Also note that the middle image, the waterborne paint is 15 months old compared to the Cold Applied Plastic and RainLine sites which are 21 and 10 months old.



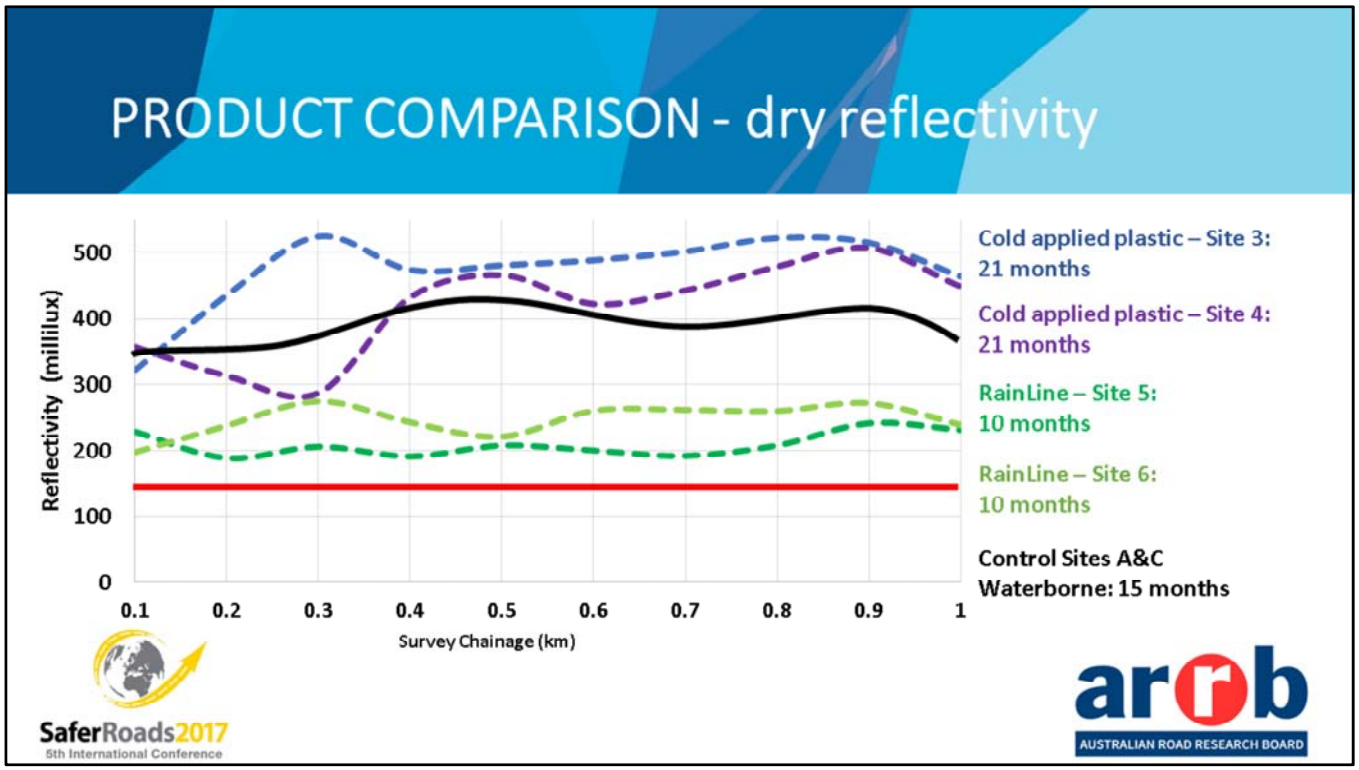

These reflectivity readings represent the average WET reflectivity of each product.

To put these in perspective note wet reflectivity threshold line of 50 millilux
CLICK

Now lets compare this to a control site with waterborne paint.
CLICK

Given the wet reflectivity readings of the Cold Applied Plastic and RainLine test sites after 22 and 10 months respectively, the data to date indicates that cold applied plastic paint with Type D-HR W glass beads a higher wet reflectivity over a longer lifespan than RainLine or waterborne paint with the same glass beads. The Rainline paint with Type D-HR W beads indicates that it will provide a similar level of wet reflectivity to the waterborne sites, however 1 of the 3 waterborne sites dropped to near the wet reflectivity threshold after only 3 months, this indicates that whilst the RainLine product may provide a similar level of wet reflectivity, it is more consistent in doing so.

ARRB will continue to collect the data at 3 month intervals over the next 12 months at all 6 test sites and the 3 control sites until reflectivity reduces to below the wet reflectivity threshold of 50 millilux. This data should also identify the rate of deterioration before the reflectivity drops below the wet reflectivity threshold.

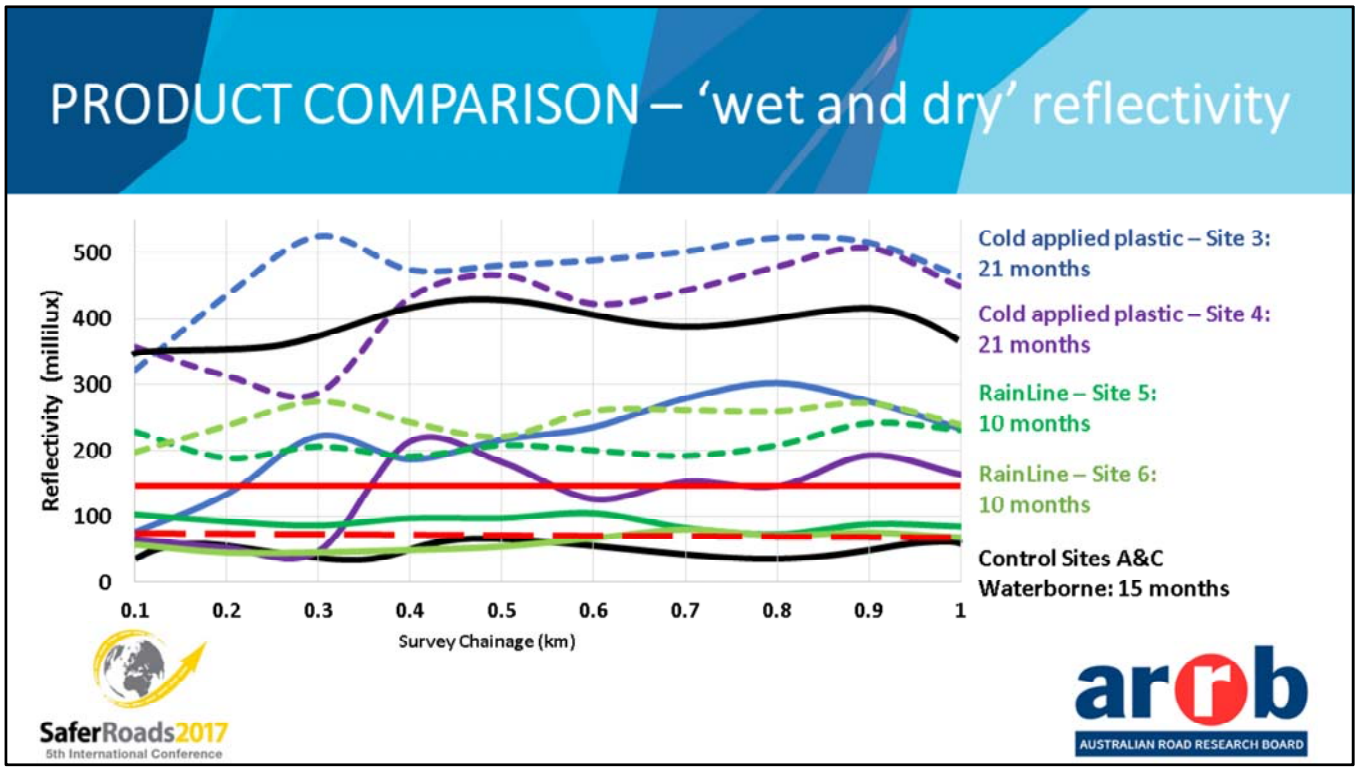



These reflectivity readings represent the average DRY reflectivity of each product.

To put these in perspective note the dry reflectivity threshold line of 150 millilux
CLICK

Now lets compare the cold applied plastic and RainLine sites to a control site with waterborne paint.
CLICK

Considering that the waterborne site is 5 months older then the RainLine you would consider that the waterborne site demonstrates better dry reflectivity performance, however when comparing the cold applied plastic site to the Rainline and waterborne sites, the cold applied plastic site demonstrates superior performance, particularly given that the cold applied plastic site is 6 months older than the waterborne site.




This is a busy graph, if you can make heads or tails of it, it shows a comparison of dry reflectivity and wet reflectivity of each product.

Whilst you are untangling the graph I'd like to tell you about some upcoming work that ARRB is carrying out with the Department of Transport and Main Roads Queensland. ARRB is continuing line marking testing under the NACoE research program. A current project is set to undertake testing of 15 different combinations of Waterborne, Cold Applied Plastic and Thermoplastic paints, with Type D-HR, B-HR and various anti-skid additives to establish the dry and wet reflectivity rates of deterioration, lifespan, and also the same for skid resistance performance.
The products are being tested in test deck conditions, it is hoped that the data collection and analysis will be completed by mid 2018.

# FOR MORE INFORMATION CONTACT -


David Milling

ARRB - Brisbane

david.milling@arrb.com.au

Santosh Tripathi

QDTMR - Brisbane

santosh.z.tripathi@tmr.qld.gov.au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