




## Sealing With Emulsion in New Zealand


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## Why use Emulsion?

- Safety
- Environment
- Quality and Engineering





## Safety

**Positives**

- Handled at less than 90°C
- Aqueous environment – not explosive
- Lower chemical content
- Less fumes
- No reported injuries from emulsion in NZ

**Negatives**

- Changing between emulsion and hot bitumen
- Some reported boil-overs in NZ



## Emulsion vs. Cutback Safety Considerations






## Environment

**Positives**

- Less energy required to get binder on the road
- Less diluent released to environment
- Less use of non-renewable resource

**Negatives**

- Risk of washout into waterways



## CO<sub>2</sub> Generated per Tonne of Sealing Bitumen Sprayed

	Cutback Bitumen (kg/t)	Emulsion (kg/t)
Transportation	2	7
Production / Heating	62	16
<b>Total</b>	<b>62</b>	<b>23</b>

## VOC Emissions



- Mostly generated by the evaporation of 60% - 75% kerosene within cutback bitumen.
- VOC is known to react with sunlight and other chemicals to form photochemical smog.
- FH calculations indicate that approx. 700,000 litres of kerosene is lost to the atmosphere each year. FH VOC emissions:
  - Cutback 19 kg/t sealing bitumen
  - Emulsion 3 kg/t sealing bitumen
- Increased use of emulsion would significantly decrease the emission of these harmful compounds.



## Quality and Engineering



### Positives

- Manufactured for purpose (not waste)
- Best delivery system for PMB
- Better wetting and adhesion
- Earlier return to base binder properties
- Binder less oxidised

### Negatives

- Susceptible to traffic while curing
- Susceptible to variation in bitumen chemistry
- Susceptible to rain and humidity
- Evaporation of significant quantities of water

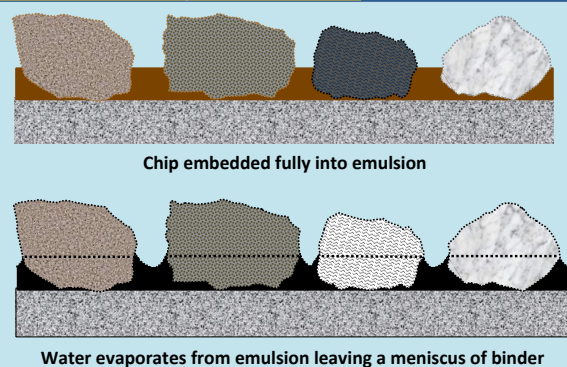


## Why not 100% Emulsion?



- Emulsions not suitable for some treatments
- Smaller contractors not producing emulsion
- Need strong technical systems
- Climate in some regions increases risk
- Base binder variability causing quality issues
- Emulsions cost more?
  - Per tonne of ordinary binder delivered onto the road
  - Can reduce application rate up to 15% (Downers)?
  - Competitive when used for PMB sealing

## Emulsion Binder Meniscus Photo courtesy Akzo Nobel



## Emulsion Primer



### Positives

- For first coat seals on new construction
- Wets through the cement or lime
- Allows second coat seal binder

### Negatives

- Cost
- Extra operation
- Time to cure

## Emulsion First Coats on Stabilised Base



## Contract Environment in NZ



- NZTA generally leave it to contractor to choose whether emulsion or cutback
  - Some contracts specify emulsion
  - NZTA South Canterbury longest seal lives using emulsion.
- LAs specify it
  - Customer preference

**No Surprises!!!**



## Performance Based Contracts



- Clients
  - Specify base binder
  - Penetration grade or PMB
  - Specify flux limits
- Contractors
  - Delivery system emulsion or cutback
  - Choose cutter levels



## No Emulsion or PMB Specification



- Emulsion just a delivery system
- Cutback and heat just a delivery system
- Contractors have Technical Data Sheets for their products
- Clients specify the end result.

