COLD RECYCLING IN SOUTH AMERICA: PERÚ AND BRAZIL

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TDM – PERÚ

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**ASPHALT MODIFIED**
The polymer modified asphalt binders are resulting from the physical interaction and/or polymer chemistry.

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**ASPHALT EMULSION**
Asphalt emulsions are an economical, safe and environmentally friendly alternative for paving purposes, since management.

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**SOIL STABILIZER**
Soil stabilizers CON-AID liquid chemicals are specifically designed to improve

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**GABIONS**
In our gabion structures are constituted by metal elements made of hexagonal mesh

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**BARRIERS DYNAMICS OF ROCK FALL PROTECTION**
Protection systems against rockfall are dynamic systems

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**FOR EMULSION PRIMER (PRIMETEC)**
Asphalt primer for PRIMETEC®, emulsions is a differentiated technology specially designed to service

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**CORRUGATED METAL STRUCTURES**
The corrugated metal structures SUPER-COR combine the advantages of a lightweight construction with high strength and durability of

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**GCL (GEOSYNTHETIC CLAY LINER)**
Geosynthetic clay liner consists of two geotextiles with a core

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## Classification of Asphalt Emulsions in Perú and Brazil

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In Peru, **cold in-place recycling (emulsion-based)** has been used for over 20 years to solve numerous pavement distresses in a cost-effective manner.

As in other parts of the world, CIPR in Peru has been used to **correct deficiencies** in pavements exhibiting fatigue cracking (age-related), transverse cracking, drainage inefficiencies, and other pavement distresses.

The use of CIPR has enabled Peruvian agencies to **restore pavement ride and performance quality** while maximizing the use of existing materials (avoiding new raw materials consumption) and minimizing traffic closures.

Significant service life extensions have been documented.
When and Why to Recycle in Perú and Brazil

- When the materials (bitumen and aggregate) in the aged pavement can be reused.
- When fatigue and other distress levels have reduced ride quality to the point that the pavement is beyond repair and beyond its useful life.
- Emulsion-based cold recycling allows significant savings in materials costs and energy consumption.
- Analyses have shown that emulsion-based CIPR is environmentally friendly.
Metrics Applied to Decide When to Recycle

- When distresses (oxidation, cracking, raveling, etc.) reach medium to severe levels
- When the underlying pavement structure is sound (via FWD)
- When the thickness of the distressed surface course exceeds 5 cm
Example: Brasil, SP-147 Limeira - Piracicaba

Fatigued surface course, 7.5 cm thick
Emulsion (CSS-1h) with rejuvenator (aromatic oil) = 3% w/w RAP
Hydrated lime = 1% w/w RAP
Tren de reciclado de carpeta asfáltica
• Crushed RAP scalped and sized

• Pug-mill mixing with CSS-1h
No virgin aggregate back-added

Rough texture
Compaction with steel wheel and PTR
Overlay with Type-III Micro-Surfacing

Pre-mix water = 7% w/w aggregate
Cement = 1% w/w aggregate
Cationic Quick-Set Emulsion (CQS-1h) 12% w/w aggregate (ISSA A-143)
Severely aged (ravelled away) pavement on unbound granular base
Base aggregate was usable (no virgin back-add)
Slow-Set bitumen emulsion (CSS-1h) = 3% w/w aggregate (RAP + base)
Cement = 0.5% (w/w RAP + base)
Dense surface after rehabilitation
Structural coefficient doubled from $a_2 = 0.14$ to $a_2 = 0.27$ (AASHTO 93)
Excelent cohesion development (photo taken after 15 days of traffic)
An HMA overlay was applied as final wearing course.
FDR– Perú, Conococha Huaraz Molino pampa

- 7.5 cm HMA severely distressed by alligator cracking and pot-holes
- Traffic upgrade required 20 cm lift with a minimum a2 = 0.26
- Virgin back-add requirement was 25%
- 2% Foamed bitumen was used for stabilization
- Cement = 0.8% w/w RAP + base + virgin back-add
- Job site location was at 4200 metros (13,780 feet) and so cement levels were minimized.
- Night temps: -14°C
- Day temps: 22°C
Virgin back-add
Reciclado con asfalto espumado (Foamed AC)
Reciclado con asfalto espumado (Foamed AC)
Conformación de la superficie de la base reciclada
Superficie de la base reciclado con asfalto espumado (Foamed AC)
Imprimación de la base reciclada
Micro-Surfacing Overlay on FDR Treatment
Setting of the Micro with PTR
Project After 4 Years of Service
Excellent ride quality via IRI.
FWD tests showed continued, long-lasting durability of the structure
THANK YOU