NCAT Pavement Test Track

Experience with Rejuvenators
Why Rejuvenators?

- 2 AC tanks (neat, polymer) common in many markets
- Aged(+) binder quality not the same as virgin binder
- Volumetrics don’t necessarily relate to mix quality
- BMD for cracking, rutting performance indicators
- Recycling agents for aged/higher RAP contents
- Difference between softeners and rejuvenators
- Agency assurance for long term benefits.
1986 partnership between the NAPA Research and Education Foundation and Auburn University

Provide innovative, relevant, & implementable research, technology deployment, & education that advances safe and sustainable asphalt pavements

NCAT Pavement Test Track operational since 2000.
History with Rejuvenators

- 2015 - \( N_7 \) \( \text{Delta S} \)
- 2016 – CSAH-8\(_{29} \), US-169\(_{22} \)
- 2018 – \( N_7 \) \( \text{Delta S} \), \( S_1 \) \( \text{Evoflex} \), \( N_3 \) \( \text{Anova} \)
- 2021 – \( S_1 \) \( \text{Evoflex} \), \( N_8 \) \( \text{EcoBlend} \), \( R_8 \) \( \text{BioMAG} \), \( R_9 \) \( \text{ReCharge} \), \( R_{10} \) \( \text{Delta S} \)
How?
“CG+” Recycling Agent in “N7” in ‘15

RAP+RAS problems
Reaction time issue
10 million ESALs
≈ 20% RAP control
MnROAD’s CSAH-8$^{29}$ & US-169$^{22}$ in ‘16
''18 Oklahoma BMD in “N9” and “S1”

- N9
  - SH-20\textsubscript{Hominy} +5.7 (+40%)
- S1
  - I-35\textsubscript{mm} 100
  - <\frac{1}{4} “rut”

Differences = f (binder, lab, plant, aging, reheating)
Higher RAP with Rejuvenation in “N3”

- 3/8 inch NMAS, 50 gyrations, PG64-22
- CT Index ≥ 70, APA ≤ 8 mm, Cantabro ≤ 7½%
- Well under ¼ inch of “rutting”
- Roughness differences...
- No Macrotexture Changes (Not Raveling)
Higher RAP with Rejuvenation in “N3”
Field Projects in 2017$_{AL}$ and 2019$_{GA}$
Rejuvenator Implementation

- Role of balanced mix design (BMD) in process
- Critical aging for mix design approval
- Plant aging for production threshold
- Verify critical aging in control strip/startup
- No aging for construction quality testing
- Minimum value consideration of statistics
- Local threshold criterion for design/construction
- Binder content and gradation tolerances/PWL.
2021 NCAT Pavement Test Track

- Traffic continuation on N3 Anova experiment (3→6 years)
- Traffic continuation of S1 Evoflex section (3→6 years)
- New N8 with Evoflex (base) and EcoBlend (surface) (vs S1)
- Off-ramp rejuvenated cold recycling (RCR) experiment
2021 Ramp RCR Sections

- 6" granular base on Track subgrade
- 4" CR mill/inlays under 1" thinlays
- R5 HMA, R6 F, R7 E, R8 BM, R9 RC, R10 E+DS.
Takeaways

• Start with volumetrics, end with performance
• Prevent failures AND incentivize innovation/ sustainability
• Role of recycling agents (rejuvenators versus softeners)
• Start with construction tests, work back to design approval
• Aging for design approval, unaged for fast construction
• 4-hour turnaround from sample pull to test results
• Everyone should be studying their mixes, options, costs!
Dr. R. Buzz Powell, PE
Associate Director and Research Professor

277 Technology Parkway
Auburn, AL  36830

Phone: (334) 844-6857
Cell: (334) 750-6293

Email: buzz@auburn.edu
Web: www.pavetrack.com
Twitter: www.twitter.com/pavetrack