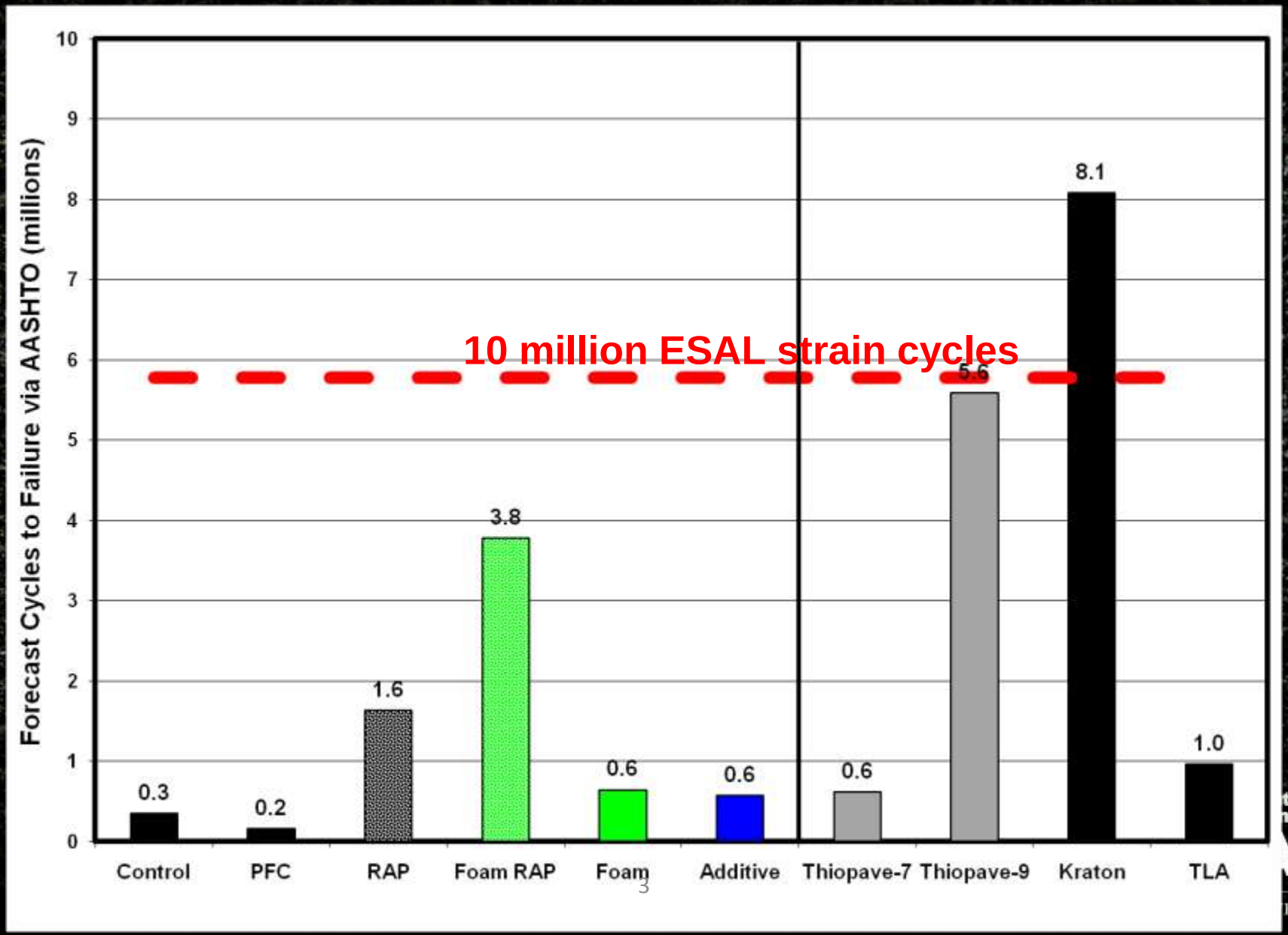
WMA & RAP and New Technologies

Current NCAT Focus Areas

- Warm mix asphalt
- High recycled content mixes (RAP & RAS)
- Alternative binder materials
- Optimized structural design
- Pavement preservation
- Automated QC technologies
- Drainable, quiet pavements

National Center for Asphalt Technology
NCAT
at AUBURN UNIVERSITY

2009 GE+ Fatigue Expectations Actual



Green Group (GG) Experiment

WMA Mix Design

- Drop in additive technologies
  - Mixing/compaction temps via technology provider
- Lab foamers are recommended
  - No way to replicate proprietary technologies
- NCHRP 9-43 "Volumetrics Plus" approach
  - Compactability ($N92_{comp\text{-}30F}$ / $N92_{comp}$ ≤ 1.25)
  - T283 (≥ 80 percent) and coating test for moisture
  - FN with criteria as function of traffic
  - Mix above PG grade of recycled materials

RAP Mix Design

- Tier 1: Up to 15% RAP
  - use specified binder grade
- Tier 2: 15%-25% RAP
  - use one full binder grade lower, e.g., PG 58-28 instead of PG 64-22
- Tier 3: Over 25% RAP
  - Extract, recover and grade RAP binder
  - use blending charts to determine required binder grade

National Center for Asphalt Technology
NCAT
at AUBURN UNIVERSITY

WMA+RAP Plant Production

- Plant temperatures (foam/additive)
  - Water injection
  - Additive addition
    - Plant site
    - Terminal blend
    - Combination foam/additive
- Testing (moisture/moisture sensitivity)
- QC/QA
- Cost versus project savings

WMA+RAP Laydown

- Haul time & equipment temperatures
- Temperature behind screed
- Standard HMA best practices
- Significant density differences

WMA+RAP National Perspective

- Federal requirements (9-43)
- Other state specifications/requirements
- Hindsight is 20/20

National Center for Asphalt Technology NCAT at AUBURN UNIVERSITY

Shingles

- Processing requirements
- Stockpile practices
- Plant modifications
- Mix quality control
- Mix design specifications
- Source of materials

Alternative Binder Materials

- Post consumer versus manufacturing waste RAS
- Modification via recycled tire rubber
- Highly polymer modified mixes
- Supplementation with Trinidad Lake pellets
- Sulfur replacement WMA technology
- Improved bond strength via tack practices

Optimized Structural Design

- M-E design validation / local calibration
  - Perpetual pavements vary from 9 to 14 inches
- Interim layer coefficient recalibration
  - Increase from 0.44 to 0.54 for dense mixes
  - Recommend 0.15 as interim PFC value
- Thinner structures via stiff interlayers
- High polymer mix for construction / rehabilitation

Pavement Preservation

- Reactive versus proactive methodologies
- Combination of plant mix and non-plant mix
- Aggressive pavement management is essential
- Decision trees to identify ideal alternative(s)
- Life cycle as a function of pretreatment condition

Life Cycle of Preservation Alternatives

Questions ?

National Center for Asphalt Technology
NCAT
at AUBURN UNIVERSITY

www.ncat.us

Dr. R. Buzz Powell, PE

Assistant Director & Test Track Manager

277 Technology Parkway
Auburn, AL 36830

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

Email: buzz@auburn.edu
Web: www.pavetrack.com

National Center for Asphalt Technology
NCAT
at AUBURN UNIVERSITY