

# Asphalt Institute Research Update

FAA Airport Pavement Working  
Group Meeting  
April 16, 2013



# Asphalt Institute News

- Plan to publish a new Mix Design manual (MS-2) later this year
  - Combines previous manuals
  - Current knowledge of RAP and RAS designs
  - Includes specialty mixtures such as drainable or open mixtures
- Webinar offerings are growing. Many recorded webinars for PDHs.
  - [www.asphaltinstitute.org](http://www.asphaltinstitute.org)
- New online site for lab accreditation management
  - [www.R18labqms.com](http://www.R18labqms.com)



# Trends in Highway Pavements

- A few notes from the recent Association of Asphalt Pavement Technologists (AAPT) held last week:
  - No rutting problems reported...no concerns
  - Several discussions on cracking and tests to evaluate cracking
  - RAP and RAS usage growing
    - \*93% of RAP was reused; 19% growth since 2009
  - Warm Mix Asphalt (WMA) growing
    - \*300% increase since 2009

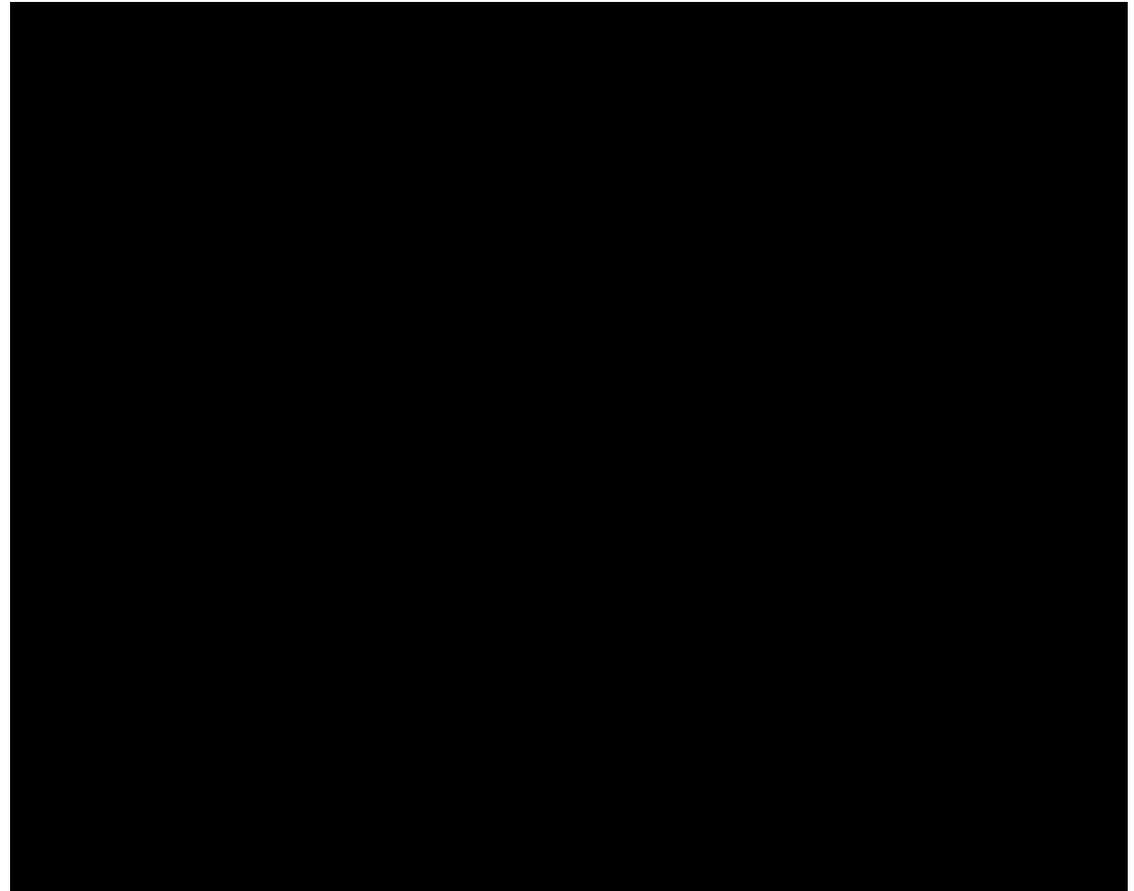
*\*Survey data from NAPA survey by Howard Marks*

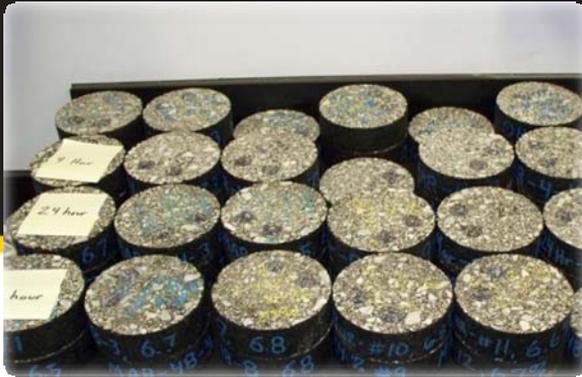


# AMPT Going Forward

Accelerated  
Mixture  
Performance Test  
moving forward

NCAT is  
coordinating  
round-robin for test  
precision and bias





## AAPTP 06-01 REVIEW

*Test Procedures for Predicting  
Non-Load Associated Cracking of  
Airfield HMA Pavements*



*Prime*

*AMEC – Doug Hanson*



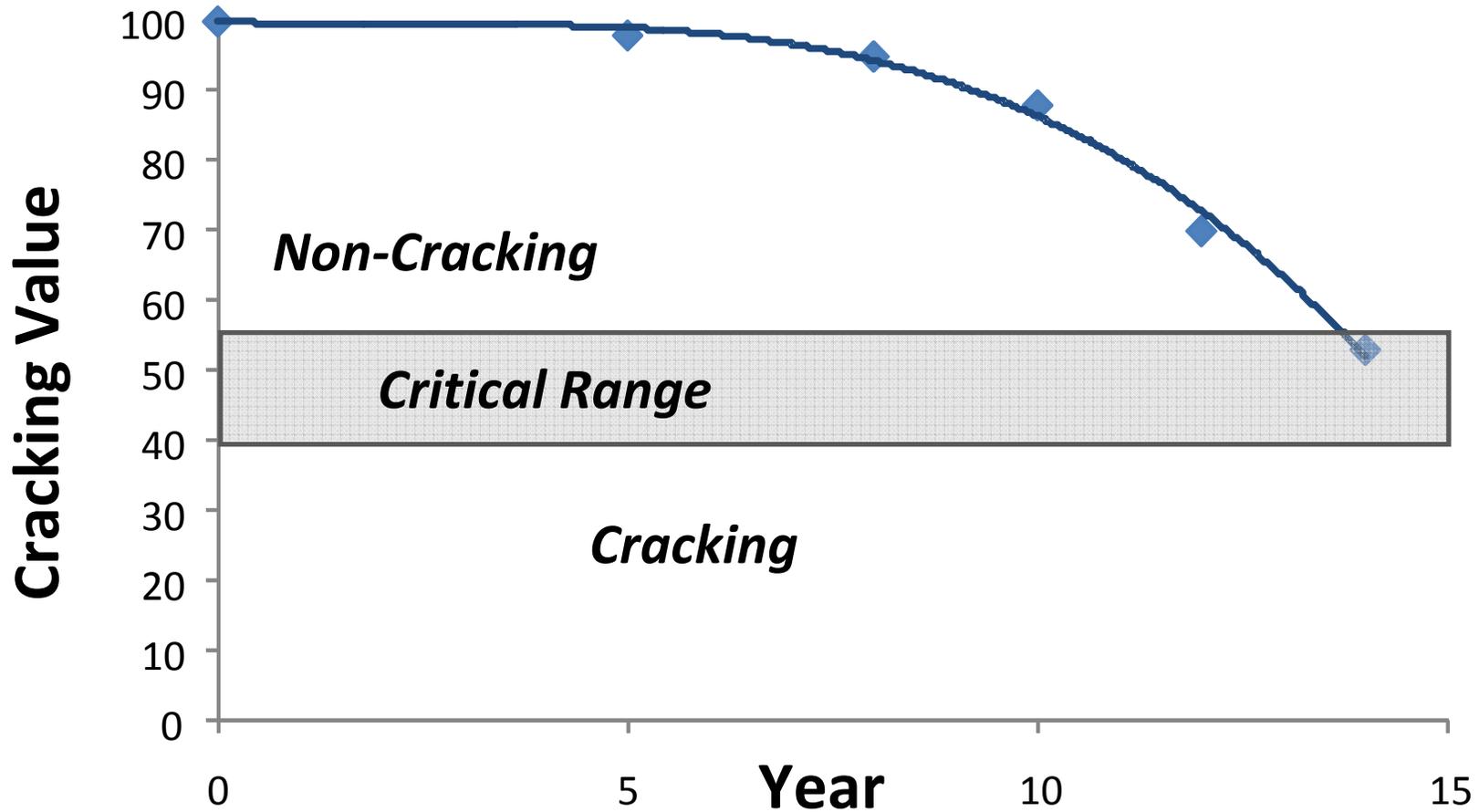
# AAPTTP 06-01 Question

As the Airport Manager...

What test do I run or what calculation can I do that will tell me when the pavement is expected to begin showing significant non-load related distress?



# Concept



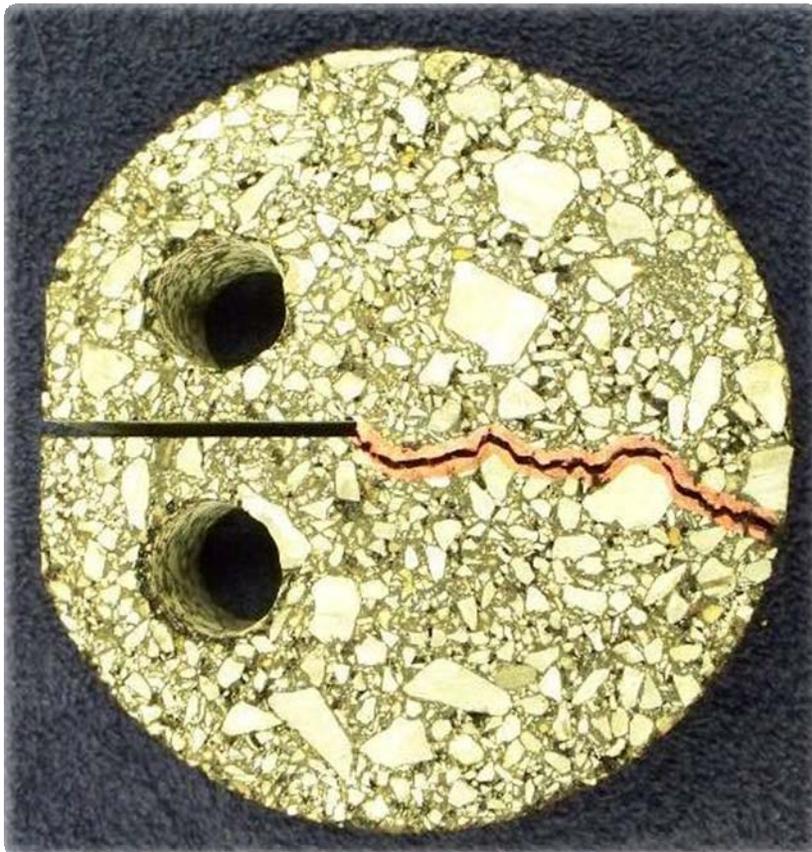
# Asphalt Binders

- Three asphalt binders representing different expected aging characteristics
  - Selected based upon the relative relationships between low temperature stiffness (S) and relaxation (m-value)
  - West Texas Sour (PG 64-16)
    - 3.1°C m-controlled
  - Gulf Southeast (PG 64-22)
    - 1.3°C m-controlled
  - Western Canadian (PG 64-28)
    - 0.6°C S-controlled



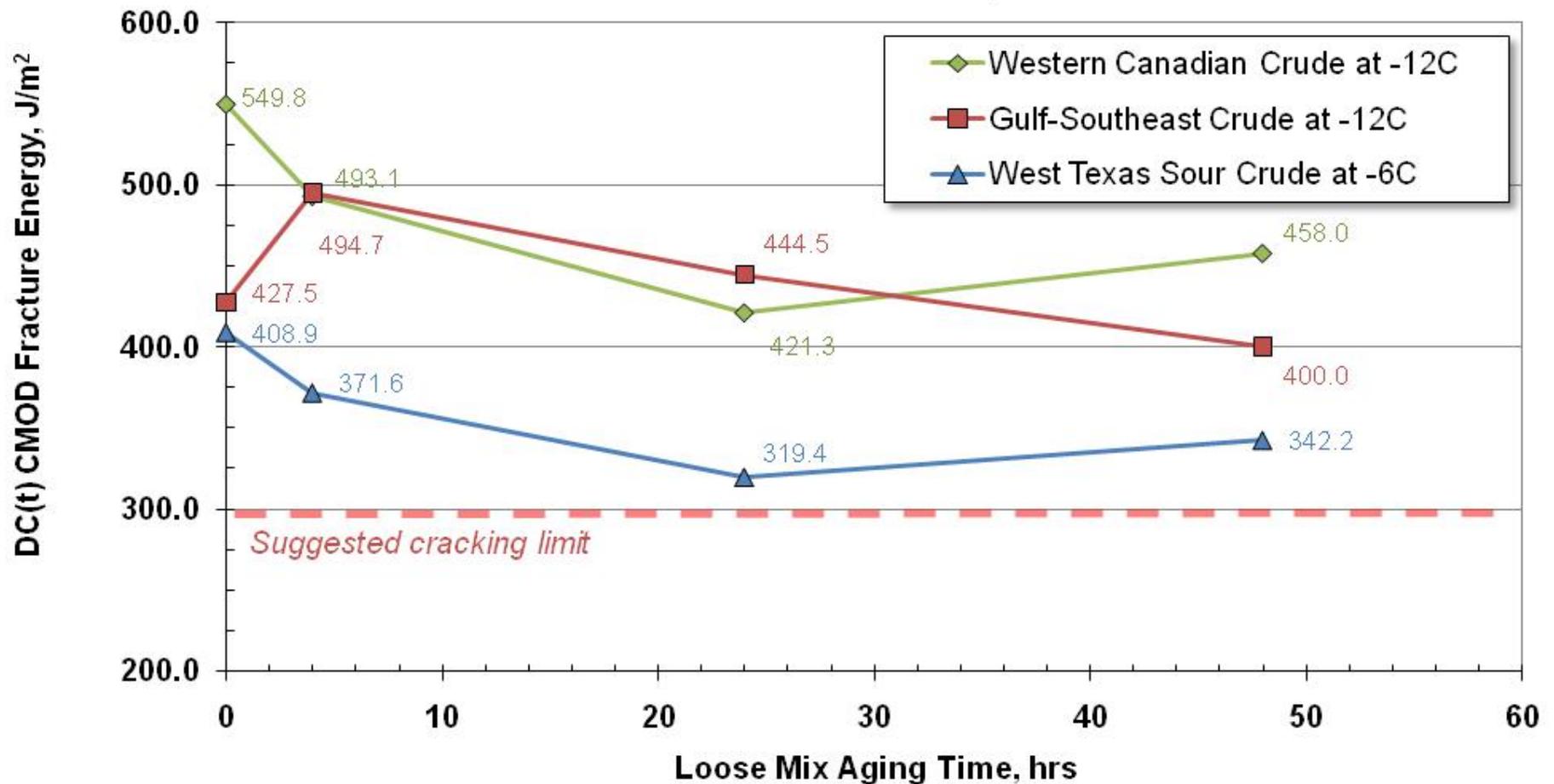
# Mix Testing: Disk-Shaped Compact Tension Test

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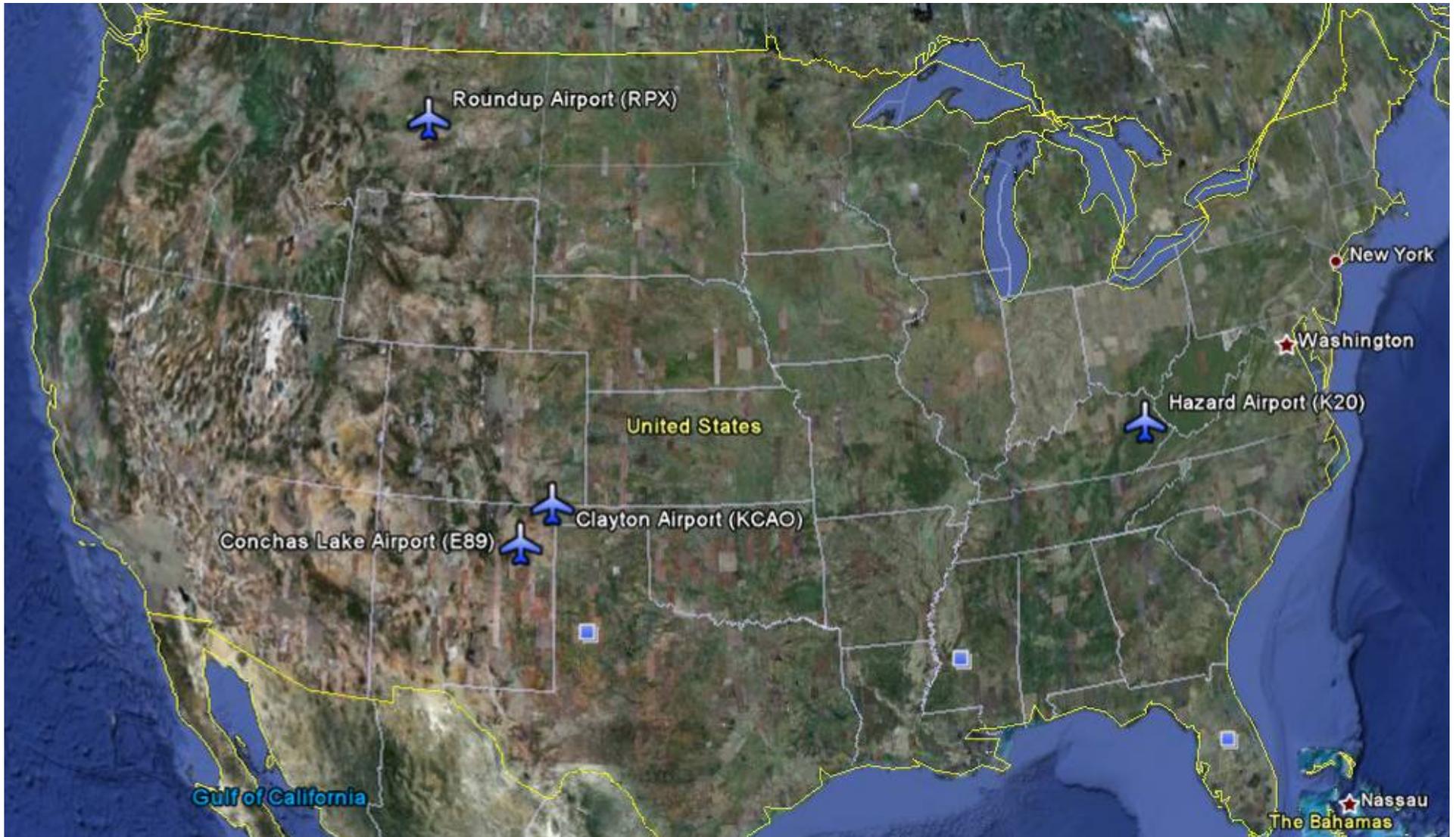


# Disk-Shaped Compact Tension

DC(t) CMOD Fracture Energy for Varying Crudes  
Climatic Temperature



# Field Validation



# Field Cores



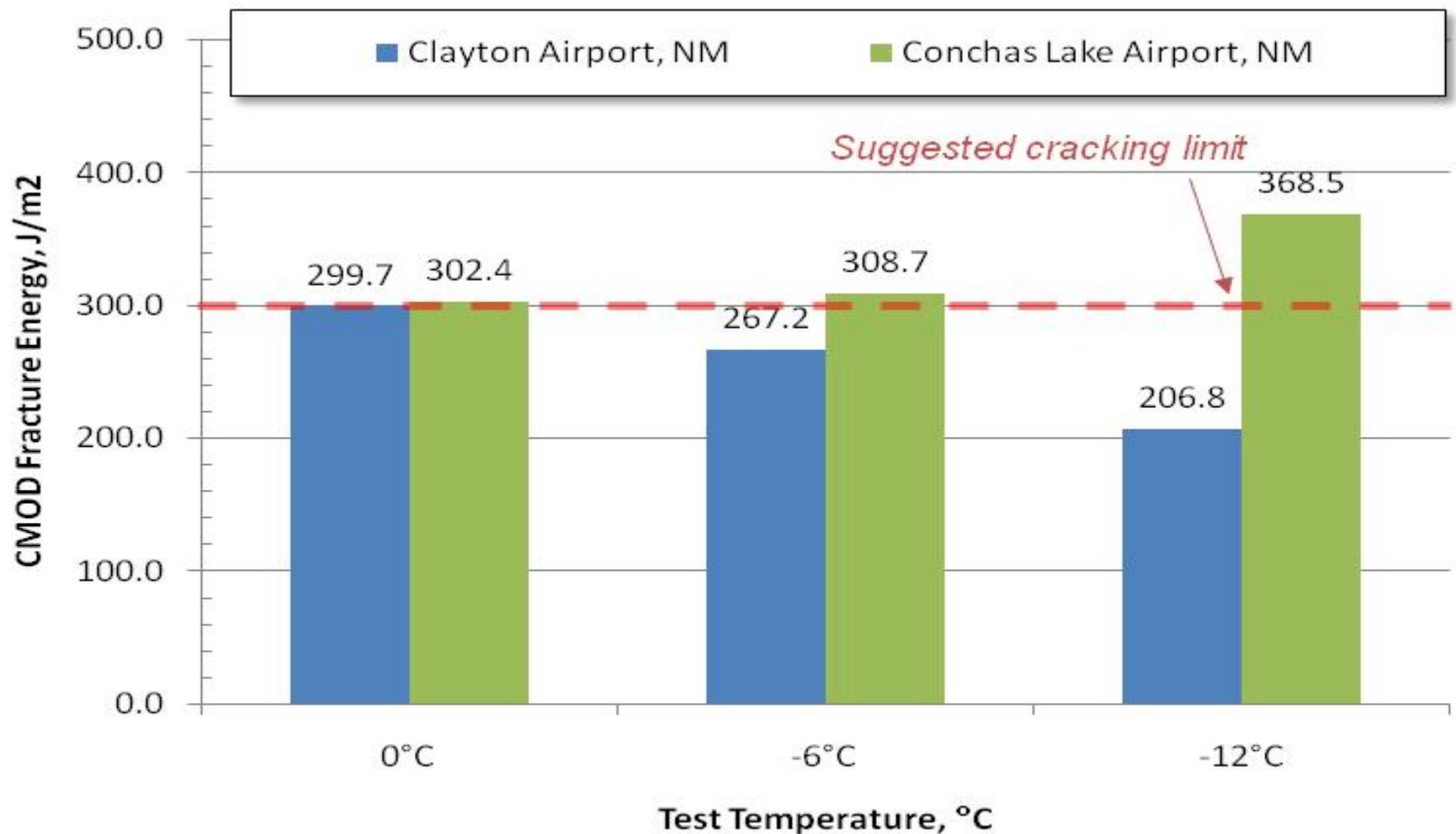
# Core Preparation

- Cut top 25mm (1in) from the surface of each core
  - Binder test
  - Mix test



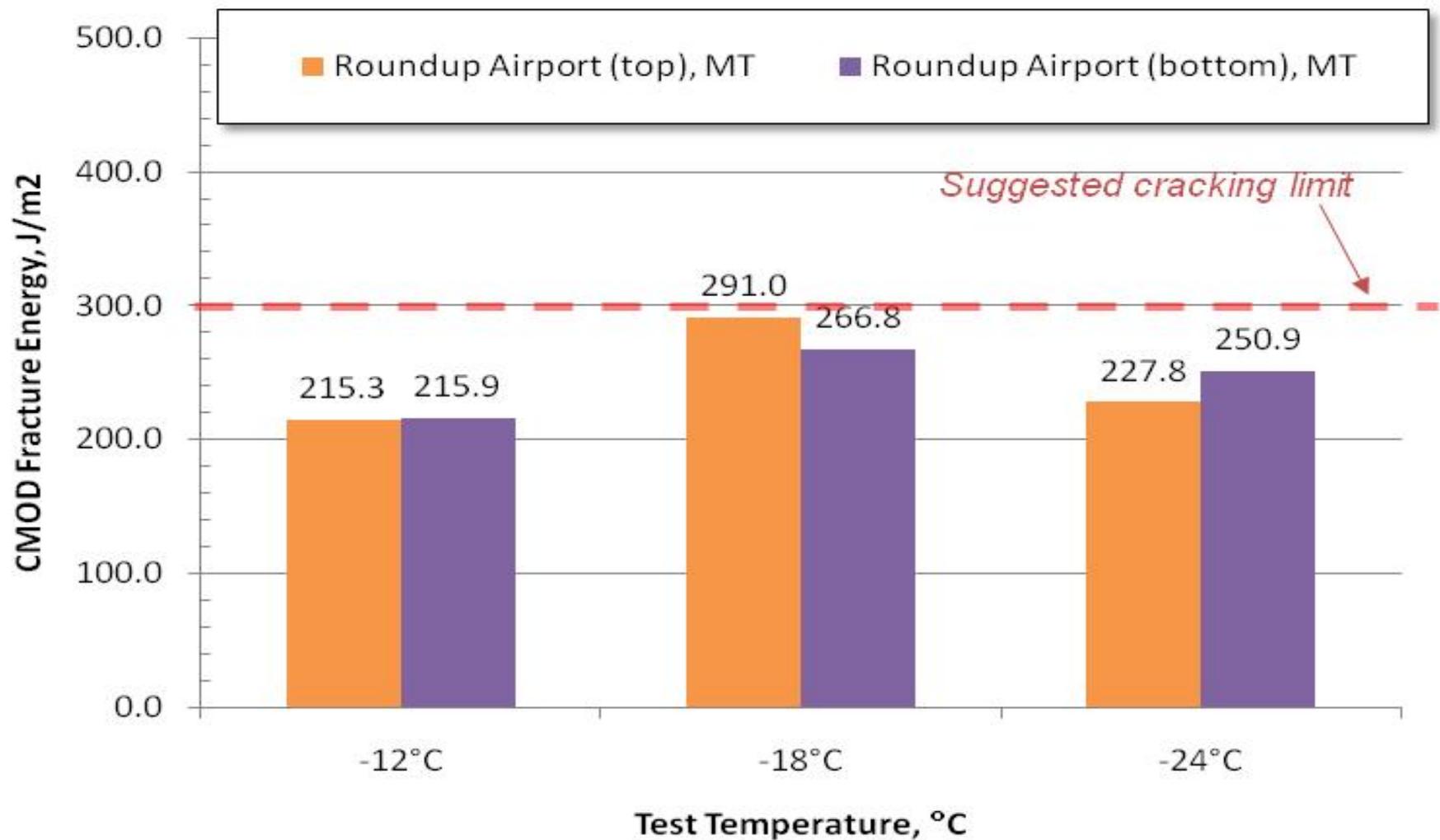
# Disk Shaped Compact Tension Results

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# Disk Shaped Compact Tension Results

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# Other Research at Asphalt Institute



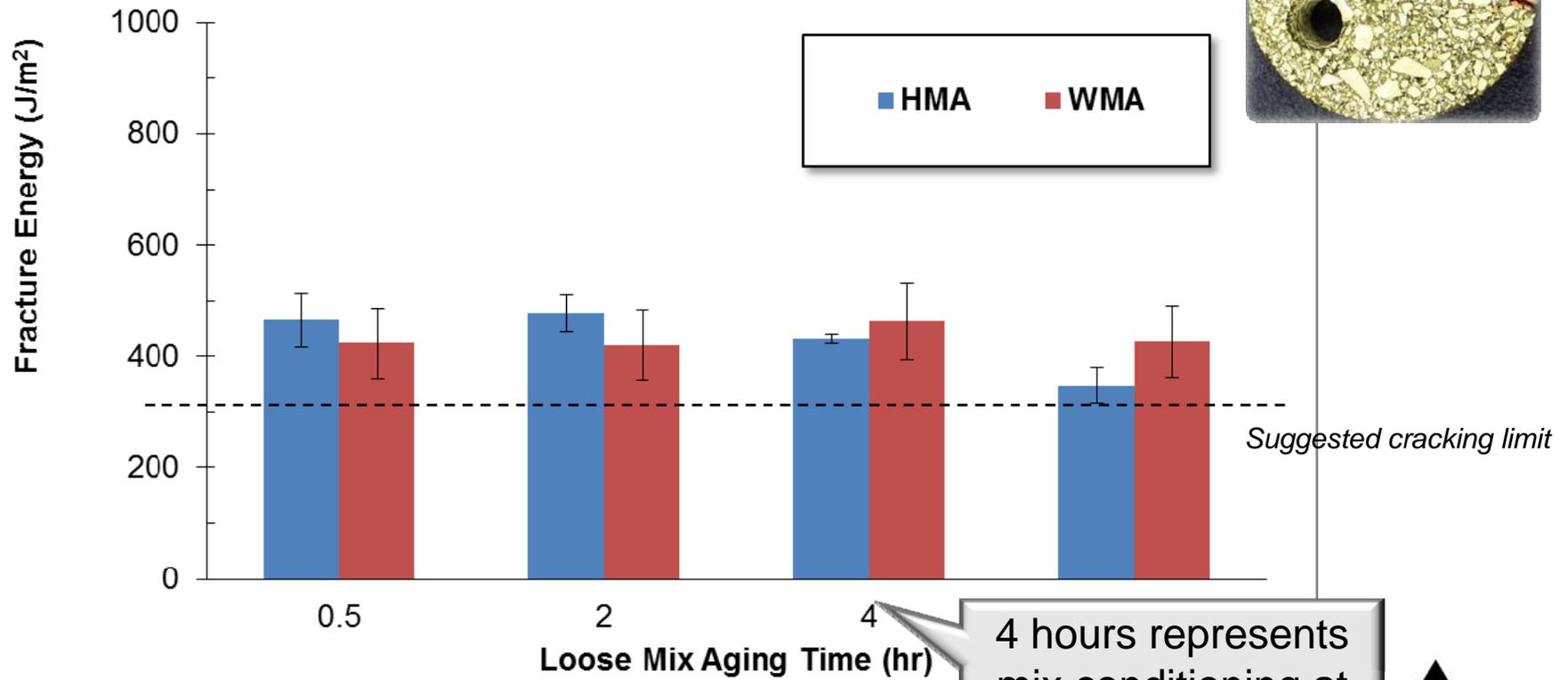
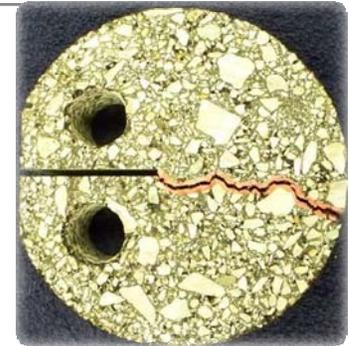
# AI Recently Completed Research

- *Completed work on FHWA Cooperative contract*
  - *Warm Mix Asphalt (WMA) additives & aging*
  - *Long-term effect of laboratory ambient aging*
    - *How long can lab samples set before testing without changing properties? 4 days? 20 days? 80 days?*
  - *RAP / RAS (recycled asphalt pavement / shingles)*
    - *What effect is current practice having on mixture performance?*



# Warm Mix Reduces Initial Aging

Disk-Shaped Compact Tension [DC(t)] Test  
Test Temperature = -12.0°C



4 hours represents mix conditioning at time of construction.

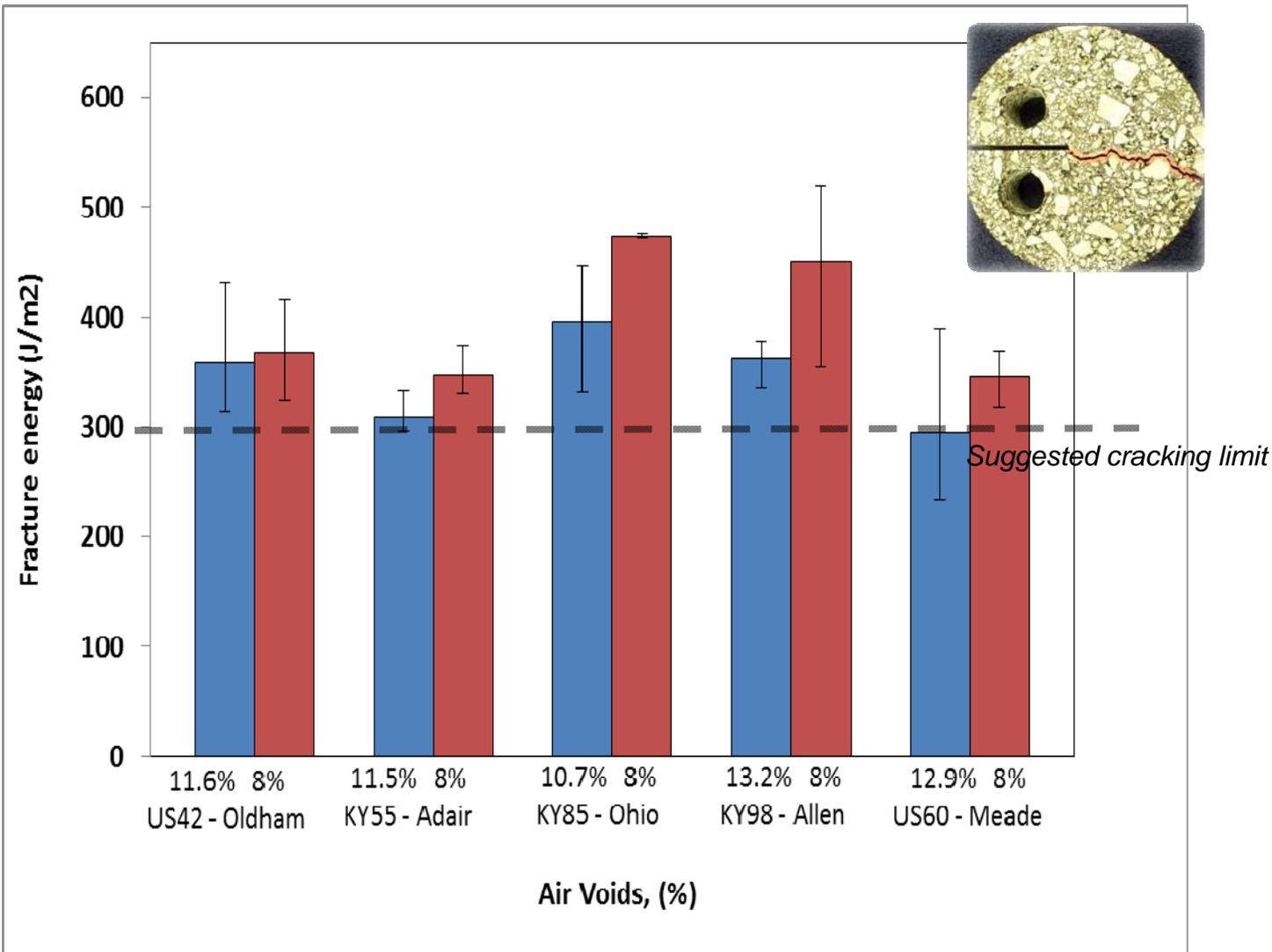
# AI Recently Completed Research

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- *Kentucky field density investigation on mixture performance (Part 2)*
  - *How does lack of density affect my Superpave pavement?*



# Density Matters...and Measurable



DC(t)  
Fracture  
Energy at -  
12°C  
Difference  
in as-  
placed and  
desired  
density

# Current Research

- *FWHA cooperative work:*
  - *Accelerated Mixture Performance Test sample preparation*
  - *Upcoming: Cracking tests review (fatigue, fracture energy, push-pull)*
- *ASTM: Draft of new ASTM standard for Toluene extraction and recovery of asphalt from a mixture*



- *MN ROAD Cracking Study*
  - Optimal Timing of Preventive Maintenance for Addressing Environmental Aging in Hot-Mix Asphalt Pavements
  - *Minnesota Road Research Facility pavement cores and performance*
  - *Measure the effect of maintenance treatments on pavement aging versus depth*

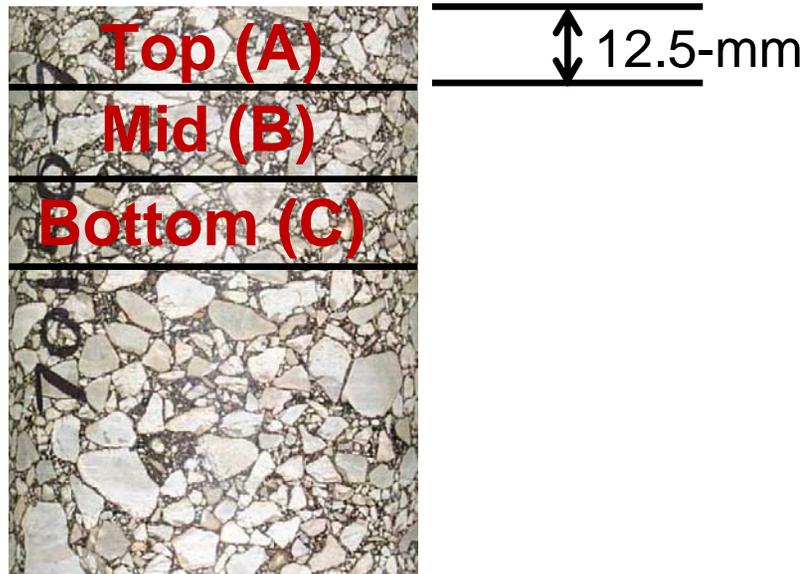


# Acknowledgments

- TPF-5(153)
  - Participating Agencies
    - Minnesota (Lead State)
    - Maryland
    - Ohio
    - Texas
    - Wisconsin
    - Local Road Research Board (LRRB)
  - Thomas J. Wood, Lead Agency Contact



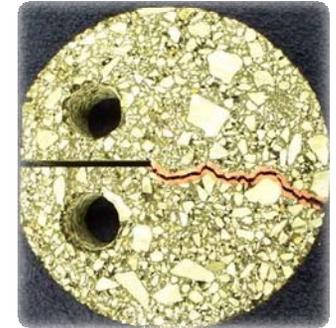
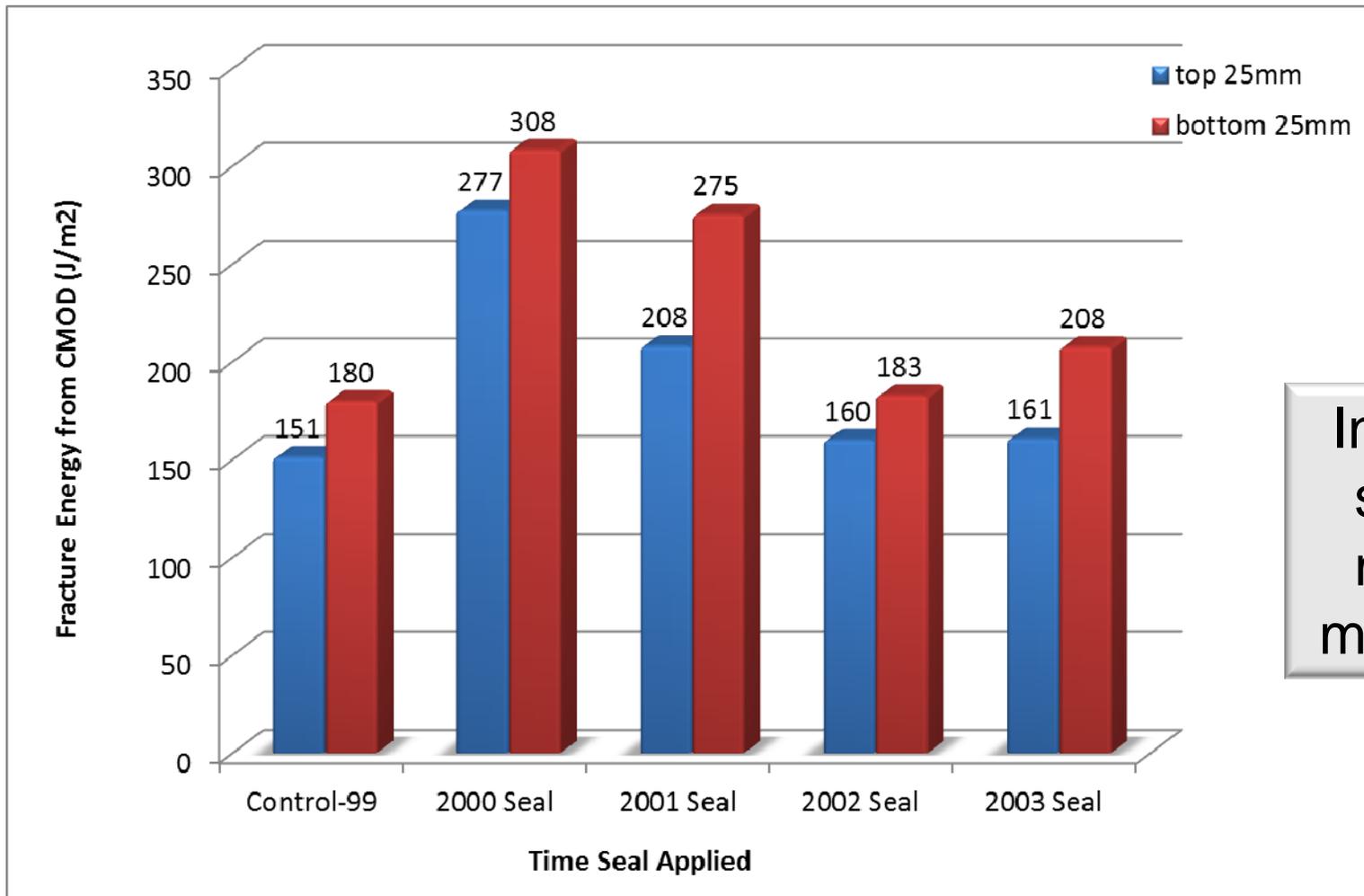
# Task 4 Cores: Recovered Binder Testing



- Extraction/Recovery
  - Centrifuge extraction using toluene/ethanol
  - Recovery using Rotavapor
- 2 Cores (150-mm diameter x 12.5-mm thickness)
  - ~50 grams asphalt
- Cracking and energy tests



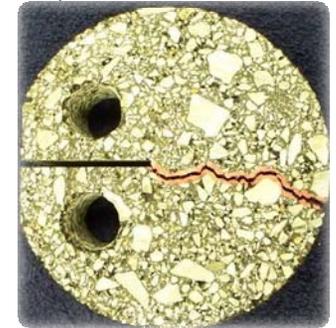
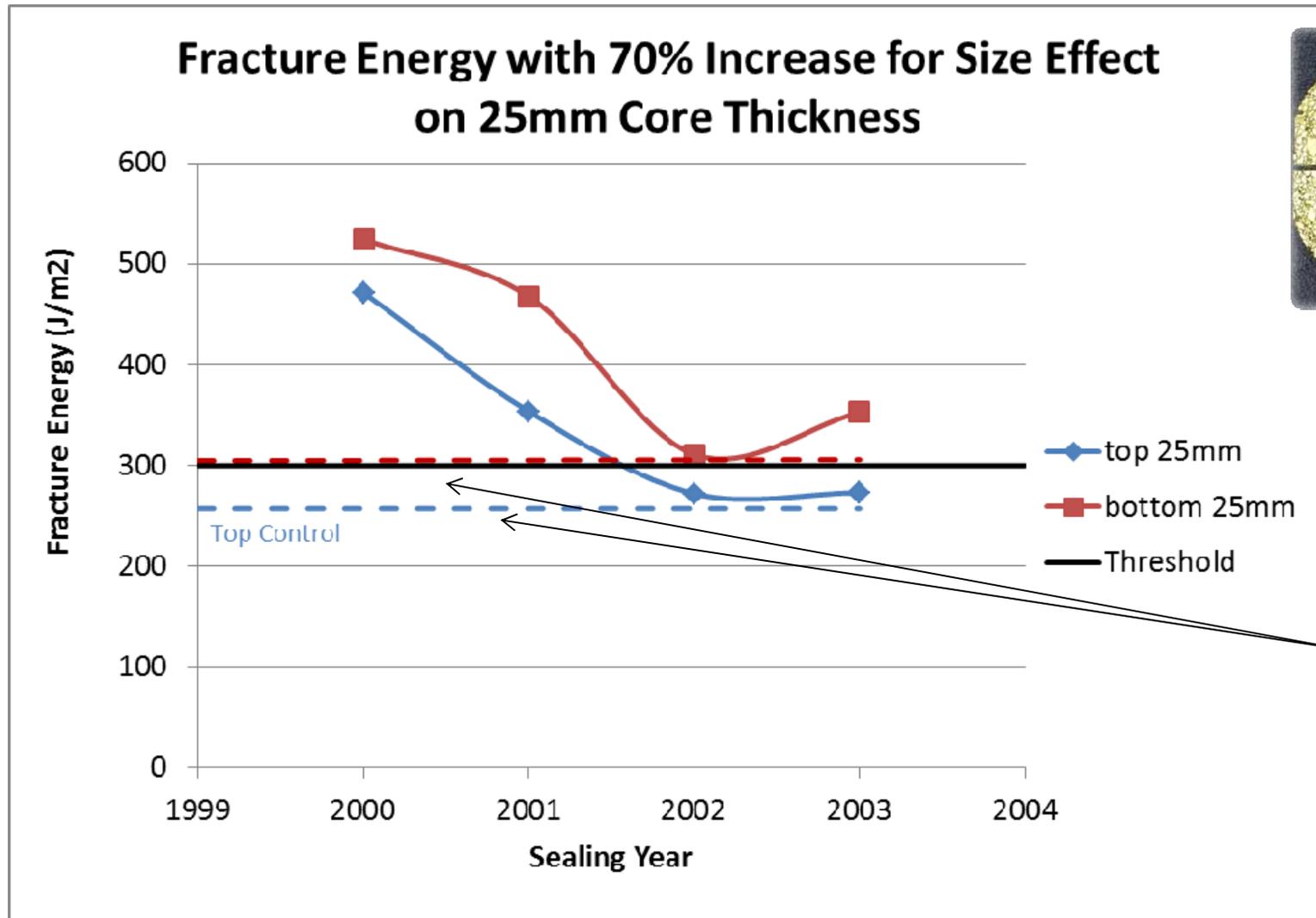
# Minnesota Highway TH-56 Fracture Energy



Initial results say, timing matters for maintenance.



# Minnesota Highway TH-56 Fracture Energy



Same graph as before with control sections shown as limits.



# Recommended FAA Research Based on Upcoming New Asphalt Technologies



# Recommend Research

- Continue to understand the APA for rutting and DC(t) fracture energy for cracking along with the AMPT for modulus and rutting
  - These tests will allow the FAA evaluate potential performance in the lab
- Understanding of RAP effect on long-term pavement performance
  - Consider using “binder replacement” spec for better control and improved spec



# Recommend Research

- Effect of Warm Mix Asphalt (WMA) on FAA pavements
  - Strong presence in US and growing
  - Becoming the standard practice on highway pavements
- Evaluate potential use of drainable bases
  - Useful to drain large, paved areas
- Timing of preventative maintenance



# Thank You

