"Best Management Practices To Minimize Emissions During HMA Construction"

North East Asphalt User Producer Group Meeting

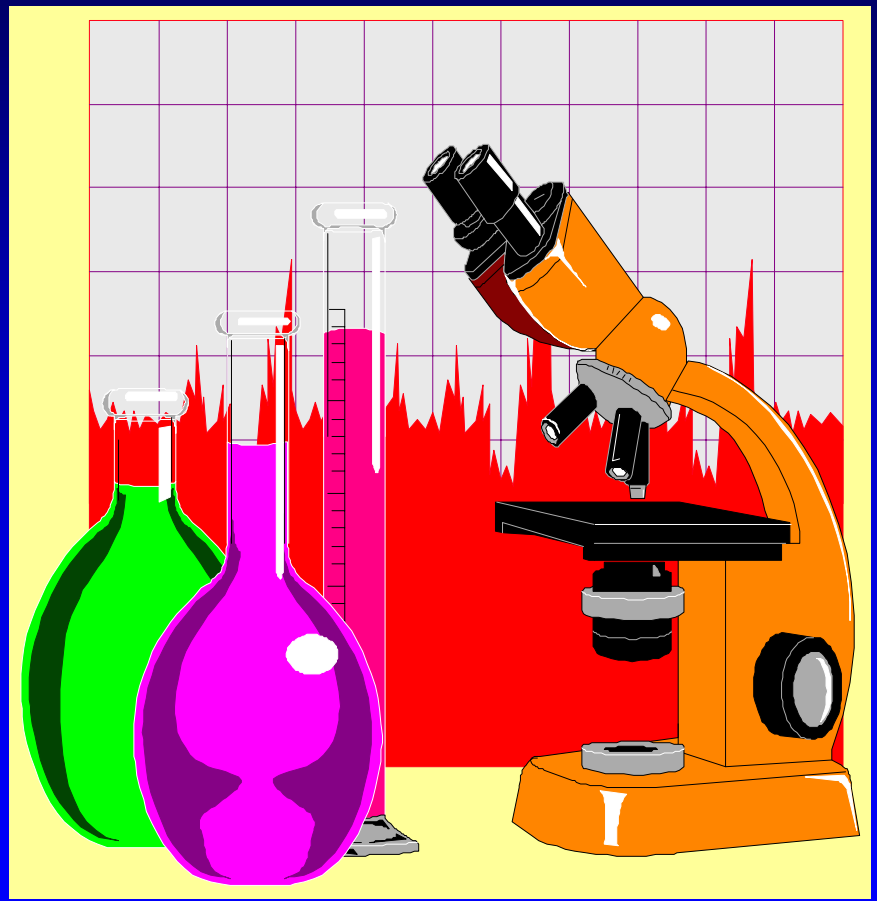
October 26, 2000

Portland, ME

Document Origin

- Asphalt Paving Environmental Council (APEC)
  - National Asphalt Pavement Association
  - Asphalt Institute
  - State Asphalt Pavement Associations

SUPERPAVE System

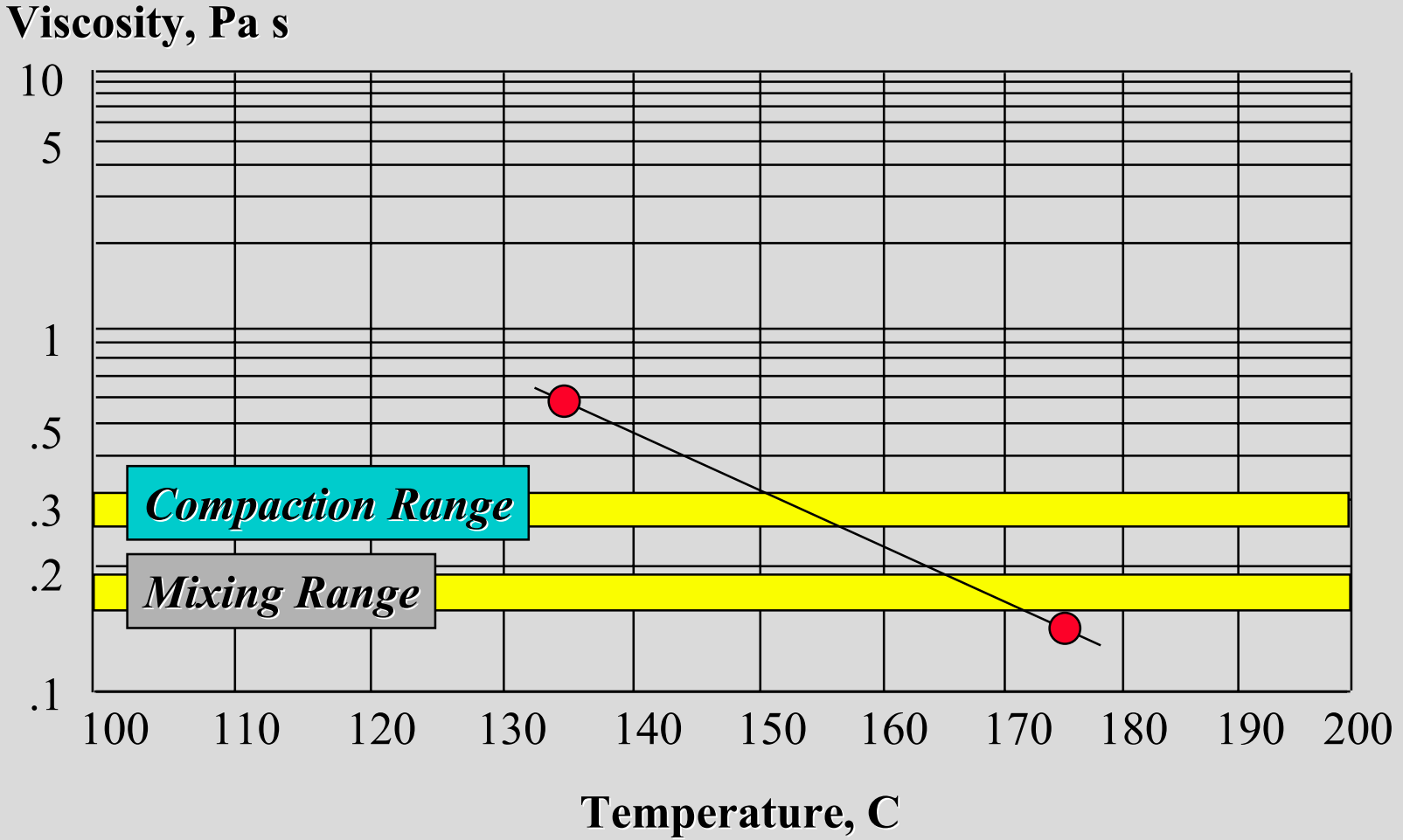


- Performance Graded Asphalts
  - Grades designed for specific climatic and traffic conditions
  - New grades for both suppliers and users

Laboratory Temperatures

- Rotational Viscometer (Brookfield)
  - Measures viscosity at 135ºC and 165ºC
  - Viscosity @ 135ºC < 3.0 Pascal seconds
  - Determines Equi-viscous Lab Mixing and Compaction Temperatures
- Does not work for PMA - use suppliers recommendations
- ***Does not determine field temperatures***

PG Asphalt Temperatures



Laboratory Vs Field Temperatures

- EXAMPLE - PG 70-22
  - Lab Mix Temperature: 333ºF - 343ºF
  - Lab Compaction Temp: 311ºF - 320ºF
  - CITGO Asphalt Recommendation Field Mix Temperature: 280ºF - 330ºF
  - Field Compaction Temperatures determined by Test Strip

SUPERPAVE Compaction

- SUPERPAVE coarse graded mixes may be difficult to compact
- Poor density may result in permeable pavements - Florida experience
- DOTs are focusing on density
- Contractors are focusing on density

SUPERPAVE Compaction

- Pavement designers typically have received very little SUPERPAVE training
- Maximum Size Vs Nominal Maximum Size
- Lift thickness less than 3 X Nominal Maximum Size makes density very hard to achieve

SUPERPAVE Compaction

- Contractors attempt to extend compaction time - Higher Mix Temperatures - should be **LAST RESORT**
- Additional rollers - three or four
- Keep Front Roller Close to Paver
- Tender Zone makes density harder to achieve
- Use an Infrared Temperature Gun

What's Wrong With Higher Mix Temperatures?

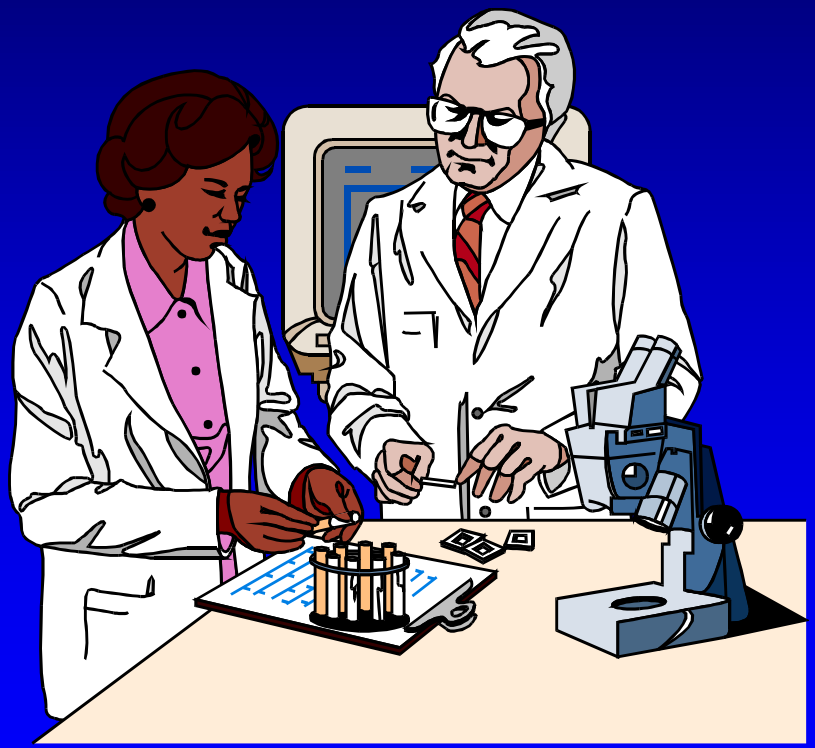
High Mix Temperature Consequences

- Damage the asphalt binder - Excessive aging during construction
- Excessive fumes
- Tender mix during compaction
- Excessive asphalt drain-down - SMA and OGFC mixes

Lab Temperatures as a Starting Point?

- EXAMPLE - PG 70-22
  - Lab Mix Temperature: 333ºF - 343ºF
- DOT allowed contractor to submit target mix temperature
  - Target +/- 25ºF
- Contractor selected 345ºF as bottom of range
- Job Mix Range - 345ºF - 395ºF
- Temperature Lowered to 315ºF - Density and ride improved

Research Efforts are Underway



- NCHRP 9-10 - Dr. Bahia working on Zero Shear Viscosity in Brookfield Rotational Viscometer
- University of Texas - Austin - Dr. Kennedy working on measuring shear rate of mix in the SUPERPAVE Gyratory Compactor

Interim Guidelines

- Field Mix Temperature Chart
  - Developed by Asphalt Institute survey
  - Listed by PG binder grade
- Contractor select starting point in middle of range
- Construct test strip - monitor temperatures & density

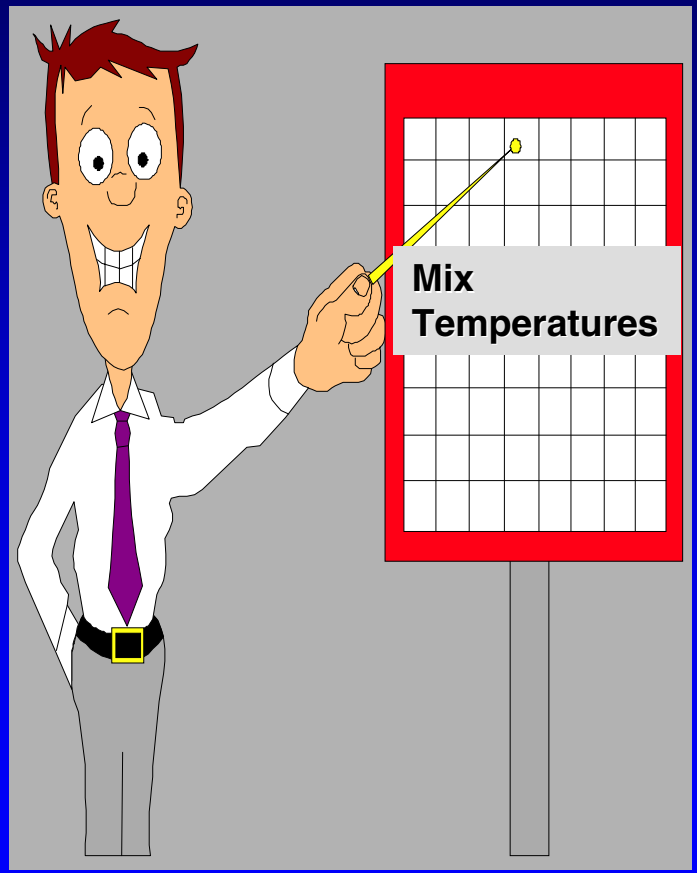
Interim Guidelines (continued)

- Determine **lowest** mix laydown temperature that will allow density
- Estimate heat loss during transport and laydown
  - Haul distance
  - Ambient temperature
  - Wind
  - Mat thickness
- Test Strip Temp + Estimated Heat Loss = Plant Mix Temp

Additional Items That May Contribute to Emissions

- Handling aggregate and RAP
- Anti-strip additives
- Plant and paving equipment
- HMA plant burner operation
- Effects of weather conditions

Conclusions



- Combination of new PG asphalt binder grades and density concerns tend to lead to high mix temperatures
- Establish separate temperature ranges for laboratory and field
- Use common sense approach based on experience until research provides an answer
- Document available through NAPA & Asphalt Institute

THE END

- Thank You For Your Kind Attention!!