Trends in Asphalt Binder Materials

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Marathon Petroleum Corporation

- More than 125 years in business
- Fourth largest U.S. refiner
  - Largest refiner in Midwest
- Employees: approx. 45,340
- Approx. 2,760 Speedway store
- Approx. 5,600 Marathon outlets

- MPC ranked #3 in Forbes “Americas Best Employers” list
Focused and Integrated Network

As of Dec. 4, 2015
Asphalt Overview

- One of the largest asphalt producers in the U.S. in terms of capacity
- 18 owned and two third-party asphalt terminals
- Market flexibility
- Key indicators
  - Sweet/sour crude differentials
  - Refinery crack spread
  - Market demand

As of Dec. 4, 2015
Trends in Asphalt Binder Materials

- **Penetration Grades**
  - (85-100, 60-70)
  - 1918 (cold climate)

- **Viscosity Grades**
  - (AC-10, AC-20)
  - 1963 (cold climate)

- **PG Grades**
  - (PG64-22, PG76-22P)
  - 1993

- **Testing time**
  - 2 hours
  - 5 hours
  - 26 hours

- **Traffic**
  - More Traffic
  - More RAP + RAS
  - More Modifiers

- **Year**
  - 2016
MSCR is being implemented
AsphaltInstitute.org: Specification Databases

- Improved binder correlation to high traffic rutting performance
  - Jnr & %Recovery better describes benefit of polymer modification
- Few States – full implementation
  - PG76-22PM ➔ PG64E-22
- More States – partial implement
  - %Recovery only: replace PG Plus
    - Elastic Recovery - 7 method variations
- IL – Testing and Evaluation
  - Stay tuned for future discussions

Source: Asphalt Institute
REOB blending into PG binders is under review

- Significant Industry Issue – DOT scrutiny
  - Many New England States have banned use
  - Discovered use without prior notification
- Claims of premature pavement cracking
- NORA: Trade Association Specifications
  - Re-refining with vacuum distillation (VTAE)
  - More than just re-claimed used engine oil
- Asphalt Institute Task Force
  - Developing publication
  - “State of the Knowledge: The Use of REOB / VTAE in Asphalt”
  - AI does not endorse or promote any materials
Bio-based modifiers for PG binders

- **Renewable & Sustainable**
  - Not tied to crude oil cost
  - Chemical processing of:
    - Soybean Oil
    - Other vegetable Oil
    - Corn fodder & Switch grass
    - Algae based

- **Proposed benefits**
  - Soften binders for RAP mixes
  - Achieve low temperature grade

Sources: MPC
Shale Crude – minimum impact on asphalt

Sources: MPC, CAPP
“New” PG binders may require new specification

- NCHRP 9-60 Research Program
- “Addressing Impacts of Changes in Asphalt Binder **Formulation** and **Manufacture** on Pavement Performance through Changes in Asphalt Binder Specifications”
- Problem statement: changes since SHRP ‘87
  - Wider, more variable range of crude oils
  - Wider variety of additives: Polymers, REOB, PPA, Bio Oils, GTR
- MSCR resulted from the last NCHRP on asphalt binders