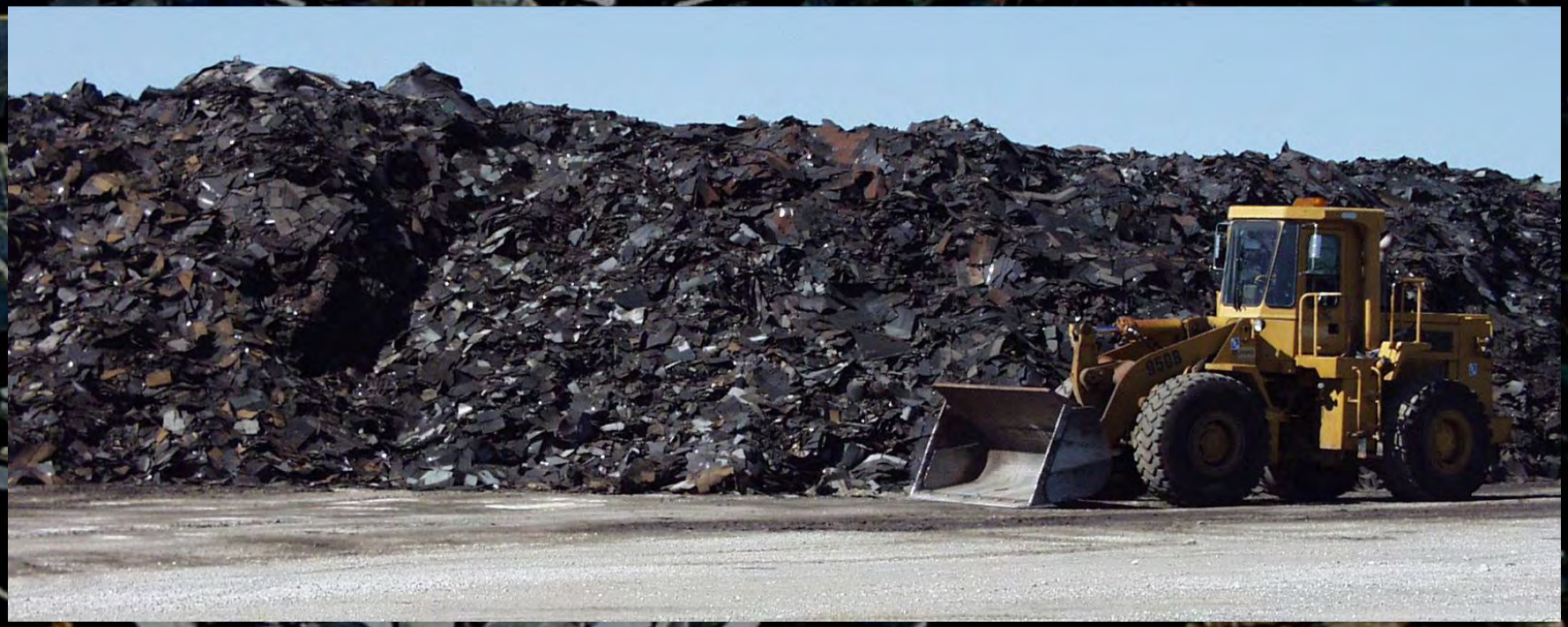
RECLAIMED ASPHALT SHINGLES MISSOURI'S EXPERIENCE

JOE SCHROER, PE

RAS in HMA SHOWCASE

SEPTEMBER 23, 2008

MoDOT



In The Beginning

- Approached by Pace Construction and Peerless Landfill
  - MoDOT Not Using RAP in Mixtures
  - Deleterious Material
  - Stiffness of Asphalt in Shingles

First Look

- Literature Search
- Other Specifications
  - Exclusion of Tear-Offs in States Allowing Manufacturing Waste
  - Contained Little Deleterious Matter
- Stiff Asphalt Extracted from Shingles
- Only One Manufacturer in State

Reclaimed Asphalt Shingles

- Asphalt ⇨ 20%-40%
  - Stiffen Roadway Asphalt
- Aggregate ⇨ ≈30%
  - Good Stuff
- Fiberglass or Paper Mat ⇨ ≈30%
  - No Harm if Well Dispersed

MoDOT Goals

- Not Focused on Environmental Effects
- Engineering Properties First
  - Harmful Effects of Deleterious Material
  - Asphalt Binder Properties
- Safety – Asbestos, Nails, etc.
- If Everything Else Works Out, Landfilling is Reduced

Why Should We Pursue Shingles?

- High Asphalt Content
- Granules Are Hard and Durable

- Recycling CO$T

Concerns

- How Will Deleterious Material Affect the Mixture
- Can the Low Temperature Grading be Maintained at Various Blending Ratios

Asphalt Grades

- High Temperature for Rut Resistance
- Low Temperature for Fatigue and Cold Weather Performance

Performance Graded = PG

PG 64-22 (PG Sixty-four Minus Twenty-two)

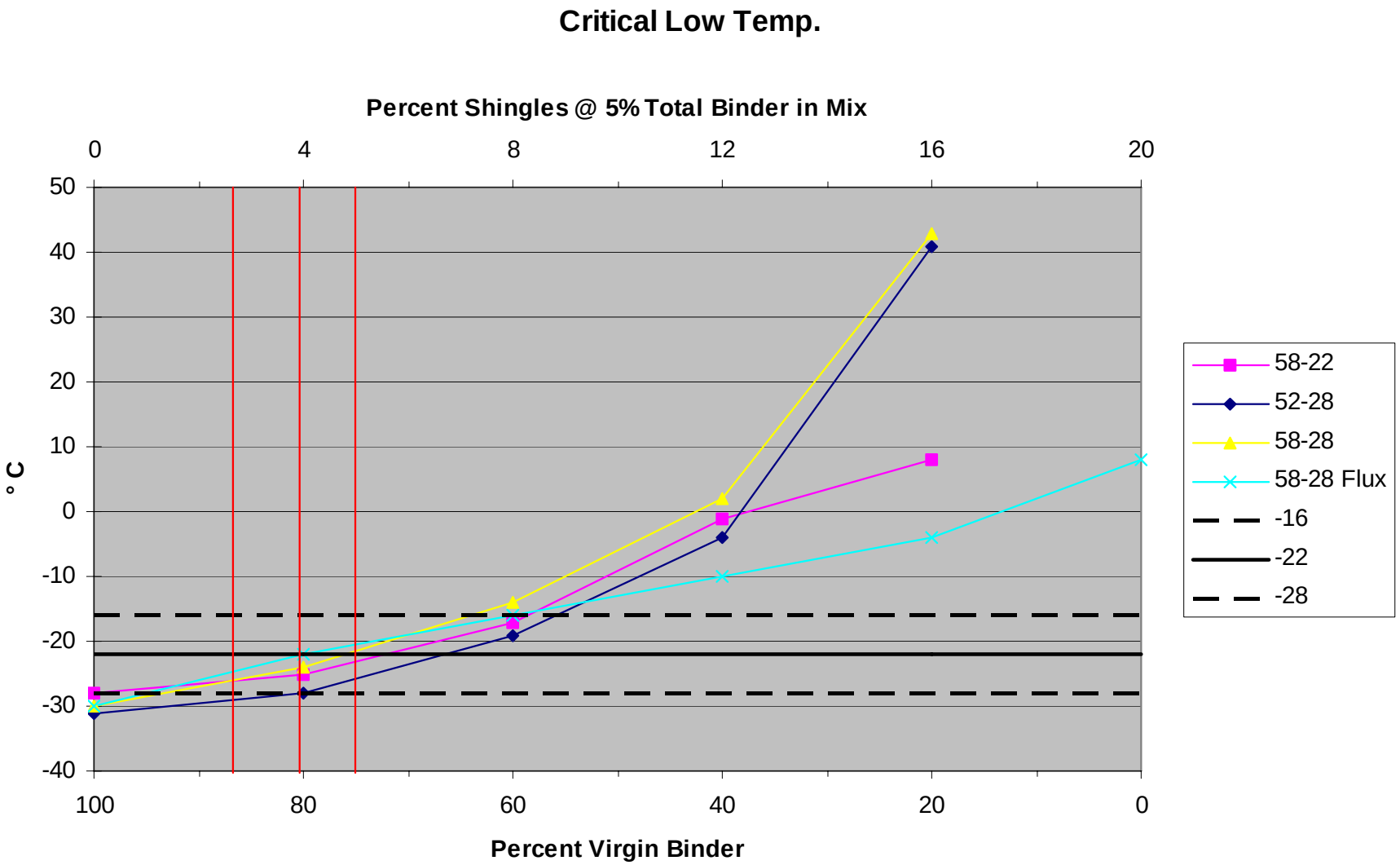
High Temp 64°C (147°F)

Low Temp –22°C (-8°F)

Asphalt Modifications Require PG 64-22

- Stiffer at High Temperature – OK
- More Brittle at Low Temperature
  - Use Lower Percentage of Shingles
  - Use Softer Roadway Asphalt

Binder Blending



Asphalt After Blending with Shingle Asphalt

- Resist Rutting

- Resist Fatigue Cracking

- Resist Cold-Weather Cracking

Deleterious Evaluation

- Specification for Aggregate
  - 0.5% “Other Foreign Material”
    - Sticks, mud balls, deer fur, etc.
- Shingle “OFM”
  - Approximately 3% Total

Deleterious Material

- Nails
- Wood
- Plastic
- Cellophane
- Paper
- Fiber Board

Safety

- Asbestos
  - No Asbestos or Trace in Samples
  - St. Louis Co. Requirement
- Nails
  - Most Remove by One Magnetic Pulley
  - Lay Flat After Rolling
    (Caution Pneumatic Rollers)

Trial by Fire

No Difference

- Visually
- Standard Mixture Tests
- Placement

Big Difference

- Rut Resistance
- Cold Temperature Tests
- OFM in Mixture

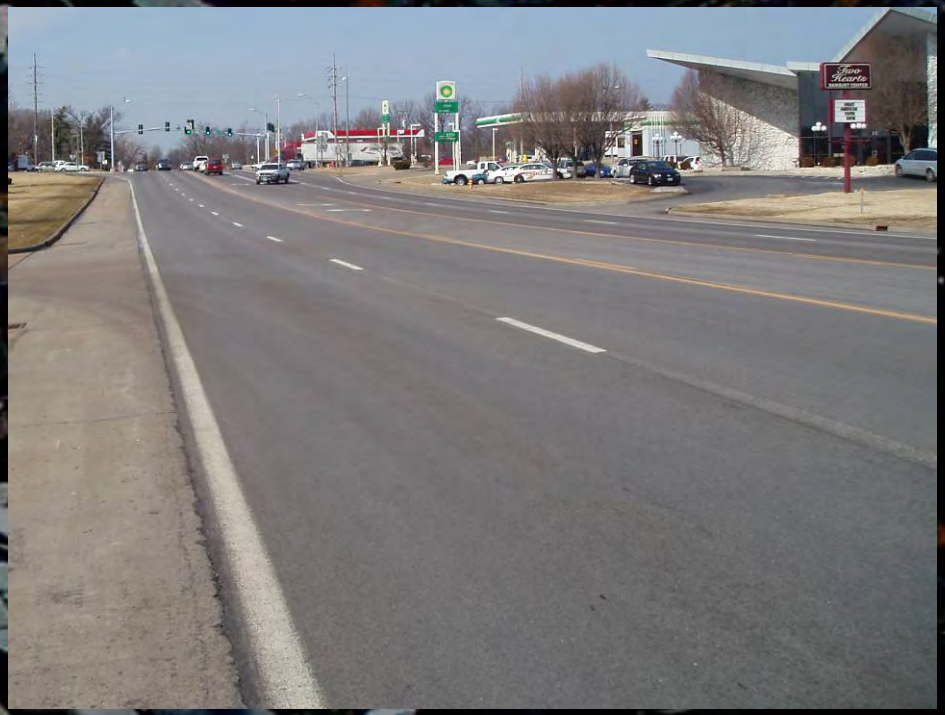
Can Tear-Off Shingles be Used?

- Allowance in OFM Due to Small Percentage of Shingles and Trial Mixture
- Start with Softer Roadway Asphalt

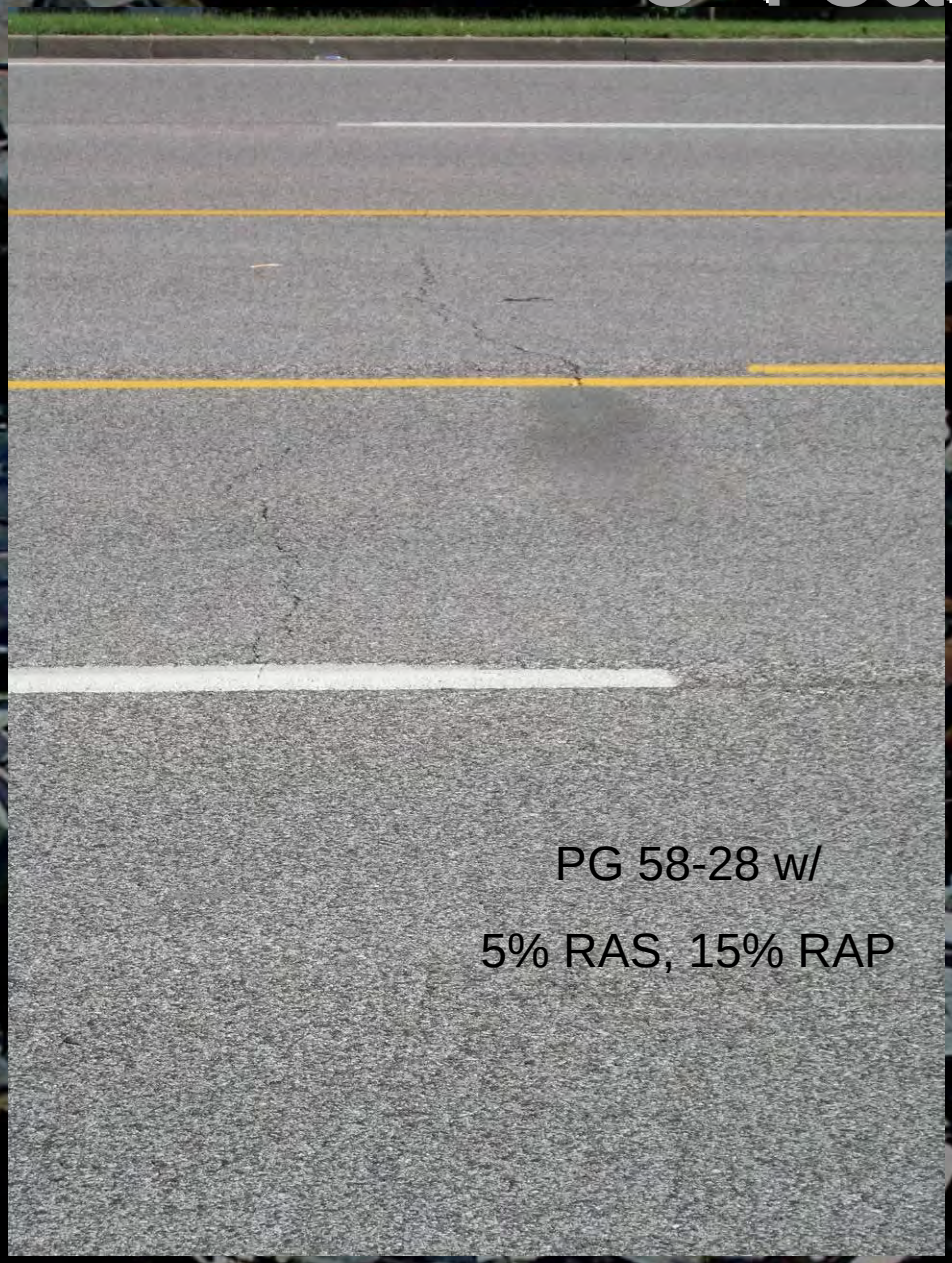
Rte. 61/67, St. Louis Co.
19 mm PG 70-22 Binder Course

1. PG 58-28
2. PG 58-28 / 5% RAS
3. PG 64-22 / 5% RAS
4. PG 64-22

No Reflective Cracking or Rutting to Date…



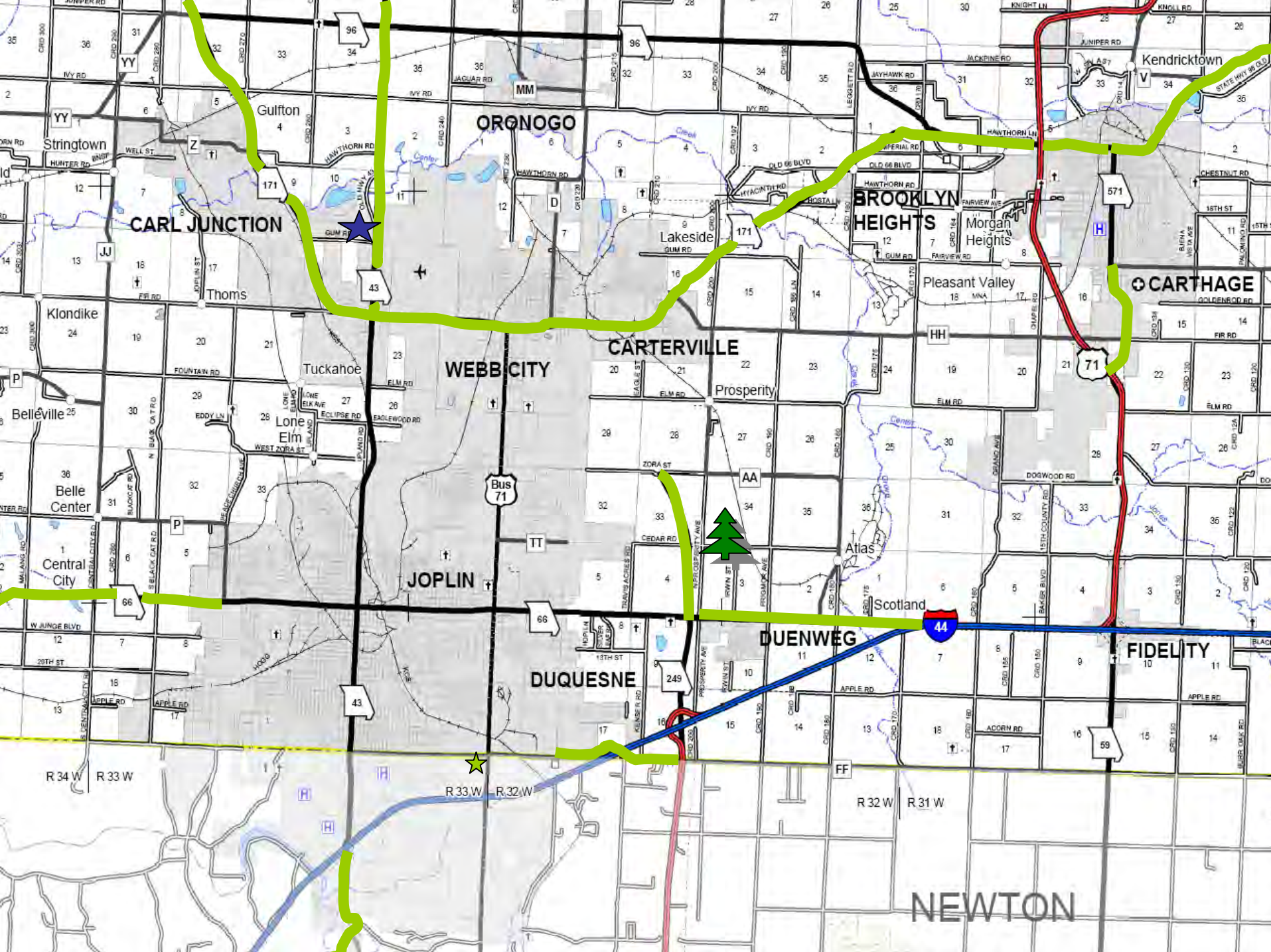
3 Years Old



Problems with RAS Mixtures

- Sporadic Mixing Problems Confined to Plants not Mixture
- Harder to Place in Cool Weather

Short Term Success


Kendricktown
Gulfton
ORONOGO
Stringtown
CARL JUNCTION
Lakeside
BROOKLYN HEIGHTS
Morgan Heights
Pleasant Valley
CARTHAGE
Thoms
Klondike
CARTERVILLE
WEBB CITY
Tuckahoe
Prosperity
Belleville
Lone Elm
Belle Center
Central City
JOPLIN
Atlas
Scotland
DUENWEG
FIDELITY
DUQUESNE
R 34 W
R 33 W
R 32 W
R 31 W
NEWTON

Where Are We?

- 2008 - 39 of 360 Mixtures Issued Contain RAS
- Known Processors and HMA Producers
  - 9 Processors
  - 11 HMA Producers (+2)
- Pooled Fund Study
  - Properties of total mixture
  - Set reasonable limits

JOE SCHROER

Field Materials Engineer
Construction & Materials

Missouri Department of Transportation

1617 Missouri Blvd. ♦ P.O. Box 270 ♦ Jefferson City, MO 65102
email: joe.schroer@modot.mo.gov

Bus. (573) 526-4353 Fax (573) 526-4354