PRESENTATION SUMMARY

• Method of foaming asphalt

• Use of foamed asphalt in a Double Barrel to produce warm mix

• Test projects completed to date

• Benefits of Astec warm mix
HOW THE DOUBLE BARREL GREEN WMA PROCESS WORKS
Double Barrel® Combination Dryer/Mixer
RAP generates steam in outer drum.
How the Foam System Works!
How much water?

1 lb. of water per ton of mix

One ton of mix has 5.3% A/C liquid or 106 lbs.

Volume of liquid – 1.63 cu. ft.

1 lb. H₂O when converted to steam = 30 cu. ft.

Expansion - \[ \frac{30}{1.63} = 18 \]
COATING THICKNESS

NORMAL COATING
9 µm

DB GREEN FOAM COATING
20-25 µm
VISCOSITY / TEMPERATURE  PG 64-22 (Approx.)
COMPLETED Projects...
1. ASTEC, INC.
Main production facility

- **Project location:** Jerome Avenue, Chattanooga, TN
- **Contact:** Scott Thompson with Southeastern Materials Company, Rossville, GA
- **Date of project:** April 18, 2007

- 300 tons of virgin surface mix at 240° F;
- 300 tons of binder mix with 30% RAP at 270° F;
- 300 tons of surface mix with 30% RAP at 270° F
• 300 tons of virgin surface mix at 240° F
Shoveling & Raking said to be comparable to Hot Mix
• 300 tons of binder mix with 30% RAP at 270° F
• 300 tons of surface mix with 30% RAP at 270° F
2. CITY OF CHATTANOOGA in Chattanooga, TN

- **Project location:** North Terrace Road, Chattanooga, TN

- **Date of project:** June 21, 2007
- **4,200 tons with 50% RAP at 270° F**

- **Contact:** Scott Thompson with Southeastern Materials Company, Rossville, GA
CITY OF CHATTANOOGA PROJECT
June 21, 2007

- City agreed to mill high traffic road and use 50% RAP @ 270°F with 64-22

  “The Environmental City”

- The RAP was fractionated

- The AC was foamed

- Southeastern Construction milled 2 inches and placed 2 inches

- 4200 tons
PROJECT OBSERVERS

• CITY OF CHATTANOOGA
• NCAT
• NAPA
• NIOSH
• STATE OF TN
• STATE OF NC
• STATE OF SC
Evaluaton of Mix

- NCAT was present to evaluate the mix
- NCAT represented by Dr. Ray Brown & Dr. Andrea Kvasnak
- Material was compacted on site
- Material was transported to NCAT Auburn Univ lab for testing
All mix processed through Roadtec Shuttle Buggy
NCAT Conclusions

- It is too early to make final conclusions but the mix at the lower temperature does have good workability, is easy to place and compact, and has no smoke. The testing generally provided good results with a couple of exceptions. The moisture susceptibility was marginal but this can be improved if needed by adding an anti-strip agent. This does not appear to be an area of major concern.
3. S. T. WOOTEN CONSTRUCTION COMPANY in Wilson, NC

- Project location: Johnson County, North Carolina
- Contact: George Reeves at S.T. Wooten Construction Company, Wilson, NC
- Date of project: September 12, 2007
- Approximately 2,000 tons of binder mix with 40% RAP at 260º, 2,000 tons of surface mix with 40% RAP at 260º F
Binder mix at 240° F in Paver Hopper
4. LAFORET COLUMBIA
BITULITHIC DIVISION

in Vancouver, British Columbia

Project location:
Vancouver, British Columbia

- Contact: Bob Forfylow at Lafarge Canada, Calgary, Alberta

- Date of project: September 22, 2007

- 200 tons of mix with 50% RAP at 250º F
Plant has 4 RAP Bins
(one for processed shingles)
Loading Warm Mix
Loading Hot Mix
Project location: Williamson County TN
S.R. 46 from US431 to S.R. 96

• Contact: Don Chambers

• Date of project: Week of Oct. 1, 2007

• 6 miles of S.R. 46 Approx 1500 tons of each of the following WMA processes:

ADVERA® WMA by PQ Corporation
Double Barrel® Green System by Astec Industries
EVO-TERM by MeadWestvaco
Sasobit® by Hi-Tech Asphalt Solutions, Inc.
No smoke at Paver Hopper
6. BOGGS PAVING

- *Project location:* York County, S.C.
- *Contact:* Drew Boggs
- *Date of project:* October 11, 2007
- *High Traffic Subdivision Road 50% RAP Fractionated 270° F mix with PG64-22*
PLANT RAP FRACTIONATION
This Street Paved With Environmentally Friendly Warm Mix Asphalt

York County
South Carolina

ASTEC

Boggs PAVING, INC.
GREEN
7. GRANITE CONSTRUCTION
Indio, CA

- Project locations:
  1. Monroe Street
  2. Avenue 40 Street

- Contact: Dr. Adam Hand

- Date of project: March, 2008

- 2500 tons mix with 15% rap at 265°F
Summary of Astec Double Barrel Green Benefits

- Comfort & safety of workers
- Eliminates need for fume systems on plants & pavers
- Good Workability
- Longer Life Pavement
- Compaction with less effort
- Extend resources by recycling at higher percentages
- Use 14% less fuel when mix temperature 50ºF lower
- 14% increase in plant production

• NO INCREASE IN COST OF MIX
PROJECTS planned in 2008...

- Alabama - 1
- California - 4
- Colorado - 1
- Florida - 5
- Georgia - 1
- Illinois – 2
- Kentucky – 1
- North Carolina - 2
- Ohio - 2
- South Carolina - 3
- Texas – 3
- Utah - 1
- Virginia - 1
- Canada - 2
- Sweden - 1