Implementation and Discussion
Overview

- WMA
- RAP
- RAS
- Combinations
Sources

Warm Mix Asphalt
“The Path Forward”

Matthew Corrigan, P.E.
Asphalt Pavement Engineer
Federal Highway Administration
Office of Pavement Technology
Washington D.C.
Sources

RAP, RAS & WMA Survey
WMA Only

Kent R. Hansen, P.E.
Director of Engineering
National Asphalt Pavement Association
In 2005 WMA Technologies Available in U.S.
In 2011 WMA Technologies Available in U.S.
WMA Usage

Percentage of Total Asphalt Production in US
source: National Asphalt Pavement Association

- 2009: 5.4%
- 2010: 13.2%
- 2011: growing

- 2009: 19.2 million tons
- 2010: 47.6 million tons

(source: National Asphalt Pavement Association)
Reported WMA Percent of Mix Tons

- Avg. % of DOT tons
- Avg % of Other Agency tons
- Avg % of Commercial & Residential tons

2009 vs. 2010
Challenges for WMA

1. Keeping track of new WMA Technologies
2. Definition of WMA
3. Developing a Mix Design Process that works for all WMA Technologies
4. Improving plant burner efficiencies
5. Lab tests that contradict field performance
RAP Usage: Percent of Mix Tonnage

2009
- Avg. % for DOT mixes: 12.5%
- Avg % for Other Agency mixes: 14.0%
- Avg % for Commercial & Residential: 17.5%
- National average all mixes: 15.6%

2010
- Avg. % for DOT mixes: 13.2%
- Avg % for Other Agency mixes: 15.2%
- Avg % for Commercial & Residential: 18.0%
- National average all mixes: 17.2%
Challenges for higher RAP contents

1. Determining the best way(s) to reduce cracking potential
2. Training mix designers and specifiers on nuances of high RAP content mixes
Estimated Total RAS: Tons

<table>
<thead>
<tr>
<th>Year</th>
<th>Tons Accepted</th>
<th>Tons use in HMA/WMA</th>
<th>Tons used in Aggregate</th>
<th>Tons used in Cold Mix</th>
<th>Tons used in Other</th>
<th>Tons Landfilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>0.96</td>
<td>0.70</td>
<td>0.01</td>
<td>0.12</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2010</td>
<td>1.85</td>
<td>1.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.12</td>
<td>0.01</td>
</tr>
</tbody>
</table>
Challenges for RAS

1. Determining the best way(s) to reduce cracking potential
2. Getting more states to allow RAS
3. Training mix designers and specifiers on nuances of RAS mixes
Questions ?