“STATUS OF WMA IMPLEMENTATION & WMA THAT DOUBLES AS ANTI STRIP ADDITIVE”

PAPA REGIONAL TECHNICAL MEETINGS
March 14, 15 & 16, 2017

PA Asphalt Pavement Association
Gary L Hoffman, P.E.
Director of Technical Services
Warm Mix Asphalt
What’s WMA?

- **Definition of Warm Mix Asphalt** - Warm Mix Asphalt (WMA) is the generic term for a variety of technologies that allow producers of Hot Mix Asphalt (HMA) pavement material to lower temperatures at which the material is mixed and placed on the road. It is a proven technology that improves the “lubricity” of the binder.

## Section MISC: Miscellaneous

### MISC Warm Mix Asphalt (WMA) Technologies

ECMS Standard Special Provision I-03111 and I-04111

For WMA Technologies that can be blended at a refinery or terminal and supplied by a bituminous material supplier (Performance Graded Asphalt Binder Supplier), the bituminous supplier must complete an online Product Evaluation Application for each grade and WMA Technology to be evaluated for potential approval. Approved WMA bituminous material suppliers are listed in Publication 35 (Bulletin 15), Miscellaneous Section, for Warm Mix Modified Performance Graded Asphalt binders.

<table>
<thead>
<tr>
<th>Product</th>
<th>Name</th>
<th>Ref. No.</th>
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</thead>
<tbody>
<tr>
<td>AKZNO 15</td>
<td>AkzoNobel Surface Chemistry, 525 West Van Buren Street, Chicago, IL 60607-3835 <a href="https://www.akzonobel.com/">https://www.akzonobel.com/</a>, Rediset® LQ-1106</td>
<td>2011-210M</td>
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<tr>
<td>MAXEQ 15</td>
<td>Maxam Equipment, Inc., 1575 Universal Ave., Kansas City, MO 64120 <a href="http://maxamequipment.com/Products.htm">http://maxamequipment.com/Products.htm</a>, Mechanical Foaming Equipment/Process</td>
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<td></td>
<td>Chemical Additive</td>
<td>Evotherm™ (DAT, 3G)</td>
</tr>
<tr>
<td></td>
<td>Mechanical Foaming Equipment/Process</td>
<td>Warm Mix System</td>
</tr>
<tr>
<td>PQCOR 15</td>
<td>PQ Corporation, Valley Forge, P.O. Box 840, Valley Forge, PA 19482 <a href="http://pqcorp.com/">http://pqcorp.com/</a></td>
<td>___</td>
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<tr>
<td></td>
<td>Foaming Additive/Process</td>
<td>Advera® WMA</td>
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<tr>
<td></td>
<td>Organic Additive</td>
<td>Sascbit®</td>
</tr>
<tr>
<td>SONNE 15 Facility</td>
<td>Sonneborn Refined Products, 600 Parsippany Road, Suite 100, Parsippany, NJ 07054 <a href="http://www.sonneborn.com/products">http://www.sonneborn.com/products</a></td>
<td>___</td>
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<tr>
<td></td>
<td>100 Sonneborn Lane Petrolia, PA 16050</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organic Additive</td>
<td>SonneWarmix RT</td>
</tr>
<tr>
<td></td>
<td>Organic Additive</td>
<td>SonneWarmix™</td>
</tr>
<tr>
<td></td>
<td><a href="#">Provisional Approval: Contact PennDOT Materials Testing Laboratory at (717) 767-2707 before using.</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mechanical Foaming Equipment/Process</td>
<td>Accu-Sheer™ Warm Mix Asphalt System</td>
</tr>
<tr>
<td>TERRO 15</td>
<td>Terex Roadbuilding, P.O. Box 1985, Oklahoma City, OK 73101-1985 <a href="http://www.trex.com/">http://www.trex.com/</a></td>
<td>___</td>
</tr>
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</table>
PennDOT BULLETIN 15 (PUB 35) Qualified Products List for Construction, Section MISC: Miscellaneous - Warm Mix Asphalt Technologies – Chemical or Organic Additive

- AKZNO 15 AkzoNobel Surface Chemistry – [www.akzonobel.com](http://www.akzonobel.com)
  - Chemical Additive - Rediset® LQ-1106
  - Chemical Additive - Rediset® WMX

- CECA 15 CECA Subsidiary of Arkema
  - Chemical Additive – Cecebase RT

  - Chemical Additive – Evotherm™ (DAT, 3G)

- SASW 15 Sasol Wax America Corporation - [http://sasolwax.us.com](http://sasolwax.us.com)
  - Organic Additive – Sasobit®

- SONNE 15 Sonneborn Refined Products - [http://www.sonneborn.com/products](http://www.sonneborn.com/products)
  - Organic Additive – SonneWarmix RT
  - Organic Additive – SonneWarmix™

- ZYDEXA 15 Zydex Industries - [http://zydexindustries.com](http://zydexindustries.com)
  - Chemical Additive - ZycoTherm
ONLY WMA TECHNOLOGIES APPROVED AS AN ANTI-STRIP ADDITIVE

1. WestRock (Ingevity) – EvothermTM (DAT, 3G)

2. AkzoNobel Surface Chemistry - Rediset® LQ-1106
WMA Implementation by PennDOT

- 2014 – 9 of 11 Engineering Districts WMA
- 2015 – 10 of 11 Engineering Districts WMA
- 2016 – 11 of 11 Engineering Districts WMA
- 2017 – 100% WMA
Anti-Strip Additive - WMA & HMA

Asphalt Stripping:
The loss of bond between aggregates and asphalt binder that typically begins at the bottom of the HMA layer and progresses upward. When stripping begins at the surface and progresses downward it is usually called **raveling**.
Need for Anti-Strip Additive

“Cost Benefit Analysis of Anti-Strip Additives in Hot Mix Asphalt with Various Aggregates”

FINAL REPORT
May 15, 2015

Donald Christensen
Advanced Asphalt Technologies, LLC

Dennis Morian
William Wang
Quality Engineering Solutions, Inc.
Anti-Strip Additive

- What is an Anti-Strip Additive?
- Concerns:
  - TSR Test variability
  - AS Approval List (What about Evotherm?)
  - Basis for quantity of AS Additive
- Implemented January 1, 2017

SOL 481-16-06
SOL 481-16-06 as of 01-01-2017 - Put at least .25% Anti-Strip Additive in all mixes
What About **WMA** Additives that are also approved as Anti-Strip Additive?

- **EvothermTM** (DAT, 3G)
- **Rediset® LQ-1106**
Neal Fannin's Email procedure to Districts is as follows:

- Pick two JMFs with the lowest asphalt and the highest RAP/RAS content. (I say 2 because I suggest testing a wearing JMF with the lowest asphalt content and highest RAP/RAS and a base because the RAP percentages are higher and asphalt are less in a base, and bases may be subject to more stripping and never get picked up because we bury them under other layers.)
- You should already have a TSR (AASHTO T 283) test with either no anti-strip or some amount that the mix was designed at. This data should be used as the first test.
- The producer should then do at least one but I suggest 2 more TSR tests on the same JMF with varying dosages of the warm mix / anti-strip additive. (So you end up with tests on the JMF with 0%, 0.25%, 0.5% as an example. These percentages will vary depending on the warm mix / anti-strip additive and the producer should work with their technical representative to establish manufacturer suggested dosages to test.)
- The TRS results should go up with increasing dosages of the additive. If they do not the additive may be ineffective as an anti-strip OR just be ineffective as an anti-strip with the aggregate type tested OR the warm mix / anti-strip additive needs to be used at a higher dosage rate than recommended with certain aggregates.
- This multiple testing is NOT needed every year. It is just needed to establish the effectiveness of chemical warm mix additive products as effective anti-strip additives for specific aggregates.
- This kind of testing is NOT needed for products that are marketed as anti-strip products only.
- This testing does not affect the testing needed if a producer choses to perform testing to establish dosage rates of mixtures with highly moisture susceptible aggregates as outlined in SOL 481-16-06, Bulletin 27 page 2A-7 (See attached) Although the test results can be used for the evaluation of the JMF family tested.
- Please let me know about any products that you get failing results with. I would like to identify poorly performing products in order to alert all DMEs about potential problems.
- If you have any questions please let me know. If we all follow the same rules then this transition will go much more smoothly.
- As always, the DME is free to handle special situations as he / she sees fit.
BOTTOM LINE - TEST USING AASHTO T-283 (TSR) TESTING PROTOCOL

- One wearing mix per geology
  - Highest RAP
  - Lowest virgin AC
  - 2 dosage rates

- One base mix per geology
  - Highest RAP
  - Lowest virgin AC
  - 2 dosage rates
Takeaways From Neal Fannin

- Work with your DME/M first.

- The intention is not to add testing requirements but some may be necessary.

- I’m from Central Office, I am here to help.

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Phone: 717.775.8099 | Cell: 717.480.8364
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To contact ...........................................

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Committed To:
Safe, Smooth, Sustainable, Long Lasting Pavements!