HMA Recycling Expert Task Group Meeting

May 19th & 20th, 2010
Auburn, Alabama

The purpose of this ETG is to coordinate, develop, and improve national guidance and recommendations for the asphalt pavement recycling program. This group will provide feedback as well as encourage correct utilization of recycling technologies and address construction problems with current state-of-the-practice solutions.

Wednesday, May 19th

2:00 – 2:15 pm Welcome – Huber and Kvasnak
- Introductions & New DOT Members
- Approval of December 2009 minutes
- Review Purpose of ETG
- Review RAP Research List
- TRB Call for Papers on RAP (Emphasis is construction)

2:15 – 4:15 pm Information for Low/No RAP States
- Review of Letter to Chief Engineers (Jones and Sines)
- Proposed Webinar on Best Practices (Kvasnak)
- Review of Pamphlet on RAP FAQ (Kvasnak)
- Discussion of other tools for increasing RAP usage
- Update on Best Practices (Copeland)
- NAPA Conference May 4th and 5th (Newcomb)

4:15 – 5:00 pm Status of RAS Standards (Sines and Huber)
- Review of Available Standards
- Discussion about needed standards and research needs

Thursday, May 20th

8:00 - 8:15 RAP ETG Membership Update (Gallivan)

8:15- 8:30 RAP Webpage Enhancements (Kvasnak)

8:30 – 10:00 am Information on Indirectly Characterizing Binder (Kvasnak)
Maximum of 10-minutes each.
- BBR Mastic Method (Hussain)
- BBR Thin Sliver Method
- DSR Torsion Bar Method
- Dynamic Modulus Method (Daniel)

- Dongre Method
- Review Summary of Indirect Methods Report
- Discussion

10:00 – 10:15 am Break

10:15 – 11:15 am Review of RAP Aggregate Recommendations (Implementable findings from each)
- UNR-NCAT Aggregate Recovery (Hajj)
- Other RAP aggregate studies
- Discussion

11:15 – 12:00 pm Handling of RAP in the Laboratory (Kvasnak)
- RAP Heating Recommendations (Michael)
- Low Temperature Cracking Study Report (McDaniel)

12:00 – 1:30 pm Lunch (on your own)

1:30 – 2:00 pm Review of NCHRP 09-33 Recommendations (Gallivan)

2:00 – 3:15 pm Discussion of RAP ETG Recommendations to AASHTO
- Review of Recommended Changes to Standards (Kvasnak)

3:15 – 3:30 pm Break

3:30 – 4:30 pm State Reports on RAP Usage
- Summary of RAP Performance in Wisconsin (Dukatz)
- Summary of RAP/RAS Performance in Missouri (D. Williams)
- Summary of Industries RAP Efforts (Newcomb)

4:30 – 5:00 pm Housekeeping
- Next meeting (One of the no/low usage states)
- Review of Past and Current Action Items
- Other Business

RAP ETG – May 19, 2010 Notes

G. Huber and L. Gallivan called the meeting to order and the minutes from the last meeting were approved.

Ongoing RAP Research

The floor was opened to discuss new RAP research projects. J. Daniel is leading a Pooled Fund study on RAP. J. Epps stated that a new study on the use of shingles in asphalt pavements will begin in September 2010. J. Epps will keep the group apprised of who wins the contract.

TRB Call

A discussion about the upcoming TRB paper deadline was initiated. Possible papers for submission were discussed. A. Copeland and A. Kvasnak have high RAP content field mix data that could be used for a TRB paper on the material properties of high RAP content mixes. R. West is in the process of writing a paper on the SPS-5 LTPP sections that compared high RAP content mixes to virgin mixes. G. Reinke could write a paper on RAP binder transfer that occurs in an asphalt plant. A. Kvasnak could write a paper on the high RAP content test track sections that were constructed in August 2009. D. Lippert will contact the Illinois Tollway about submitting a paper on the RAP usage in the recent reconstruction.

It was decided that we need to develop consistent RAP terminology to be used in these and future papers.

Information for Low/No RAP States

Direct Appeal Letter – Ron Sines

Ron Sines presented the letter that he developed to encourage states with no or low RAP to consider using higher percentages of RAP. The intent of the letter is to let agencies know there is a resource available of RAP knowledge and to request a meeting to discuss concerns about RAP usage in asphalt pavements. D. Newcomb commented that the decreased volatility in RAP pricing should be mentioned in comparison to virgin material prices.

If a meeting is established, one or more RAP experts will make themselves available to discuss the cost savings, quality of RAP, and pavement performance of roads containing RAP. The RAP expert can be anyone with experience in RAP as they are not representing the RAP ETG. These RAP experts may present information that has been made available through the RAP ETG website. A. Copeland was asked about the status of R. McDaniel's RAP blending report and if it could be distributed at a meeting with agencies. A. Copeland commented that the report is under FHWA review and once it is finalized will be available to the public.

Proposed Webinar on Best Practices (Kvasnak)

A. Kvasnak discussed possible RAP Webinars that could be used to educate people about proper RAP usage. She suggested that multiple webinars be developed with a specific focus instead of trying to create one overview presentation. She presented the different topics that could be stand-alone webinars (see presentation for the list of topics). R. West volunteered to have NCAT produce the webinars.

Additional webinar topics were suggested such as field performance, DOT and contractor experience, and case studies.

R. Sines and G. Huber volunteered to help R. West with a RAP management webinar. R. West thought work on the RAP management could begin within the month and be the first webinar.

A webinar on case studies will be led by A. Kvasnak and J. Daniel.

Review of Pamphlet on RAP FAQ (Kvasnak)

A RAP FAQ was developed at NCAT and presented to the group. There will be a 1-page pamphlet with key FAQs and then an 11-page FAQ posted on the RAP ETG website. Both documents will be reviewed by L. Gallivan, A. Copeland, M. Corrigan, D. Newcomb, R. Sines, and D. Williams.

Discussion of Other Tools for Increasing RAP Usage

The floor was opened to discussions of other tools that could be used to inform about the benefits of increased RAP.

It was felt that there needed to be a report on high RAP content field mix performance over time. It was suggested that a research needs statement be developed that addresses long-term field monitoring of high RAP content pavements. J. Musselman, J. Pappas, and A. Kvasnak would develop RNS.

Another RNS was suggested that would focus on the Economics of RAP. D. Williams and J. Pappas will lead this effort.

D. Lippert commented that Tim Murphy has a RAP 101 presentation that may be helpful.

A third RNS was suggested to address the environmental aspects of RAP. J. Pappas will be lead and J. Epps, H. Marks, and C. Williams will help.

A fourth RNS was suggested that would address the properties of shingles and processing techniques. G. Huber will lead the writing of the statement and be assisted by J. Epps, C. Williams, J. Schroer, R. Sines, A. Copeland, J. Pappas, and D. Lippert.

A RNS on crack testing related to field performance was suggested. R. West volunteered to lead the effort and to be assisted by L. Gallivan, S. Diefenderfer, J. Epps, and A. Copeland.

There was a discussion about possible AASHTO specification changes. NCHRP 09-46 is making recommendations to the current AASHTO specifications on designing Superpave mixes with high percentages of RAP. A. Kvasnak will ask E. Harrigan if the RAP ETG may review the specification changes prior to the report being finalized. It was also suggested that RAP contribution should reference RAP binder contribution. M. Corrigan, A. Mergenmier, and C. Williams will work on compiling the documentation to present to the Mix ETG to suggest changing RAP contribution to refer to RAP binder contribution.

E. Hajj and A. Kvasnak will include a recommended provisional specification for determining RAP aggregate consensus properties in their final report.

Suggested topics for the next meeting were discussed. The topics included:

1. C. Williams discussing shingles usage on the Illinois Tollway
2. R. Dongre presenting on his back-calculation method
3. LTRC presenting on their RAP binder research
4. TTI presenting on their RAP mix design study
5. R. McDaniel discussing her final FHWA report on binder bumping
6. G. Reinke on torsion bars
7. T. Scholz on Oregon State University RAP research

Update on Best Practices (Copeland)

The best practices guide is under FHWA review. A. Copeland will let the group know when it is ready.

NAPA Conference May 4th and 5th (Newcomb)

NAPA held a recycling symposium that was attended by more than 180 people. They will continue to plan conferences that address recycling.

D. Newcomb commented that NAPA will be holding a RAP best practices conference September 28-29, 2010 in Seattle, WA. It was suggested that representatives from the low or no RAP usage states be invited to attend conference to learn more about proper RAP usage.

May 20, 2010

Status of RAS Standards (Sines and Huber)

R. Sines presented on the current use of shingles in asphalt pavements. Oldcastle uses shingles in five states and AASHTO standards are working fairly well. The process of

back-calculating the shingle binder is weak and needs improvement. The other area that needs to be addressed is the gradation and currently it only states that it has to pass the ½". R. Sines commented that RNSs need to be developed to better understand shingle use and characterization. The approach that Colas took was a good approach and would give us a good understanding of the blending that occurs and further research should be conducted (see RAP ETG December 2009 Presentation by F. Chignon).

G. Huber presented on the use of shingles in Indiana. Indiana adopted the recommendations put forward by R. McDaniel. They are allowing up to 25% reclaimed binder; it can be from either RAP or RAS. They do not differentiate between post consumer or manufactured waste. Colas only allowed 70% of the binder from shingles to be considered binder, the rest was considered inert. Indiana has not taken that approach.

Wisconsin has a permissive specification for shingles.

Huber said that nationally the use is dependent upon economics. The manufacturer is no longer giving away shingles and is selling to highest bidder. If there is a lot of RAP in an area, then shingles tend not to be used. Florida has run into the same issue with the shingles no longer being given away by the manufacturer.

G. Reinke said that post-consumer shingle binder properties are all over the place while manufacturer waste tends to be more consistent. G. Reinke suggests that post-consumer shingle asphalt should be graded.

D. Lippert commented that Illinois still has a strong concern about asbestos. They have found that the architectural shingles have a low probability of asbestos and they allow those.

J. Epps said that Texas has a specification that is similar to Indiana and limits shingles (grain and asphalt) to 5% and is fairly active.

R. Sines said that Oregon is going to do a shingles test section.

G. Huber said that Todd Shultz looked at RAS/RAP mixes with different percentages. It is a laboratory study. Results similar to what Francois Chignon presented in December 2009 RAP ETG meeting.

G. Huber's action item is to get a copy of the report for the website.

C. Williams said that where it makes real economic sense is SMAs since you can eliminate fibers. Ontario uses shingles in their SMAs and specifies it that way. It does depend on the local area whether or not shingles are used.

C. Williams said that the shingles pooled fund can address the technical issues. He said the big gap is on the environmental side. The environmental agencies in each state work very differently.

If you use them in overlays with reflective cracking or thin lifts you may have problems. The predominant concern with RAS is fatigue resistance.

A. Kvasnak commented that one of the problems is the consistency of shingles throughout mix. D. Newcomb said that there are methods to address that. Shingles should be ground to the optimal size and could be blended in with sand. R. Sines commented that feeders were not meant to feed in such small percentages so it is very difficult to feed the RAS in so slowly.

D. Newcomb said that the fibers in the shingles helped mixes in terms of indirect properties in the lab.

R. West said that we need to address a series of tests that can help us identify properties that are good indicators of fatigue cracking, low temperature cracking, etc. It will require a significant effort. R. West suggested that coordination with the APTs could identify link between field and lab results for cracking testing. A. Kvasnak suggested a pooled fund.

C. Willaims said that pooled funds lose their enthusiasm after the first phase. Could start with one but then look at other sources for longer term.

R. Sines suggested looking at it as a business approach also.

M. Corrigan discussed the research needs statement that was discussed at the WMA TWG. There is a need for a study looking at how much blending is occurring in WMA with RAP and/or RAS. M. Corrigan will handle writing it and then it will be sent to RAP ETG to review.

Other Business

L. Gallivan announced that NAPA is working on the Second International Warm Mix Asphalt conference. There will be sessions with WMA containing RAP. The conference will be approximately 2-3 days with training and typical conference sessions. Invited and peer reviewed papers. The committee is looking to have the conference November 2011.

L. Gallivan commented that C. Abadie had hoped to be at the meeting to present on Louay's work on GPC analysis on molecular size distribution in RAP. They have interest in getting RAP from different places in the country and are requesting that samples of RAP in a small tin be sent to them for analysis.

L. Gallivan's action item is to send A. Kvasnak the e-mail describing how much material is needed for the samples.

Action item for all is to send RAP if they have it.

Date for the next meeting is October 26-27, 2010.

Information on Indirectly Characterizing Binder

H. Bahia gave presentation on mortar BBR. See presentation for details on the process. H. Bahia said he would like to evaluate RAP from different regions and to have others try the method. He has requested the opportunity to present on the topic again once more RAP sources have been evaluated.

A. Kvasnak presented on the BBR mix sliver method, DSR torsion bars, and dynamic modulus methods for back-calculating. The presentation can be found on the RAP ETG website for details. She commented that the dynamic modulus method appeared to be the most promising, but there were still some issues that needed to be resolved. S. Buchanan suggested modifying the BBR mix sliver analysis and backing out the modulus values at 20000psi and to use a modulus of 50 GPa for limestone.

Review of RAP Aggregate Recommendations

UNR-NCAT Aggregate Recovery

E. Hajj presented on an extraction aggregate evaluation study that is being conducted by UNR and NCAT. The presentation can be found on the RAP ETG website.

F. Fee suggested that the precision and bias for each particular test be used.

F. Fee said that there is a procedure in ASTM using G_{mm} to estimate the difference between effective and bulk gravity.

C. Williams suggested using a phase diagram.

G. Huber pointed out that using the G_{se} is a small error.

Handling of RAP in the Laboratory (Kvasnak)

A. Kvasnak presented on the RAP heating study that was conducted at NCAT. The presentation can be found on the website. The general conclusion was that RAP should be heated at the target mixing temperature for the amount of time required for the sample to reach the target mixing temperature.

Review of NCHRP 09-46

A. Kvasnak presented on the status of the NCHRP 09-46 study. The presentation is available on the RAP ETG website.

The group thinks it is ok to leave the permanent deformation recommendation as is.

The mix ETG is working on evaluating the different methods for conducting the flow number test and that will not be done until next year.

Low Temperature Cracking Study Report

R. McDaniel was unable to attend; therefore, G. Huber addressed her study. G. Huber strongly recommends this group review R. McDaniel's report on binder bumping at an asphalt plant. The report is still being edited and needs to be reviewed by FHWA before it comes to the RAP ETG.

J. Epps suggested that at the next RAP ETG we also have a discussion/presentation from the TTI group about their RAP study being led by Fuji Zhou.

Summary of RAP Performance in Wisconsin

E. Dukatz was not available to give presentation and should be asked to present at the next meeting.

Summary of RAP/RAS Performance in Missouri (Williams)

D. Williams presented on Missouri's experience with RAP and RAS. The presentation can be found on the RAP ETG website.

Missouri had a poor experience with RAP in the 1970s and 1980s. They began trying RAP again in 2003 in the shoulders. In 2008, Missouri allowed unlimited use of RAP but stipulated that mix testing was required for percentages higher than 20%. In 2010, it was proposed that testing not be required until greater than 30% RAP is used.

Up until three years ago all RAP went to maintenance, but now all of it goes to the contractors.

Missouri has not seen a difference in the performance of RAP mixes compared to virgin mixes.

Missouri began using RAS four years ago. Minimal reflective cracking and no rutting to date in first pavement placed that contained RAS. R. Sines thinks the fibers are helping with preventing cracking.

Missouri constructed a pavement that contains varying levels of RAP in WMA and HMA. The RAP percentages used were 20, 28, and 35%. The WMA with 35% RAP had similar binder properties to the HMA 20% binder properties.

Summary of Industries RAP Efforts

A few years ago Heritage was not for fractionation but have now started using it stated G. Huber.

R. Sines stated that if the RAP quantity exceeds the demand that it is sensible to fraction. However, if there is insufficient RAP to meet the demand then fractionating does not make sense.

Housekeeping

Next meeting is October 26-27th.

Action Items

J. Musselman, J. Pappas, and A. Kvasnak develop RNS on high RAP content field performance.

D. Williams and J. Pappas write a RNS on the economics of RAP.

J. Pappas, J. Epps, H. Marks, and C. Williams will write a RNS on the environmental aspect of RAP.

G. Huber, J. Epps, C. Williams, J. Schroer, R. Sines, A. Copeland, J. Pappas, and D. Lippert will write a RNS on the properties of shingles and processing techniques.

R. West , L. Gallivan, S. Diefenderfer, J. Epps, and A. Copeland will write RNS on crack testing related to field performance.

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