North Central Superpave Center News

Volume 4, Number 3

Spring 2005

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National News

NCSC Vision and Mission:

To be a recognized source of hot mix asphalt expertise and to lead further development and implementation of hot mix asphalt and Superpave technology by providing services to its customers, through excellence in research, training and communication.

NCAUPG Conducts Regional Round Robin

Rebecca S. McDaniel, North Central Superpave Center

Since its inception in the early 1990's, the North Central Asphalt User Producer Group (NCAUPG), has discussed working towards more uniformity in test methods across the region. Getting past the talking stage, though, has proven to be problematic.

In 1996, Rich Wolters, of the Minnesota Asphalt Pavement Association, and Gerry Huber, of Heritage Research Group, reviewed the applicable AASHTO standards and recommended ways to standardize the test methods by removing options. (Some methods allow multiple options, meaning states can rightly claim to be running the test according to AASHTO yet still have procedures that differ widely from those of neighboring states.) The recommendations were presented to the NCAUPG and forwarded to AASHTO for consideration, but were never implemented.

Laird Weishahn, of the Nebraska Department of Roads, Mike Heitzman, of the Iowa DOT, and others in the region continued to try to make headway. However, with a reliance on volunteer efforts, infrequent meetings and the press of other work, these attempts could not get off the ground.

The goal of standardizing test methods in the region remains a worthy one. Many contractors and material suppliers work in multiple states, meaning they have to test their materials differently depending on where they are sending them. Differing test methods also mean that personnel have to receive extensive training for certification in each state they work in, which represents a considerable investment in time and resources.

The goal for the region is not to force all states to use the same specification *limits*, but rather to standardize many, if not most, of the test *procedures*. If common protocols are used, the required training should be the same though the specification limits may differ. This would facilitate reciprocity of training and certification between states on a wider basis. Training on the differences in state specification limits and operational procedures could be accomplished with a short review of state-specific material rather than a long, intensive, often repetitive certification course. Standardized testing procedures would also make it easier for states to share information about materials, construction methods, etc., and to learn from other states' experiences.

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Getting started on the road to standardization presents a number of hurdles. One big hurdle has simply been the question: *where to start?*

Jump-Starting the Process

In January 2004, Erv Dukatz, Mathy Construction Co., issued a proposal to the NCAUPG to re-focus attention on test standardization by outlining a plan to help answer the question of where to start. The proposal was to have each state in the region sample materials from one or two projects and send them to each other state. The states would then test the materials according to their own procedures and send the results to the North Central Superpave Center (NCSC) for analysis.

The concept was that the round robin testing would help to identify which different test protocols produce meaningful differences in the results. This information could then guide considerations of test standardization. If differences in how we run a given test do not produce different results, that test might be one that could be more easily standardized. States could modify the procedures without changing specification limits or how they interpret the results. On the other hand, states might choose to retain their methods, but accept other state's methods as well, since the answers are the same either way.

If significant differences in test results were observed, more investigation into the causes of these differences and an attempt to identify which results were "right" could be in order. Ultimately this could promote more standardization as well as improved testing techniques for the region.

Status

In the end, six labs were able to participate in the round robin, testing nine different mixes from around the region. This represents a great deal of lab work over and above the routine workload. Several states realized at the outset that their limited personnel and resources would not allow them to take on such a large amount of work. The commitments and efforts of the Indiana, Iowa, Kansas, Nebraska and Wisconsin labs that did participate are greatly appreciated. The NCSC lab also tested all of the materials in support of the experiment.

The nine mixtures tested represented a wide range of properties. There were three 9.5mm, three 12.5mm and three 19.0mm mixes. The design traffic levels ranged from under 300,000 to 40 million ESALs, with Ndesign values of 50, 75, 96, 100, 109 and 125. (The Ndesign level to use was provided to each lab rather than having labs use their standard, differing compaction levels.) The binder grades used included PG58-28, 64-22, 64-28, 70-28, 76-22 and 76-28.

Each lab tested the aggregates to determine:

- individual bulk specific gravities (if possible using their test protocols),
- combined bulk specific gravity (measured or calculated),
- fine aggregate angularity,
- coarse aggregate angularity or percent crushed, and
- gradation of the design blend using given stockpile percentages.

Getting started on the road to standardization leads to the big question: where to start?

Each lab then prepared mixtures according to the given design and tested mixture properties including:

- effective specific gravity,
- maximum theoretical specific gravity;
- bulk specific gravity at Ndesign (either measured or backcalculated),
- air voids at Ndesign (measured or backcalculated),
- Voids in the Mineral Aggregate (VMA),
- Voids Filled with Asphalt (VFA),
- density at Ndesign, and
- compacted sample weight and height.

Testing was completed and results were sent to the NCSC by mid-January. Analysis of the data is underway. A full report will be prepared this Spring and distributed to the NCAUPG Management Committee for consideration and action.

Preliminary Results

Two primary factors have been considered in the data analysis to date, Lab and Mixtures. That is, for a given set of test data, say the maximum specific gravity (or Rice) data, the results were analyzed to see if there were significant differences in the values for different mixes and if there were differences in the results from different laboratories. The results should be different for different mixes; the analysis confirmed that, which adds confidence that the data and analysis are reasonable. The real question was whether there would be significant differences in the results from different labs when they test the same materials.

The preliminary analysis of the data shows some interesting trends when comparing labs. For example, the aggregate test results were very consistent among the labs. No statistically significant differences have been identified in the results of fine aggregate angularities or bulk specific gravities. On the mix results, there were no significant differences in the maximum theoretical specific gravity results. These may be test methods where we can easily achieve standardization or accept the results of alternate test methods.

On the other hand, statistically significant differences were observed in the mixture bulk specific gravities between the labs. Consequently, there were also significant differences in the air voids, VMA and VFA. These differences imply either a difference in the compaction of the specimens or in how the bulk gravities were measured. Additional data analysis is on-going to investigate the possible explanations for these differences. Information on the type of gyratory used, how it was calibrated, how the specimens were compacted (to Ndesign or Nmax), the short term aging procedure, mixing and compaction temperatures, test methods and equations, and more, is being scrutinized to see if there is any relationship to the observed differences in test results.

It will unlikely that a single cause for the differences can be identified, but it is hoped that this exercise will help the region determine where to go next. Perhaps a round robin exchange to measure the bulk specific gravity of compacted specimens would be advisable. Or perhaps a more detailed investigation of gyratory compaction procedures will be needed.

After the final report is reviewed, the NCAUPG Management Committee will be asked to determine the next recommended step towards test standardization. The first step taken with this round robin will likely lead to additional steps and more round robins. It is hoped that additional labs, perhaps including contractors labs, will be able to participate in more focused, less intensive follow-up studies.

The final report and information on future efforts will be posted on the NCAUPG website at http://bridge.ecn.purdue.edu/~spave/NCAUPG/Index.html, as it becomes available.

NCSC Moves into New Lab

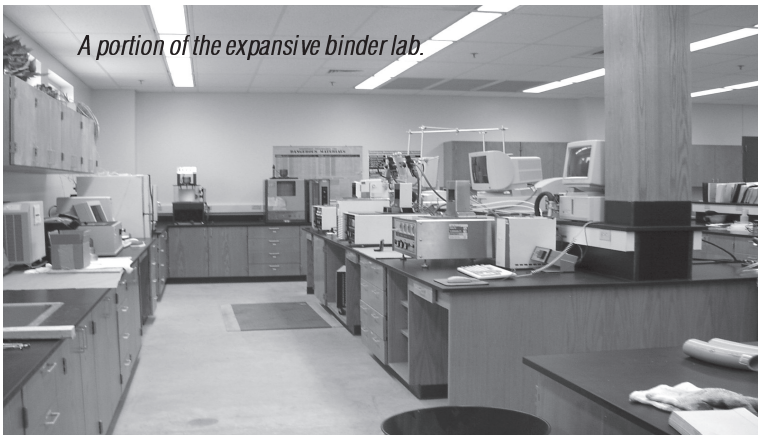
The NCSC has completed its move into new lab space provided by the Indiana Department of Transportation. Attendees at the NCAUPG meeting in Lafayette in January toured the 17,000 square foot addition to the INDOT Division of Research, which houses the main branch of the NCSC.

The new addition was formally dedicated in April 2004, but it took several months after that to finish installing and recalibrating the equipment. Months of planning and working with the architect allowed the design of the labs to facilitate the flow of materials from receiving, through sample preparation and testing. Separate rooms are available for aggregate processing, binder testing, mixture sample preparation, mixture testing and cleaning. INDOT also has concrete testing facilities in the building.

Work is now underway on remodeling the NCSC's former lab and office space into a full suite of offices. In addition to such amenities as carpeting and wall treatments, the new offices will provide additional space for student and staff offices, a work/file room, conference room and more. The primary benefit of the new space, however, will be a quieter office environment, since the exhaust fans, hydraulics and refrigeration units associated with our lab tests have been moved into separate space. The NCSC staff has been temporarily displaced to make way for the remodeling, but plans to move back into the offices later this summer.

Tours of the facility are also planned for the upcoming Quiet Asphalt Conference/Workshop in November or can be arranged at any time by contacting the NCSC. We'd love to show you around and update you on our current activities any time you are in the area!

More shakers than you can shake a stick at are in a separate room to limit noise and dust.



A portion of the expansive binder lab.

The sample preparation room features two compactors, mixers, ovens and more.

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The National and Regional Superpave Newsletters are published three times a year and are coordinated by the North Central Superpave Center. The NCSC is one of five Superpave Regional Centers established to assist with implementation of the Superpave performance-based system for designing asphalt pavements. The NCSC is a joint effort of Purdue University, the Indiana Department of Transportation, and the Federal Highway Administration and is administered by the Joint Transportation Research Program at Purdue University.

2005 Calendar of Events

April 19-20	**Michigan Asphalt Paving Association Annual Asphalt Paving Conference** Soaring Eagle Casino and Resort, Mt. Pleasant, Michigan Website: www.miasphalt.com/
Sept 15-20	**AASHTO Annual Meeting** Gaylord Opryland Hotel, Nashville, TN Website: www.transportation.org/aashto/calendar.nsf
Nov 1-3	**Quiet Asphalt 2005 Symposium** Holiday Inn Select, Lafayette, IN Website: widget.ecn.purdue.edu/~sqdh
Nov 3	**49th Annual Kansas Asphalt Pavement Conference** University of Kansas, Lawrence, KS Website: www.kuce.org/programs/kapc/aa63000/
Nov 30-Dec 1	**45th Wisconsin Asphalt Pavement Association Conference** Marriott Madison West, Madison, WI Website: www.wispave.org
Dec 6	**Asphalt Pavement Association of Indiana HMA Confernce** Indianapolis Marriott East, Indianapolis, IN Contact: Ruth Bedwell, INAPAI@aol.com
Dec 6-8	**Minnesota Asphalt Pavement Association's (MAPA) 52nd Annual Asphalt Conference** Radisson Hotel and Conference Center, Plymouth, MN Website: www.asphaltisbest.com/calendar.asp
Jan 10-12 2006	**North Central Asphalt User/Producer Group Technical Workshop and Hot Mix Asphalt Conference** St. Louis, MO Website: http://bridge.ecn.purdue.edu/~spave/NCAUPG/Index.html

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