

MINUTES
of the
THIRTIETH PACIFIC COAST CONFERENCE
ON ASPHALT SPECIFICATIONS

i. NOTICE OF CONFERENCE

Pursuant to notification and invitation by Professor C. L. Monismith, Moderator for the Conference, to leading governmental asphalt user agencies, asphalt and aggregate suppliers and asphalt mix producers and others interested in the various forms of asphalt and asphalt mixtures marketing in the area of the states of Alaska, Arizona, California, Hawaii, Nevada, Oregon and Washington, the Thirtieth Pacific Coast Conference on Asphalt Specifications was held at the University of California, Berkeley Pavement Research Center in Richmond, California on Tuesday and Wednesday, May 12-13, 1998.

The Conference was called to order at 9:08 a.m., Tuesday, May 12, 1998, by the Moderator, Professor C. L. Monismith.

ii. ATTENDANCE

The following were in attendance:

Asphalt User Agencies

- | | | | |
|----|--|-------|------------|
| 1. | Arizona Department of Transportation | J. | Nodes |
| 2. | California Department of Transportation (CALTRANS) | R. N. | Doty |
| | | R. | Reese |
| 3. | Federal Highway Administration | J. | D'Angelo |
| | | S. | Healow |
| | | J. | Lewis |
| | | J. | Massucco |
| | | B. | Neitzke |
| 4. | City of Los Angeles | R. | Villacorta |
| | | G. | Scott |
| 5. | Nevada Department of Transportation | C. | Cook |
| | | D. C. | Weitzel |

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|----|--|----|------------|
| 6. | Oregon Department of Transportation | B. | Patterson |
| 7. | San Diego County Dept. of Public Works | J. | Goldhammer |
| 8. | Washington State Dept. of Transportation | D. | Jackson |
| | | J. | Walter |

Asphalt Producers & Materials Suppliers

- | | | | |
|-----|------------------------------|-------|-------------|
| 1. | Albina Asphalt Co. | C. A. | Clayton |
| 2. | BASF | J. | Rountree |
| 3. | Chevron Products | S. | Nisula |
| | | S. | Reyda |
| 4. | Conoco | T. | Claret |
| 5. | Dupont | J. | Seay |
| 6. | Enichem Elastomers | D. B. | England |
| | | T. | Nichols |
| 7. | Golden Bear | S. | Escobar |
| | | B. | Staugaard |
| 8. | Huntway Refining Company | D. | Goss |
| 9. | Idaho Asphalt Supply | D. | Salomon |
| 10. | Koch Materials Company | S. | Charmot |
| | | S. | Metcalf |
| 11. | LTR | V. | Nguyen |
| 12. | McCall Oil & Chemical | P. | Turpen |
| 13. | Morgan Emultech | J. | Van Kirk |
| 14. | NCAPA | R. | Smith |
| 15. | Oxnard Refinery | J. | Chase |
| 16. | Paramount Petroleum Corp. | S. | Burhans |
| 17. | Reed & Graham Lab Services | F. | Rancadore |
| 18. | San Joaquin Refining Co. | D. | Powell |
| | | E. | Starbuck |
| 19. | Shell Chemical Co. | J. | Kendrick |
| 20. | Shell Oil Co. | R. J. | Holmgreen |
| 21. | Sim J. Harris | D. | Baltzer |
| | | L. | Liston |
| 22. | Telfer Sheldon Oil Co. | H. | Ho |
| 23. | U. S. Oil & Refining Company | S. M. | TecleMariam |

Visitors & Guests

- | | | |
|----|---|-----------------|
| 1. | Asphalt Institute | R. E. Campbell |
| | | R. P. Humer |
| 2. | Nichols - Vallerger, & Associates | B. A. Vallerger |
| 3. | Oregon State University | R. G. Hicks |
| 4. | UCB Institute of Transportation Studies | L. E. Santucci |
| 5. | University of Nevada - Reno | J. A. Epps |

Moderator, Legal Counsel & Secretary

- | | | |
|----|---|-----------------|
| 1. | University of California, Berkeley, Moderator | C. L. Monismith |
| 2. | Pillsbury Madison & Sutro | J. Hall |
| | | K. Jaenike |
| 3. | J. F. Pearring, Inc., Secretary | J. F. Pearring |
| | | L. G. Economy |

iii. POLICY ON ANTITRUST COMPLIANCE

It is customary that all Producer Representatives to the Conference adhere to Antitrust Compliance requirements. Representatives from Pillsbury, Madison & Sutro served as Legal Counsel; Ms. Judith Hall on May 12, 1998 and Ms. Karen Jaenike on May 13, 1998. They reminded all Producer and Supplier Representatives present that the Conference has adopted a Statement of Compliance with Antitrust Principles, which is on file in the office of the Conference Secretary.

AGENDA

TWENTY NINTH PACIFIC COAST CONFERENCE

ON ASPHALT SPECIFICATIONS

University of California, Berkeley
Research Field Station

Richmond, California

May 12-13, 1998

MODERATOR: Professor C. L. Monismith, University of California.

REGISTRATION: Tuesday, May 13, 1997, 8:00 a.m.,

CONFERENCE CONVENED: Tuesday, May 13, 1997, 9:08 a.m.

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|------|--------------------------------|-----------------------|
| i. | Notice of Conference | C. L. Monismith |
| ii. | Attendance | C. L. Monismith |
| iii. | Policy on Antitrust Compliance | J. Hall
K. Jaenike |

- | | <u>Discussion Items</u> | <u>Speaker</u> |
|-----|---|-----------------|
| I. | Introductory Remarks & Approval Minutes | C. L. Monismith |
| II. | Paving Asphalt Committee Report and Recommendations | J. Massucco |
| | A. Standard Practice | J. Massucco |
| | B. PG Evaluation Process | J. Massucco |

C.	Task Group Reports	
	1. Round Robin	S. M. TecleMariam
	2. Cleaning Oven Study	J. Massucco
	3. Asphalt Rubber Binder	J. Goldhammer
III.	Joint Paving Asphalt and Asphalt Mixture Committee Report	R. J. Holmgreen
A.	Fatigue Task Group	R. Reese
B.	Ignition Oven Study	B. Neitzke
IV.	Asphalt Mix Committee Report	R. J. Holmgreen
A.	Compaction	J. Massucco
B.	Smoothness	J. Nodes
C.	Superpave Status	WA, NV, OR, CA, AZ, SD County, City of LA
V.	Asphalt Mix Committee Recommendations	R. J. Holmgreen
VI.	Paving Asphalt Committee Recommendations	J. Massucco
VII.	ASTM Activities	S. Burhans
VIII.	Superpave National Report	J. D'Angelo
IX.	Standing Committee Report and Recommendations	R. P. Humer
X.	Emulsion Committee Report and Recommendations	S. M. TecleMariam
XI.	Progress of AASHTO Activities	D. Jackson
XII.	Northwestern States Alliance	J. Massucco
XIII.	Review of Standard Practice	J. Massucco
XIV.	WesTrack Update	J. A. Epps

XV. Superpave Regional Centers

- A. UN Reno**
- B. UC Berkeley**
- C. Heavy Vehicle Simulators**

J. A. Epps
L. E. Santucci
C. L. Monismith

**XVI. Conference Action on Paving Committee
Recommendations**

J. Massucco

**XVII. Conference Action on Asphalt Mix
Recommendations**

R. J. Holmgreen

XVIII. Recommendations for Future Activities

J. P. Walter
R. J. Holmgreen

XIX. Future Conferences

C. L. Monismith

XX. Resolutions

J. P. Walter
R. J. Holmgreen

XXI. Appreciation to Moderator

Conf. Delegates

XXII. Adjournment

I. INTRODUCTORY REMARKS AND APPROVAL OF MINUTES

Professor Carl L. Monismith opened the Conference by welcoming the representatives of the user agencies, asphalt producers, materials suppliers, visitors and guests to the University of California, Berkeley, Richmond Field Station for the Thirtieth Pacific Coast Conference on Asphalt Specifications (PCCAS). Professor Monismith then introduced Mr. B. A. (Barney) Vallerger, formerly Division Managing Engineer of the Asphalt Institute, one of the coordinators the First Pacific Coast Conference on Asphalt Specifications held January 25-27, 1956 and a Conference Secretary. Mr. Vallerger briefly stated that the original purpose for the Conference being established was to try and reduce the number of grades of asphalt being used at that time as well as adopting uniform asphalt specifications in the Pacific Coast States. Mr. Vallerger then thanked the Conference Members for their continued support of the Pacific Coast Conference on Asphalt Specifications.

Mr. Jack Pearring invited the Conference to acknowledge Mr. Vallerger's and Professor Monismith's many contributions toward the Conference, reminding everyone that Professor Monismith had been the Conference Moderator since the Fifth Conference held in 1963, thirty-five (35) years ago. Mr. Pearring informed the Conference Members that copies of the "PCCAS Purpose, Organization and Operation from 1956 to present" were located on the registration table and available for their perusal, **APPENDIX I**.

Professor Monismith then requested that each attendee state his/her name and company affiliation to the Conference so that the Minutes being recorded at this Conference are properly documented and distributed.

Professor Monismith then took action relative to the **Minutes of the Twenty Ninth Conference** held at the University of California, Berkeley, Pavement Research Center, Richmond, California, May 13-14, 1997.

It was **Motioned, Seconded and Carried (MS&C)** that the Minutes of the Twenty Ninth Pacific Coast Conference on Asphalt Specifications be approved as prepared and distributed.

II. PAVING ASPHALT COMMITTEE REPORT

Mr. Joe Massucco, Federal Highway Administration (FHWA) and Chair of the Paving Asphalt Committee (PAC) reported that the Committee in association with the Asphalt Mixture Committee (AMC), has met three (3) times since the last Conference; August 18-20, 1997; December 15-17, 1997; and April 14-16, 1998. The three (3) major topics presented to the Conference dealt with: The Standards for Suppliers of PG Asphalts, PG Evaluation Process and the Expert Task Groups.

A. Standard Practice for Suppliers of Performance Graded Binders

The PAC focused on finalization of the "Standard Practice for Asphalt Suppliers That Certify Performance Graded Asphalts," **APPENDIX II**, which was simplified in order to better serve Conference Members. The procedure centered on need for a refinery or terminal to certify supply leaving the purchaser with maintenance of job site certification procedures due to the individuality of field binder supply. This document is now ready for Conference adoption.

B. PG Evaluation Process

The PAC is now focusing on the PG Evaluation Process, **APPENDIX III**, and validation of the PG specification. Analysis of field and laboratory performance data in support of this effort occupies much of the PAC and AMC members time. The evaluation process has been divided into four Tasks:

- 1) Validate PG Low Temperature Criteria
- 2) Validate PG Fatigue Criteria
(In association with AMC)
- 3) Validate PG Permanent Deformation Criteria
(In association with AMC)
- 4) Data gathering and data base management

Task number two (2) is consuming the PAC and AMC members time now. Mr. Massucco referred the Conference to the Time Line, **APPENDIX IV**, stating that the PAC began validation of the PG Specification after the 1995 Conference and would like to recommend adoption at the 1999 Conference.

Mr. Massucco then thanked his Co-Chair, Mr. Bob Staugaard, Golden Bear and all the Task Group members who on a volunteer basis have devoted their time and energies to realization of the PAC charges. A copy of Mr. Massucco's notes are included as **APPENDIX V**.

C. Task Group Reports

1) Round Robin

Mrs. Shauna-May TecleMariam, U.S. Oil & Refining, reported that twenty-five (25) samples of a PG 70-10 asphalt were sent out and eighteen (18) responded with results that were tabulated in the second survey of round robin testing conducted this year by the task group. Mrs. TecleMariam highlighted that the second sample heating time was reduced considerably. Problems occurred with variability in testing procedures; resulting in a wide range of result. Specific problems were associated with the maintenance of the testing temperature before starting the test. Everyone should have waited ten (10) minutes before starting the test after the sample was put on the plates. Mrs. TecleMariam mentioned that all laboratories involved should make an effort to understand the correct procedures and possibly needed to brush up on changes made in SHRP testing protocol.

The task group believes another sample should be tested along with a short questionnaire. The next sample will address the heating time of the sample as well as increasing the pressure of the Pressure Aging Vessel (PAV).

The second survey along with the results of testing and a summary of Mrs. TecleMariam report is located in **APPENDIX VI**.

2) Cleaning Oven Study

The purpose of this study was to evaluate the use of high temperature ovens to replace the use of solvents in the laboratory for cleaning equipment used for the testing of asphalt binders and mixes. Three (3) States participated in this study evaluating ovens supplied by the FHWA to determine if this method of cleaning laboratory equipment was feasible and did not damage the equipment being cleaned. The results of the study were favorable; the ovens were efficient in cleaning the equipment, reducing the use of solvents and were cost effective. A copy of this study is located in **APPENDIX VII**.

3) Crumb Rubber

Mr. Joe Goldhammer, San Diego County Department of Public Works, reported that since the 1997 Conference the task group has met three (3) times to continue evaluation and development of a Performance Based Specification for CRM Binder. The round robin testing on the samples furnished by California Department of Transportation (CALTRANS) was completed this year. The results showed some variations between laboratories.

Mr. Goldhammer reported that the work performed by NIOSH for the Massachusetts DOT has been published, and copies of this report are available at the NIOSH Publications office, whose address is available in **APPENDIX VIII**, which also includes a summary of Mr. Goldhammer's report. The NIOSH study on air quality on seven (7) proposed sites has been completed and that report is due in the fall of 1998.

CALTRANS has completed the MB-7 project south of El Centro in Imperial County and tests show the binder met the "MB" specifications. Another project by CALTRANS in the Central Valley has gone to bid using MB-5 specifications. After the overlay construction has begun, the MB-5 material will be available for round-robin testing. Currently CALTRANS is analyzing retained samples of CRMB and cores of pavement samples containing CRMB to determine performance and deflection. Previous samples of CRMB that were sent to CALTRANS representing failed pavements in Nevada, have failed to meet MB specifications.

All testing by Oregon State University on HMA containing CRMB has ceased.

The use of CRMB hot mixes, open graded friction courses and chip seals continues in the Southern section of the region. Los Angeles County has increased its use of CRMB hot mix overlays for maintenance. San Diego City is currently constructing a slurry seal with an emulsion of CRMB and Arizona has prepared a report on the success of open graded friction courses using CRMB.

This task force recommends continued testing of MB specified binder with recommendations for specifications to be made at the 1999 Conference. The task force also wants to encourage User Agencies to try MB specifications and will continually monitor the uses of crumb rubber asphalt products.

Mr. Goldhammer then announced his impending retirement and the need for a new task group leader. It was suggested that Mr. George Way be invited to replace Mr. Goldhammer as task group leader.

Mr. Massucco thanked all the PAC and AMC members for their efforts and turned the floor over to Mr. Ron Reese to discuss the PAC and AMC shared efforts in relation to fatigue.

III. JOINT PAVING ASPHALT AND ASPHALT MIX COMMITTEES REPORT

The results of the work these committees share will provide a major contribution toward the recommendations presented to the Conference in 1999.

A. Fatigue

Mr. Ron Reese, CALTRANS, reported to the Conference the Expert Task Groups (ETG) work plan presented at the last Conference determining binder contribution to fatigue. It comprises two parts:

1) Binder Parameter Identification

Identifying binder parameters requires evaluating the validity of a "focus" model for binders using a broad range of properties. The methods of fatigue will be the 4 point bending beam and slice. Evaluation will be focused on correlation of fatigue life with various binder rheological properties.

2) Specification Limit Determination

Determination of specification limits will include deflection. Projects will be identified as having either good or bad fatigue life. Properties and performance data will be evaluated then recommendations for binder specification will be prepared.

Discussion followed and a suggestion was made to obtain material from the field for analysis and compare that to data from laboratory material. Mr. Reese pointed out that he and Mr. John D'Angelo, FHWA, are reviewing the complexities of fatigue and are still in the process of gathering data. Much work is still required before a binder specification can be completed.

B. Ignition Oven Study

Mr. Brad Neitzke, FHWA, reported that the intent of this joint mix/binder task force formed last fall is to investigate and develop procedures associated with the use of the ignition furnace. The task force has developed a plan which includes investigation of the development of test procedures and comparing them with existing methods. The plan also includes compilation and review of problems associated with equipment including a report on current evaluation studies of the ignition oven.

Currently in the PCCAS, the test methods used are AASHTO TP 53 (minor variations) and Nevada T761.

Three completed studies and one preliminary report examining various uses of the ignition furnace have been obtained by the task force:

- 1) Washington Department of Transportation (WSDOT) study involved eleven (11) laboratories and dealt with the amount of aggregate loss and how it effected the correction factor in providing reliable asphalt content results in specific mixes.
- 2) Nevada Department of Transportation (NDOT) study consisted of two (2) phases. Examining the feasibility and accuracy of the ignition oven method compared to existing test procedures used by NDOT and noting variability's in bitumen ratio, lime content and gradation.
- 3) The Canadian Asphalt Mix Exchange study included fifteen (15) laboratories and examined the reproducibility of asphalt content on a single mixture.
- 4) Preliminary results have been compiled by the FHWA Ignition Oven Study and the task force will be reviewing the final results.

A copy of Mr. Neitzkes remarks and copies of the studies can be found in **APPENDIX IX.**

IV. ASPHALT MIX COMMITTEE REPORT

Mr. Rick Holmgreen, Shell Oil Company and Co-Chair of the AMC, in the absence of Dr. Rita B. Leahy, reported to the Conference that the AMC had met three (3) times since the 1997 Conference in joint sessions with the PAC. He too wanted to thank Mr. Bob Staugaard on behalf of both the PAC and AMC

Committee's for preparing the minutes for all the Committee's meetings. Anyone requesting access to these minutes needs to contact the Committee Chairs or the Conference Secretary.

Mr. Holmgreen reported that the first charge given to the AMC was to interact with FHWA, other User-Producer Groups and Superpave Regional Centers regarding SHRP technology related to mix design and evaluation. AMC has received periodic reports from three FHWA ETGs: Binder, Mix and Superpave Models. The Binder issue has been addressed by the PAC, the Mix and Superpave Models ETGs (in reference to Dr. Leahy's notes, see **APPENDIX X**) have focused on:

- ⇒ aggregate consensus properties
- ⇒ availability of two (2) gyratory compactors
- ⇒ revision of AASHTO provisional standards to be "user-friendly"
- ⇒ creating Nationwide Superpave database including mix design, production and performance data
- ⇒ Superpave team assisting user agencies
- ⇒ NCHRP research including restricted zone, moisture sensitivity, modified binders and gyratory compactor protocol
- ⇒ performance test to supplement volumetric mix design
- ⇒ dust to asphalt ratio possible revision
- ⇒ designing SMA mixes with Superpave

With respect to interaction with other User Producer groups, Mr. Holmgreen made reference to a recent AASHTO Survey involving nationwide implementation of Superpave, indicating that it varies dramatically between regions. The number of projects awarded in the North Central, Northeastern, and Southeastern regions are considerably larger than the number awarded in the Rocky Mountain and West Coast regions. The major reason for this appears to be the reluctance of the West to incorporate Superpave in their pavement designs. He stated that the States feedback of Superpave projects was necessary for the accurate assessment of Superpave as a feasible pavement material.

Mr. Holmgreen then announced that the discussion of the activities of the Superpave Regional Centers at University of Nevada at Reno (UNR) and University of California at Berkeley (UCB) would be held later on during this Conference under Item XV.

The second charge the Conference gave the AMC was to develop an evaluation process for SHRP technology with emphasis on mixes, working in cooperation with the PAC. Though three (3) task groups were formed to address three (3) different distresses, (permanent deformation, fatigue and low temperature

cracking) only the fatigue task group has made progress and this issue was discussed in Item III under the PAC report.

The third charge given to the AMC was to encourage the use of SHRP mix design technology on field projects to develop validation data. Mr. Holmgreen emphasized the Committees efforts to increase industry participation has not been met with the enthusiasm they had hoped. Industry's attitude is still "spec it and we'll build it" and the Committee feels this attitude will remain unchanged until more User Agencies require the use of SHRP technology for mix design or for QC/QA.

The fourth and final charge given to the AMC was to report on the procurement and trials of Superpave software and equipment and the effect on binder selection. Mr. Holmgreen reported that all State Highway Agencies within the Conference have gyratory compactors in their central labs, Washington DOT has a Superpave shear tester and Oregon DOT has purchased a portable gyratory from TestQuip. More time and money will be required for the Superpave Models Contract. Currently the highest priority is to select a strength test to supplement volumetric mix design. Mr. Holmgreen's overheads are included in **APPENDIX XI**.

Mr. Holmgreen then reported that at the 1997 Conference the AMC broadened its scope of discussion from SHRP related mix technology to include asphalt mix technology. It was hoped that the AMC could develop general specifications for compaction and smoothness that would be adopted by the Conference. In addition each State was asked to update the Conference as to their progress on implementation of Superpave. The following reports highlight the ACM's work on these topics:

A. Compaction

Mr. Joe Massucco referred Conference members to an article written by Mr. Larry Santucci, University of California Berkeley, Pavement Research Center, "Using Air-Void Content as a Pavement Performance Measure" **APPENDIX XII**. Mr. Massucco summarized the article for Conference members by stating that at an average air void of eight percent (8%) the fatigue life of agebolt concrete is almost one third (1/3) of that if the mix is impacted to an air void content of five percent (5%). Furthermore, State Agencies should be encouraged to tighten compaction requirements, establish QC/QA processes and institute pay incentives to realize improved asphalt pavement performance of dense graded mixes. Mr. Massucco included in his report a common reference density and street compaction specification that Conference members can readily understand, this is available for reference as **APPENDIX XIII**.

B. Smoothness

Dr. Julie Nodes, Arizona Department of Transportation's (ADOT), reported on end product specification developed by ADOT researchers aimed at obtaining pavement smoothness. Pavement smoothness is significant in reducing life cycle costs and user costs and very importantly that the public perception is "a smooth road is a good road."

ADOT's approach to obtaining smoother pavement involves incentives and disincentives for the contractor based on relating actual smoothness to target smoothness to determine the dollar value of the incentive or disincentive. Some contractors use this incentive when bidding a project to reduce the bid and recover costs with the smoothness bonus. Smoothness is currently being tested using a K.J. Law Profilometer. Evidence has shown little relationship between existing pavement smoothness and final resurfaced smoothness. Results have shown that contractors are paying closer attention to details and that the quality of pavements is improving consequently reducing life cycle costs as a result of implementation of this specification.

Re-evaluation of ADOT's smoothness specification is an ongoing process. Target smoothness values are adjusted based on highway class versus construction type versus mixture properties. A copy of ADOT's current smoothness specification and Dr. Nodes notes and overheads can be found in APPENDIX XIV.

C. Superpave Status

- 1) WASHINGTON: Mr. Jim Walter, Washington State Department of Transportation (WSDOT) detailed what has been accomplished in planning for the implementation of the PG grading system and Superpave in the State of Washington.

PG Projects:

1995 -- 2
1996 -- 3
1997 -- 13

Superpave Projects:

1996 -- 0
1997 -- 4
1998 -- 9

WSDOT currently has three PG grades for use with regular traffic but will be using variations based on traffic conditions:

Western:

Regular:	PG 58-22
Slow:	64-22
Standing:	70-22

Northeastern:

Regular:	PG 58-34
Slow:	70-34
Standing:	70-34

Southeastern:

Regular:	PG 64-28
Slow:	76-28
Standing:	76-28

A PG 58-34 asphalt cement will presumably be used in all mountain passes due to colder temperatures.

WSDOT concluded from these projects that the gyratory compactor is a "great" tool and adjustments can be made quickly to get the mixture needed. A test section, however, should be used on larger jobs in order to make appropriate adjustments to the mix. WSDOT has added two additional sieves, the 3/8" and the No. 4 combined with the three originally used: the 1/2", No. 8 and No. 200 for gradation acceptance. On course graded mixes below the restricted zone, volumetric properties are sensitive to changes in gradation on the intermediate sieve sizes.

Problems experienced with implementation includes lack of funding for equipment and research as well as education of state personnel, contractors and local agencies. In 1995 and 1996 FHWA gave binder and mix training in Olympia for contractors, suppliers and State Agencies. In 1997 and 1998 several Superpave classes and presentations were offered to contractors, suppliers and State Agencies prior to bidding all Superpave projects.

In 1999 all projects will be PG graded; Superpave implementation, however, remains uncertain. WSDOT targets implementation for:

Ignition Furnace-----	1998
PG Binders-----	1999
Volumetric Mix Design-----	2000
Full Superpave Mix Design---	2005 -- 07

A copy of Mr. Walter's overheads can be found as **APPENDIX XV**.

- 2) NEVADA: Mr. Chuck Cook, Nevada Department of Transportation (NDOT) reported that there are key issues that require attention and these issues are the reason Nevada has pushed Superpave implementation into the future.

Issues:

With regards to PG binders, Nevada has only two (2) years in-service performance data available. Of noticeable concern is a tendency for the PG binders to strip, some samples prepared for Lottman testing turned a brownish color in the water bath and tensile strength ratio results were lower than expected.

Nevada has used AC-20P "workhorse binder" for years and are pleased with its performance in both low and high temperature climates. They have graded AC-20P by the PG system and found that it grades from 52 to 64 on the high temperature side and -16 to -28 on the low temperature side.

With respect to the project on Interstate-80: PG criteria designated a high temperature grade of PG 70 for this project, Nevada's AC-20P, graded at PG 52, has been performing satisfactorily without rutting since 1993.

NDOT has a full set of binder testing equipment, however, their experience with this equipment has not been positive. All pieces with the exception of the rotational viscometer and the rolling film oven have proven unreliable, with down time being around fifty percent (50%). The largest common problem has been the inability to consistently meet required temperature control.

NDOT has only two (2) years of in-service performance on one (1) Superpave mix design. Segregation, fatigue cracking, rutting and moisture susceptibility has been experienced in the coarser Superpave aggregate gradation. Approximately seventy-five percent (75%) of NDOT agency mix gradations violate the restricted zone. VMA, dust to asphalt ratio, moisture sensitivity are all problems NDOT has experienced. Presently there is no readily performed strength test for Superpave mixes, "all performance eggs are placed in the gyratory compactor basket."

NDOT has two (2) dense graded mixes in place at WesTrack that are performing well, in contrast to Superpave mixes that were placed at the same time. Mr. Cook stated that reasonable

explanations relating to performance issues of Superpave mix designs at WesTrack need to be developed.

NDOT tentative SHRP Implementation Schedule:

1998: Superpave specifications
1999: Revised specifications
2000: 50% binder -- 10% mix
2001: 100% binder -- 50% mix
2002: 100% binder -- 100% mix

APPENDIX XVI is a copy of Mr. Cooks outline and remarks.

- 3) OREGON: Mr. Bruce Patterson, Oregon State Department of Transportation (ODOT) reported that to date no true Superpave mix design projects are in place in the field, only in the laboratory.

PG graded projects:

1998 -- 4
1999 -- 10
2000 -- All

Areas of ODOT evaluation with respect to:

Binder:	Switching from PBA to PG DSR testing.
Aggregate:	Flat/Elongated pieces evaluation Sand equivalent specification limits.
Mix Design:	Replacement for Hveem stability TSR versus IRS for stripping.

Mr. Patterson stated that ODOT is satisfied with current process, liked the PBA and finds it difficult to switch to PG when field performance has been good. A copy of ODOT's Superpave Implementation chart can be found as **APPENDIX XVII**.

- 4) CALIFORNIA: Mr. Ron Reese, CALTRANS, stated that only one (1) project using Superpave is scheduled for 1998 and will be designed by the contractor. PG specification at this time, is not at a point for implementation, yet CALTRANS is working to resolve differences. Mr. Reese reported that current use of the Hveem mix design is satisfactory for stable pavements in the state of

California. For standard asphalt pavements and polymer modified asphalts, continued validation is the main focus of efforts.

- 5) ARIZONA: Dr. Julie Nodes reported that ADOT fully implemented PG binder specification in 1997. To date, minor modifications have been made to meet with Arizona's conditions. PAV temperature and number of grades in use are the only issues ADOT has with the current PG system.

ADOT constructed several Superpave test sections prior to 1997 and was generally pleased with their performance. Modifications to air void content and sand equivalent minimum were made to address Arizona's hot climate. In 1997 eight (8) projects were constructed with one (1) showing problems relating to compaction and one (1) had problems applicable to insufficient mix temperature for compaction. In 1998 four (4) Superpave projects are currently underway and five (5) more are under contract. Approximately ten (10) more are expected for bid this year.

Issues of concern relating to Superpave performance are:

- ⇒ Ndesign values dependent on temperature.
- ⇒ High/Low VMA mixes=high/low asphalt content.
- ⇒ Variable design air void content might work better
- ⇒ Binder grade=76-16, instead 76-10 for better quality.
- ⇒ No TSR results experience.
- ⇒ High mixing and compaction temperatures required by certain binders present a construction problem.
- ⇒ Minimum lift thickness to obtain compaction.

Challenges of Superpave Implementation:

- ⇒ Rutting on Route 66 (high VMA & asphalt content).
- ⇒ Raveling of mix containing PG 82-10 binder.
- ⇒ Cracking on Route 93 north of Kingman on SPS-9 test section.

ADOT is proceeding forward with full implementation of Superpave albeit with caution. Changes from the standardized version may be required to meet with Arizona's needs. A complete copy of Dr. Nodes notes and overheads are located in **APPENDIX XVIII**.

- 6) **SAN DIEGO COUNTY:** Mr. Joe Goldhammer reported that they had recently received the gyratory compactor (two (2) weeks ago) and have had the binder equipment for about one (1) year. Experimentation will occur this summer with Superpave design and the use of PG binders, which will include some modified binders. One (1) design test strip will include crumb rubber (CRM) designed by an asphalt producer having a MB-4 binder and using the Superpave volumetric procedure. San Diego intends to follow CALTRANS' lead and use the specification that CALTRANS designates.
- 7) **CITY OF LOS ANGELES:** Mr. Ricardo Villacorta, City of LA, stated they have the gyratory compactor and last year using Marshall mix design testing compared this to the gyratory compactor. No results were offered. This year LA hopes to have one (1) Superpave project.

V. ASPHALT MIX COMMITTEE RECOMMENDATIONS

Mr. Rick Holmgreen stated that the AMC recommends to the Conference:

- 1) Continue participation with Mix and Models Expert Task Groups
- 2) Continue to experiment with SHRP mix technology (field and lab) and share Superpave experiences with Conference members.
- 3) Work to develop guidelines/specifications for smoothness and compaction
- 4) Reconvene the Conference in 1999.

A copy of these recommendations are included as **APPENDIX XIX**.

VI. PAVING ASPHALT COMMITTEE RECOMMENDATIONS

Mr. Joe Massucco stated that the PAC recommends to the Conference:

- 1) Continued validation of PG binder specification using all available data.
- 2) Prepare PG validation report for 1999 Conference with recommendations on adoption.
- 3) Continue evaluation and development of a performance based specification for CRM binders.
- 4) Reconvene the Conference in 1999.

A copy of these recommendations are included as **APPENDIX XX**.

Mr. Massucco announced that a caucus was taken during the lunch break and Mr. Jim Walter has agreed to Co-Chair the User Agencies for one (1) more year and Mr. Rick Holmgreen has agreed to Co-Chair the Producer agencies for one (1) more year.

VII. ASTM ACTIVITIES

Mr. Steve Burhans, Paramount Petroleum, reported on ASTM activities since the last PCCAS Conference. The topics he discussed covered: metrification, asphalt specifications, asphalt tests and asphalt emulsions.

There is a major push for metrification, Mr. Burhans reported; as of January 1, 1998 all revised standards will be written in metric. Eventually all Fahrenheit thermometers, etc. will not correspond to ASTM procedures.

The new ASTM specifications table, **APPENDIX XXI**, deals mostly with modified asphalt's. Type I, II, III, and IV are built around the polymers as indicated on the specification sheet, but it is not mandatory that these polymers be used to meet the specification. ASTM has not yet adopted the PG specification, currently designated D5973. Presently being revised to delete non-metric units, is the viscosity graded specification D3381. Mr. Ray Pavlovich, task group chair, is trying to retain the viscosity units of poise and cSt instead of converting them to Pa·s and mm²/s.

Mr. Burhans also reported that ASTM committees are continually working on development of procedures for PG tests such as DSR, BBR, and DT. Publishing of these procedures should take place within the next few years. A major change relating to increased aging, has been made to the Rolling Film Oven test (D2872), which will be in the 1998 edition of Volume 4.03. The bottles are now to be cooled in a horizontal position, rather than vertical, in the cooling rack. As a result, when the bottles are placed in the oven, the film is formed faster, therefore aging increases. The new procedure also requires the bottles to be scraped out with a scraping tool into the compositing container, and at the end of the eighty-five (85) minute aging period, the bottles are to be removed for scraping one at a time, leaving the remaining bottles rotating in the carriage with the heat flow still on. Up to ten minutes is allowed to scrape out a full load of eight (8) bottles, increasing the effective aging time from eighty-five (85) to ninety (90) minutes.

No changes are forecast for the Performance Grading of emulsion residues. A task force has been formed to develop a performance based specification for surface treatments, which would include both hot applied chip seals and residues from chip seal emulsions. Mr. Burhans stated that this specification will probably include standard PG tests with the addition of elastic recovery. In the next

printing of Volume 4.03, ASTM specifications D977 and D 2397 have been revised to include QS-1H and CQS-1H respectively.

A question arose as to who currently uses ASTM specifications for polymer modified asphalts. The FAA, Navy and mostly off mainland airfields was the answer supplied by Conference members.

A copy of Mr. Burhans notes can be found as **APPENDIX XXII**.

VIII. SUPERPAVE NATIONAL REPORT

Mr. John D'Angelo, FHWA, reported to the Conference on the work of the FHWA Binder Expert Task Group. Mr. D'Angelo discussed the basic testing equipment:

- ⇒ Rotational Viscometer
- ⇒ Dynamic Shear Rheometer (DSR)
- ⇒ Bending Beam Rheometer (BBR)
- ⇒ Direct Tension Tester (DTT)
- ⇒ Aging Equipment:
 - Rolling Thin Film Oven (RTFO)
 - Pressure Aging Vessel (PAV)

Mr. D'Angelo said all do an excellent job of classifying binders and specifications can be refined to obtain the mixture desired.

Specifically, Mr. D'Angelo pointed out that high variability's (CV 40%) are experienced when using the PAV DSR testing. Evaluations are underway using larger plates and smaller gap, which currently show lower variability. Different material will be experimented with to verify this result. Air bubbles in the PAV material may cause problems with test results; the ETG recommends the use of a vacuum oven to remove excess air.

The ETG has done an extensive study to determine why test results from two (2) manufacturers of the BBR were not the same. The load start time of the test and the distance between the supports were found to be the main problem and corrections have been made. Mr. D'Angelo reported that the BBR works well in determining critical cracking temperatures of unmodified binders; however, modified binders need new tools to evaluate their critical cracking temperatures.

A new prototype of the DTT has been delivered and refinement of test procedures are currently underway. So far, the ETG is happy with the results. A new low temperature specification for the DTT is being formulated. The original silicone molds were showing signs of stress due to lower molecular weight than the new or

clean molds. The use of alcohol fluid affects the surface of the specimen and reduces strength. Potassium Acetate, however, while smelly, has no effect and is inexpensive, non-toxic and has no flash point.

The ETG reported that binders with the same critical cracking temperatures perform differently at lower temperatures. The Superpave specification is based on actual pavement temperature. At high temperatures, bumping of grades occur for increased traffic; bumping of grades should also be allowed for low temperature fatigue.

The Superpave Binder specifications are continually evolving; as findings from various studies become available, the ETG will review and make recommendations for changes to the specification.

A copy of Mr. D'Angelo's handouts and overheads are included as **APPENDIX XXIII**.

IX. STANDING COMMITTEE REPORT AND RECOMMENDATIONS

Mr. Robert Humer, The Asphalt Institute, Chair of the Standing Committee, reported that the committees' members included: Mr. Brad Neitzke, Mr. Robert Doty, Mr. Rick Holmgren, and Mr. Bob Staugaard. The Committee has no issues that require their attention at this time. The Committee recommends that if Conference Members have any issues of general concern, the Standing Committee will gladly assist.

X. EMULSION COMMITTEE REPORT AND RECOMMENDATIONS

Mrs. Shauna-May TecleMariam, Co-Chair of the Emulsion Committee, reported that the Committee met three (3) times since the last Conference. The Committee was charged at the 1997 Conference to:

- 1) Continue to identify performance of modified asphalt emulsions compared to conventional systems and develop functional limiting values for the modified asphalt emulsions.
- 2) Characterize the residue from various grades of asphalt emulsions and residue recovery methods available in the Conference Membership. Compare these data with current PBA/PG test methods to determine if there are common properties relating to performance.

Both of these charges were given attention by the Emulsion Committee.

Groups that are performing emulsion studies include AEMA, Utah DOT and a group in Texas. The AEMA study is large and it deals with recovery of emulsion residue using six (6) different samples including conventional and modified emulsions. They are distilling the emulsion residue to 350°F, 500°F, vacuum and also using the oven method. Their report is due out this winter. Utah DOT is beginning to gather data on emulsion residue using SHRP equipment and conventional testing.

The Emulsion Committee started an historical search to determine why penetration and ductility were chosen for the residue tests. A report was found, but it did not identify why the test was selected, field performance was related to the specification. Currently, the historical information available does not assist in replacing the conventional tests with the SHRP tests. Research is ongoing.

The round robin study has continued since the last Conference. The Emulsion Committee repeated the original study using a different suppliers CRS-2 and tested a different suppliers CMS-2. The theory that the RTFO not required to age is holding. The round robin will be ongoing this next year. A copy of the results of the round robin and Mrs. TecleMariam's notes can be found in **APPENDIX XXIV**.

The Emulsion Committee recommended that the charges be continued and made broader to include:

- 1) **Continue to identify performance of modified asphalt emulsions as compared to conventional systems and develop functional limiting values for the modified asphalt emulsions.**
- 2) **Characterize the residue from various grades of asphalt emulsions and residue recovery methods available in the Conference Producer Membership. Compare these data with current PBA/PG test methods to determine if there are common properties relating to performance.**
- 3) **Attempt to identify tests that do not relate to performance of the emulsion residue**
- 4) **Determine if any specifications can be combined or any performance tests can be improved for both modified and conventional emulsion systems.**

The Moderator called for action on the Emulsion Committees recommendations and it was,

MS&C, for these recommendations to be charged to the Emulsion Committee.

(The vote result was unanimous.)

XI. PROGRESS OF AASHTO ACTIVITIES

Mr. Dennis Jackson, Washington State DOT, gave Conference Members an update on resolutions adopted by WASHTO and AASHTO with reference to Superpave implementation.

The WASHTO Subcommittee on Construction and Materials recommends to AASHTO that the FHWA continues and expands the experiment at WesTrack to allow Member States participation in the design and installation process. Additional testing will contribute to the understanding and implementation of Superpave. WASHTO also recommends a slowing-down of the implementation of Superpave to allow FHWA and certain States time to complete needed research and evaluate performance data to answer unresolved design issues of Superpave.

When implementing SHRP Superpave technology, Mr. Jackson informed the Conferees, AASHTO recently resolved that substantial modification of prescribed SHRP standards, requirements, or methodologies for Superpave technology beyond what has been adopted in the AASHTO Standard (and Provisional) Specification for Transportation Materials and Methods of Sampling and Testing would not be accepted. When modification beyond what has been adopted in the AASHTO Standards is necessary, avoid referring to the asphalt pavement so constructed as utilizing SHRP Superpave technology.

Mr. Jackson then reviewed the procedures by which the Standard Process is implemented and stated that the Provisional Standards would be ready the first part of June and the normal standards would be ready by August.

Mr. Jackson reported that the Lead States are providing much needed guidance for other states in the implementation of Superpave. He referred to a study, conducted by FHWA, **APPENDIX XXV**, reviewing the "Performance of Course-Graded Mixes at WesTrack--Premature Rutting." The FHWA team concluded that the major cause of early rutting of reconstructed test sections was a combination of a coarse-graded mixture with high asphalt content and low binder stiffness.

The “State of the Nation” with regard to Superpave Implementation: by the year 2000 all but four(4) states will have PG binder specifications implemented and thirty-nine (39) will have implemented mix design.

Mr. Jackson stated that AASHTO’s view on metrification was “hoping it would go away.” A copy of Mr. Jackson’s handout can be found as **APPENDIX XXVI**.

XII. NORTHWESTERN STATES ALLIANCE

Mr. Joe Massucco reported the following agencies have formed the Northwest Alliance for Quality Transportation and Construction (NAQTC): Alaska DOT, FHWA Region 10, Idaho DOT, Oregon DOT, Washington DOT, Utah DOT, Montana DOT, and other west coast Agencies are considering joining. Training modules for: embankment and in-place density, aggregate, concrete and asphalt have been developed by this group. Manuals and training methods are provided to User Agencies to implement as they see fit. Each module is a five day course costing \$80/day. Mr. Tom Baker, Idaho Materials Engineer, is the Chair for the National Alliance and is currently working with a consultant to develop a package of standard training and certification for field material technicians to administer on their own. The NAQTC wants to develop more laboratory testing, inspection of AC, PCC, and QC managers. Membership is on an individual agency basis.

XIII. REVIEW OF STANDARD PRACTICE FOR SUPPLIERS

Mr. Joe Massucco then reviewed the “Standard Practice for Asphalt Suppliers That Certify Performance Graded Asphalts” with Conference members before it was voted upon for adoption. Discussion resulted in Conference members wanting to see more documents like this pertaining to all QC/QA for materials. Voting on adoption of this document was reserved for action on PAC recommendations.

XIV. WESTRACK UPDATE

Dr. Jon Epps, University of Nevada, Reno, discussed WesTrack, the FHWA’s hot-mix asphalt performance-related specification test facility in Nevada. He gave Conference Members an overview of the data received from analysis of certain test sections. Potential contributors relating to permanent deformation and fatigue were a combination of a coarse-graded mix with high asphalt content and low binder stiffness. Currently reconstructed test sections are being analyzed. Dr. Epps urged Conferees to not make judgments concerning WesTrack until all the data have been properly analyzed.

XV. SUPERPAVE REGIONAL CENTERS

A. UN Reno:

Dr. Epps briefly updated the Conference regarding the success of training classes offered at Superpave Centers around the country. A national newsletter is distributed three times a year providing facts on training classes available and general information. Training classes offered at UNR have been successful and more training will be available in the coming months.

B. UC Berkeley:

Mr. Larry Santucci stated his disappointment with attendance of the training classes offered at the UCB, Richmond Field Station. A significant interest has been shown with respect to General Asphalt Fundamentals--Design, Construction and Rehabilitation. Two (2) two and one half one (2½) day seminars will be available on October 27-29, 1998 in Anaheim, California and February 23-25, 1999, in Richmond on this topic. Two (2) one (1) day classes on What is New in Asphalt Paving will be available on October 14, 1998 in Eureka, California, and October 20, 1998 in Burbank, California. On December 7-11, 1998, a four and one half day (4½) day seminar concerning Asphalt Mixture Design and Analysis will be available in Richmond, California.

C. Heavy Vehicle Simulators:

Professor Monismith then acknowledged the ongoing work of the UCB, Pavement Research Center in cooperation with CALTRANS with respect to heavy vehicle simulators. Two (2) heavy vehicle simulators, one (1) operating at the Richmond field station since March of 1995, have helped provide validation efforts using CALTRANS designs and SHRP testing. The results obtained provide a basis for the analysis of the pavement sections which have exhibited fatigue cracking at Wes Track. Professor Monismith stated this increased capability to test and analyze data, results in better validation thus enhancing the opportunities for advancement of technology.

**XVI. CONFERENCE ACTION ON PAVING ASPHALT COMMITTEE
RECOMMENDATIONS**

Mr. Joe Massucco stated that the PAC recommends to the Conference that the **“Standard Practice for Asphalt Suppliers That Certify Performance Graded Asphalts”** be adopted for use by Conference members. The Moderator called for action and it was,

MS&C, that the Conference adopts **“Standard Practice for Asphalt Suppliers That Certify Performance Graded Asphalts”** for use by Conference members.

(The vote result was unanimous with one (1) member abstaining.)

The PAC then recommended that the **Conference reconvene in 1999**. The Moderator called for action and it was,

MS&C, that the Conference reconvene in 1999.

(The vote result was unanimous.)

The PAC then recommended that these Charges be continued:

- 1) **Continued validation of PG binder specification using all available data.**
- 2) **Prepare PG validation report for 1999 Conference with recommendations on adoption.**
- 3) **Continue evaluation and development of a performance based specification for CRM binders.**

The Moderator called for action on the PAC recommendation that these charges be continued and it was,

MS&C, that the PAC continue these charges.

(The vote result was unanimous.)

XVII. CONFERENCE ACTION ON ASPHALT MIX COMMITTEE RECOMMENDATIONS

Mr. Rick Holmgreen stated that the AMC recommends to the Conference:

- 1) **Continue participation with Mix and Models Expert Task Groups**
- 2) **Continue to experiment with SHRP mix technology (field and lab) and share Superpave experiences with Conference members.**
- 3) **Work to develop guidelines/specifications for smoothness and compaction**

The Moderator called for action on the AMC recommendation that these charges be continued and it was,

MS&C, that the AMC continue these charges.

(The vote result was unanimous.)

XVIII. RECOMMENDATIONS FOR FUTURE ACTIVITIES

Mr. Jim Walters, Co-Chair for the User Agencies, stated that there seems to be a full Agenda and called for comments from other User Agencies. No comments were added.

Mr. Rick Holmgreen, Co-Chair for the Producer Representatives, concurred that the Agenda was full and moving in an appropriate direction.

XIX. FUTURE CONFERENCES

By action taken during the Conference Action on PAC segment of this Conference, the User and Producer representatives assembled agreed to schedule the Thirty-First Pacific Coast Conference on Asphalt Specifications for May 11-12, 1999, at the University of California Berkeley, Richmond Field Station.

XX. RESOLUTIONS

At the conclusion of the Conference, the following Resolution was passed by the User Agency Representatives in attendance:

Whereas, government agencies use asphalt materials in construction and maintenance of pavements for transportation facilities and

Whereas, the quality, durability, and uniformity of asphalts, as well as their continued supply is in the interests of everyone and

Whereas, the present state-of-the-art is insufficient to permit comprehensive development of completely informative and meaningful specifications or effective control procedures and

Whereas, financial and environmental constraints require the controlled development of technology for the production and use of asphalt materials and

Whereas, it is evident that the combined understanding, knowledge, efforts, and tolerant viewpoints of both Producers and Users are needed to solve these problems. Now be it;

Resolved that the asphalt Users here present express sincere appreciation for the continuing efforts of the Producers of asphalt for their initiation of, and involvement in, the many Pacific Coast Conferences on Asphalt Specifications, the latest being held at the University of California at Berkeley, Richmond Field Station on May 12-13, 1998, and strongly urge that such Conferences be continued, it being the firm consensus that such Conferences are in the public interest.

In response, the Producer representatives in attendance unanimously passed the following resolution:

Whereas, the purpose of the Pacific Coast Conference on Asphalt Specifications is to promote quality, durability and uniformity of asphalt's and uniformity of asphalt specifications, and

Whereas, considering the diversity of specifications among Conference Member agencies, the workings of the Conference provides a forum for discussion of asphalt problems, and provides technical study on asphalt subjects, and

Whereas, The Paving Asphalt Committee of the Conference, charged to re-evaluate the specifications adopted by User agencies in previous years, has diligently pursued the task of introducing a Performance Based System leading to the ultimate acceptance of Performance Graded Binders, and

Whereas, this same Paving Asphalt Committee composed jointly of User and Producer representatives, has undertaken its task with combined understanding, knowledge, efforts, and tolerant viewpoints; Now be it;


Resolved that the Asphalt Producer representatives here present, express sincere appreciation for the continuing efforts of the User agency representatives for their initiation of, and involvement in, the many Pacific Coast Conferences on Asphalt Specifications, the latest being held at the University of California at Berkeley, Richmond Field Station on May 12-13, 1998, and strongly request that such Conferences be continued.

XXI. APPRECIATION TO MODERATOR

By general acclamation, the Conferees expressed their sincere thanks and appreciation to Professor Carl L. Monismith for his excellent handling of the Conference as Moderator. His detailed knowledge of the subjects discussed and expertise in guiding all of the deliberations for the past thirty-five years, has contributed immeasurably to the successes of all the Conferences. In the same action, the Conferees expressed appreciation to the staff of the University of California, Berkeley, Richmond Field Station for making its facilities available.

XXII. ADJOURNMENT

With no further business before the meeting, Professor Monismith adjourned the Conference at 2:55 p.m. on Wednesday, May 13, 1998.


J. F. Pearring
Secretary

APPROVED:


C. L. Monismith
Moderator