

**PACIFIC COAST CONFERENCE ON  
ASPHALT SPECIFICATIONS**

**50 Years**

**of**

**Cooperation and Achievement**

**between**

**Highway Agencies and Industry**

**1956 - 2006**

# **PACIFIC COAST CONFERENCE ON ASPHALT SPECIFICATIONS**

## **50<sup>th</sup> Anniversary**

The Pacific Coast Conference on Asphalt Specifications (PCCAS) was established in 1956 with the First Conference held January 25-27, 1956. Since that time, Conferences have normally been held on a biennial basis, with some exceptions where Conferences were scheduled annually to address pressing specification issues.

### **Purpose**

Initially, three main reasons were given for the establishment of the PCCAS:

1. Reduce the number of asphalt grades being used at the time.
2. Develop uniformity in asphalt specifications throughout the Pacific Coast States.
3. Address any other subjects of mutual interest to the User Agencies and Producers.

### **Organization**

A Conference Moderator, usually from the staff of a major university, was selected to guide and control each Conference according to a pre-approved Conference Agenda. Professor Carl Monismith of the University of California, Berkeley served in that capacity for over 35 years from 1963 until 1999. Earlier Conference Moderators included Mr. Barney Vallergera, and Professors Robert Hennes and Harmer Davis. Mr. Lawrence Santucci of the University of California, Berkeley Pavement Research Center has served as Moderator since 2000.

A Recorder, or Secretary, was appointed to ensure that all preparations were completed, proper invitations were extended, and Minutes of each Conference were recorded and distributed. Until the 18<sup>th</sup> Conference in 1983, the Pacific Coast Division of the Asphalt Institute furnished the Secretary. Messrs. Barney Vallergera, Vaughn Marker, and Jack Pearring, all Division Managing Engineers of the Asphalt Institute, served in that capacity, with the exception of the 8<sup>th</sup> Conference in 1969, which was recorded by Mr. Glenn Kemp of the California Division of Highways. From 1983 through 1999, Mr. Pearring, acting as a private consultant and asphalt technologist, served as the Secretary. More recently, Ms. Lisa Economy filled the Secretary position from 2000 through 2003 and Mr. Robert Staugaard has served as Secretary from 2004 until the present.

The Conference includes membership of technical representatives from (1) governmental asphalt user agencies in the Pacific Coast States and (2) asphalt producers marketing within the states of Alaska, Arizona, California, Hawaii, Nevada, Oregon, and Washington.

The governmental asphalt user agencies generally include federal, state, county, and city agencies actively involved in asphalt technology. The agencies are usually represented by Materials Engineers or others specifically involved in asphalt responsibilities for the agency. A Conference Co-Chair is selected by this group to serve on a Steering Committee and to provide input to each Conference Agenda.

Producers normally consist of technical representatives from asphalt producer companies, additive or modifier producer companies that are involved in the combination of these materials with asphalt, and (effective in 1994) asphalt mixture producing companies. All producers must have marketing operations in the Pacific Coast States. A Conference Co-Chair is selected by this group to serve on the Steering Committee and to provide input to each Conference Agenda.

The User Agencies and Producers at the initial meeting of the PCCAS in 1956 were as follows:

**User Agencies**

- Arizona Highway Department
- California Department of Highways
- Idaho Department of Highways
- Nevada Department of Highways
- Oregon Department of Highways (California proxy)
- Washington Department of Highways
- Bureau of Public Roads, District 7
- Bureau of Public Roads, District 8
- US Army Corps of Engineers, South Pacific Division
- US Army Corps of Engineers, North Pacific Division (So. Pac. Div. proxy)

**Producers**

- American Bitumuls & Asphalt Co.
- Douglas Oil Company
- Envoy Petroleum
- Macmillan Petroleum Company
- Richfield Oil Corporation
- Seaside Oil Company
- Shell Oil Company
- Union Oil Company of California

Obviously, the names of the user agencies and producing companies have changed over the years of the PCCAS existence.

The Steering Committee, consisting of the Co-Chairs from the User and Producer groups and the Secretary of the Conference establishes the necessary functions and activities to hold each Conference, develops the Conference Agenda with input from the User and Producer groups, appoints Working Committee Co-Chairs, establishes funding policies and procedures approved by the Conference, and carries out any other assignments given by formal action of the Conference. The Moderator of the Conference serves as an ex-officio member of the Steering Committee.

In addition to the Conference, Working Committees have been established to carry out programs approved by each Conference. These committees are made up of members from both the User and Producer groups, with an attempt to get equal representation from both groups. Usually, the Working Committees are co-chaired by representatives from both the User Agency and Producer sides. Active Working Committees over the years include:

1. Paving Asphalt Committee, or Binder Committee, which addresses all necessary action on the development of uniform specifications for paving grade asphalts among user agencies in the Pacific Coast States. At each Conference, specific charges are given to the Paving Asphalt Committee. The Committee then establishes a work schedule to accomplish each charge and report back its progress at the next Conference.

2. Mixture Committee, which addresses asphalt mix design and testing methods with a view towards uniform usage throughout the Pacific Coast States or nationally, where appropriate. In recent years, the Mixture Committee has been combined with the Paving Asphalt Committee to form the Paving Asphalt and Mixture Committee.

3. Emulsion Committee, which addresses all necessary action to the development of uniform specifications for asphalt emulsions and their recommended use throughout the Pacific Coast States. As with the Paving Asphalt and Mixture Committees, specific charges are given to the Emulsion Committee at each Conference for the Emulsion Committee to work on and report back to the next Conference on its progress.

4. Recycling Committee, which addresses all necessary action to accomplish the various charges given at a Conference related to the development of uniform specifications for recycling agents and all acceptable recycling methods. The Recycling Committee is directed to report back its progress on the assigned charges to the next Conference.

In addition to these Working Committees, a Standing Committee of selected members from the User and Producer groups serves as a Task Force to provide early assistance to review problems associated with asphalt pavement construction or field performance. Specific direction is given by the Conference through the Steering Committee.

## **Accomplishments**

### **The Early Years: 1956-1959**

One of the primary goals of the initial PCCAS in 1956 was to reduce the number of penetration grade asphalts and to move toward uniformity of asphalt cement specifications on the Pacific Coast. Other discussions held during this Conference included the use of the Shell sliding plate microviscometer for measuring asphalt consistency at primarily 25°C and the use of the Zeitfuchs capillary viscometer at 135°C as a replacement of the Saybolt Furol viscometer. A reduction in the number of grades of liquid (cutback) asphalts from six to four was also considered.

At the 1957 Conference, uniform penetration graded asphalt cement specifications were adopted. Five grades (40-50, 60-70, 85-100, 120-150, and 200-300) were selected. One interesting aspect of these specifications was the use of the penetration at 4°C, in addition to the penetration at 25°C, to help control low temperature behavior. The Pensky-Martens Closed Cup Flash Point Test was also selected over the Cleveland Open Cup Test.

“New” liquid (cutback) asphalt grades were discussed and developed at the 1959 Conference to provide better performing and more uniform products. Another highlight of this Conference was a discussion on change from penetration grading to viscosity grading of asphalt cements.

### **Penetration versus Viscosity Grading of Asphalt: 1960-1969**

In the 1960’s, discussions at the Conferences focused on penetration versus viscosity grading of asphalt cements. In 1963, the debate centered around the Asphalt Institute study specifications that used viscosity at 60°C on the original material to grade asphalts versus a proposed California specification that involved the use of a Rolling Thin Film (RTF) test to simulate the hot mix hardening of an asphalt. In 1965, a Rolling Thin Film Oven Test (RTFOT) cooperative study involving six agencies was undertaken. This led to the adoption of the RTFOT (75-minute oven exposure) as an alternate to the Thin Film Oven Test (TFOT) that required a 5-hour exposure period. Serious consideration of original (AC) versus aged residue (AR) viscosity grading of asphalt cements continued at the 1969 Conference.

Additional noteworthy accomplishments in the 1960’s included the adoption in 1961 of “new” liquid (cutback) asphalt grades of 70, 250, 800, and 3000 that indicate the minimum allowable kinematic viscosity in centistokes at 60°C. The maximum allowable viscosity for each grade is twice the minimum allowable value. This grading system for liquid asphalts replaced an earlier 0-5 grade designation. Test methods to measure the properties of residues from liquid asphalts and rate of change in characteristics were also discussed.

Other topics discussed at the 1961 Conference included asphalt sampling, specification compliance, tender or “slow setting” asphalt pavements, and field compaction control using air and water permeability devices. The user agencies first introduced a resolution of appreciation at the 1961 Conference. The practice of reading these resolutions by both user agencies and producers to recognize the contributions and commitment of each group has continued in all subsequent Conferences.

Discussions on specification compliance and asphalt sampling continued at the 1963 Conference along with a discussion on the replacement of the Float Test by a kinematic viscosity test.

In addition to the continuing debate between original grading of asphalt cements and the aged residue grading system introduced by California, the 1965 Conference included discussions on the measurement of low temperature asphalt properties using the sliding plate microviscometer at 4°C to 15.5°C. A procedure to measure the glass transition temperature

of asphalts was also introduced by California Research Corporation (Chevron). Discussions continued on specification compliance, asphalt sampling, and the use of kinematic viscosity in lieu of the Float Test for slow curing (SC) liquid asphalt residue. Asphalt emulsion terminology was also reviewed at the 1965 Conference.

In 1967, the kinematic viscosity test at 60°C was adopted to replace the Float Test, effective January 1968. The fatigue of asphalt mixes was discussed and the importance of proper mix compaction was emphasized. Mix stripping was also discussed at the 1967 Conference.

At the 1969 Conference, the need for a durability test on asphalt to measure long-term durability characteristics was emphasized. The PCCAS adopted nomenclature used nationally for cationic emulsions. Stripping of asphalt concrete mixes was reported by Arizona and Idaho. It was concluded from a field visit to several Pacific Coast States that the major problem was a moisture sensitive aggregate source in Arizona. Most other states reported limited problems.

### **Aged Residue Era Arrives: 1970-1979**

The primary activity during the 1970's was the evolution of the aged residue (AR) system for grading asphalt cements. The California Division of Highways reported to the 1971 Conference the results of tests on asphalts manufactured under the proposed 1965 AR grading system. Refinements to the RTF oven were suggested to improve repeatability of test results. This led to the development of the Rolling Thin Film Circulating (RTF-C) oven procedure. A comparison of RTF-C and TFO procedures was conducted in a cooperative study involving 19 Producers. Based on these developments, a committee was formed to produce AR specifications for presentation and consideration at the 1972 Conference.

In 1972, the RTF-C oven procedure was adopted. AR specifications were also adopted by the PCCAS for implementation on January 1, 1974. Five AR grades (AR-1000, AR-2000, AR-4000, AR-8000, and AR-16000) were specified. An RTF-C precision study involving 16 participants that established reproducibility and repeatability limits was reported to the 1973 Conference. Action was also taken at this Conference to coordinate PCCAS activities on AR grading with ASTM and AASHTO. Modification to the AR grading system surfaced in 1977 with the adoption by Washington State Department of Transportation of AR4000W and AR2000W grades. The Paving Asphalt Committee, chaired by Larry Santucci of Chevron, recommended no change from the 1974 AR specifications but suggested the use of one grade harder for mixes prepared below 149°C (300°F).

Other actions at the 1971 Conference included adoption of modifications to asphalt emulsion specifications (pH and solubility requirements). Discussions on stripping of asphalt mixes and the use of resilient modulus,  $M_r$ , for mix design and to monitor moisture sensitivity were also heard.

Additional topics at the 1973 Conference included proposed test roads for AR graded asphalts and a Rolling Micro-Film Durability Test developed by Chevron. Committees were charged to examine base asphalts used for asphalt emulsions and to define suitable alternatives for liquid (cutback) asphalts.

In 1974, the practice of electing Conference Co-Chairs began with Grant Allen of the Arizona Department of Transportation and Don Davidson of Golden Bear/Witco serving in that capacity. The energy crisis and asphalt supply concerns were the main topics at the 1974 Conference. Other discussion items included low temperature cracking and a change from Pensky-Martens (PM) Closed Cup Flash Test to the Cleveland Open Cup (COC) Test.

Roger LeClerc of the Washington State Department of Transportation and Hans Mangold of Newhall Refining were Conference Co-Chairs in 1977. The Paving Asphalt Committee recommended a study of the low temperature cracking problem. The Asphalt Emulsion Committee was directed to develop specifications for quick set emulsions and a Recycling Committee was formed to develop softening agent specifications.

Conference Co-Chairs in 1978 were Jim Wilson of the Oregon Department of Transportation and Ron Hovey of U.S. Oil and Refining. In addition to update reports from the Paving Asphalt Committee, the Asphalt Emulsion Committee and the Recycling Committee, discussions centered around the effects of moisture on mix performance.

In 1979, Conference Co-Chairs of the PCCAS were Neil Anderson of the Washington State Department of Transportation and Art Samuels of Emulsified Asphalts, Inc. Quick set emulsion specifications were adopted on a provisional basis. Hot recycling agent specifications, designated RA, were also adopted on a provisional basis and the Recycling committee was charged with developing cold recycling specifications.

### **Recycling Becomes Important: 1980-1989**

In the 1980's, recycling became a major theme for the Conferences. The Recycling Committee recommended to the 1981 Conference continued use of the hot mix recycling (RA) specifications adopted in 1979 and to continue work on specifications for cold mix and surface recycling additives. In 1983, the Recycling Committee recommended the use of asphalt emulsions for cold mix recycling. A Cold Mix Recycling Committee, established in 1983, reported on performance data collected in PCCAS States at the 1985 Conference. In 1987, the Recycling Committee was reactivated and charged to develop guide specifications for cold emulsified recycling agents. Tentative specifications for "Partial Depth Cold-in-Place Recycling" were accepted in 1989. The Recycling Committee was asked to collect data on the use of materials meeting these specifications and report results to the 1991 Conference.

Co-Chairs for the 1981 Conference were Pete Pradere of the Nevada Department of Transportation and Bill Tolonen of Phillips Petroleum Company. The Paving Asphalt Committee introduced a design procedure to minimize low temperature cracking for use by

participating agencies. PCCAS members were also asked to evaluate a new long-term durability test, the Tilt Oven Asphalt Durability Test, developed by Caltrans. It was also recommended that asphalt recovery procedures should continue to be used, primarily for forensic analysis of mix performance problems.

Ray Forsyth of Caltrans and Larry Santucci of Chevron Research Company became Conference Co-Chairs in 1983 and remained as Co-Chairs for the 1985, 1987, and 1989 Conferences. In 1983, the Paving Asphalt Committee continued to study asphalt durability and began to examine the effects of different climates on asphalt performance. Conference participants agreed in 1983 to a pay-as-you-go strategy for future Conferences. Several committees were established or renamed at the 1983 Conference including the Asphalt Specification Committee, Asphalt Emulsion Committee, Cold Mix Recycling Committee, Asphalt Durability Committee, and the Standing Committee.

A national research effort, the Strategic Highway Research Program (SHRP), was introduced at the 1985 Conference. The Asphalt Specification Committee presented penetration and viscosity data, furnished by Producers, on original and RTF-C aged asphalts. In addition, some polymer-modified asphalts designed to meet the Tilt Oven Durability Test requirements were examined. The Asphalt Emulsion Committee addressed a recommendation to develop usable quick set emulsion specifications and expanded its activities to include an investigation into emulsion base stocks for conventional as well as polymer modified emulsions. The Standing Committee was activated to investigate asphalt mix performance and construction problems in Nevada.

In 1987, the role of the PCCAS relative to SHRP Asphalt Research and the Long Term Pavement Performance (LTPP) program was discussed. The Asphalt Specification Committee was charged with developing specifications for modified binders. The Asphalt Emulsion Committee was given a charge to identify performance of conventional emulsion systems as compared to modified systems and to develop functional limiting values for modified emulsions.

In 1989, the Paving Asphalt Committee was charged to compare AASHTO M226 Tables 2 and 3 specifications for possible development of a core specification for climate extremes. This Committee was also charged to continue its effort to develop performance-based specifications for modified asphalts. The 1989 Conference adopted tentative specifications for quick set asphalt emulsions and the Asphalt Emulsion Committee continued its work on emulsions containing modified asphalts and on updating the emulsion section of the 1985 Conference version of "Recommended Uses of Asphalts".

### **Performance Based Specifications Evolve: 1990-1999**

Conferences were held annually in the 1990's in response to rapidly evolving issues associated with the development of Performance Based Asphalt (PBA) specifications and coordination with the SHRP effort. A four-person subcommittee, established by the Paving Asphalt Committee, was primarily responsible for introducing a unique approach to asphalt



specifications. Subcommittee members were Ron Reese of Caltrans, Joe Goodrich of Chevron, Tony George of the Oregon Department of Transportation, and Steve Escobar of Golden Bear/Witco. The PBA concept involved relating asphalt binder characteristics to mix performance, such as rutting, fatigue, and low temperature cracking. Temperature susceptibility of the asphalt binder was used to distinguish one PBA grade from another. Climate was an important consideration in the development of different PBA grades. Both unmodified and polymer modified asphalts were included in the PBA specifications. Initially, there were 7 PBA grades (PBA-1 through PBA-7) that used conventional asphalt tests, such as penetration, viscosity, and ductility to characterize the asphalts. Tests were run on the original material, on an RTFO Residue, and on the California Tilt Oven Asphalt Durability Residue. Some binder tests developed under SHRP were later incorporated into the PBA specifications. The work done by this subcommittee had a significant impact on the national asphalt specifications that came out of the SHRP effort, namely the Performance Graded (PG) specifications.

In 1991, the Paving Asphalt Committee adopted a PBA evaluation process that included retrospective analysis, SHRP test method evaluation and validation, and definition of environmental guidelines. The PBA specifications were presented at the 1992 Conference and recommended for optional use. In 1993, validation efforts began on SHRP PG specifications using PCCAS developed performance data. Contact was established with an FHWA technical group to increase the effort to implement SHRP binder research. The Pressure Aging Vessel (PAV) test developed under SHRP was recommended as an alternate to the Tilt Oven Asphalt Durability Test in 1994 and rheologic testing for shear susceptibility was undertaken. In 1995, the use of PG binders on test projects was encouraged to develop validation data. Validation of PG specifications continued in 1996 with some states (Arizona and Washington) indicating PG usage in 1997. At the 1997 Conference, PG binders were adopted for optional use and evaluation.

Co-Chairs for the 1990 and 1991 Conferences were Bob Doty of Caltrans and Roy Hodgson of Conoco. Bob Doty and Steve Escobar of Golden Bear/Witco served as Conference Co-Chairs in 1992 and 1993 while Bob Doty and Rick Holmgreen of Shell served in that capacity in 1994 and 1995. Jim Walter of the Washington Department of Transportation and Rick Holmgreen were Conference Co-Chairs from 1996 through 1999. Joe Massucco of the Federal Highway Administration chaired the active Paving Asphalt Committee during the PBA specification development and SHRP validation period of the 1990's.

Although the major PCCAS accomplishments in the 1990's were associated with PBA and PG specification developments, other actions were taken and other topics discussed. They included a discussion on the role of asphalt mixes at the Conference, acceptance of an update on "Recommended Uses of Asphalts" developed by the Asphalt Emulsion Committee, encouragement of Users to construct pavements containing asphalt rubber in order to development performance based tests for these materials, development of an intermediate grade between PBA-1 and RA-500 for hot mix recycling, and the adoption of a standard practice for asphalt suppliers to certify PG asphalts. An Asphalt Mix Committee was created in 1995 with Rita Leahy of Oregon State University as Chair. The Asphalt Mix Committee initiated interactions with other User-Producer groups and Superpave Regional Centers on

mix design evaluation, encouraged User agencies to compare SHRP developed mix design technology with current technology, and considered ways to evaluate mix compaction and pavement smoothness in determining construction quality.

### **PG and Superpave Arrive: 2000-2006**

Conferences in 2000 through 2006 were held biennially. Most states in the Pacific Coast region had adopted some version of PG specifications by the early 2000's with California being the last state to do so in 2006. Some states also adopted Superpave mix technology or initiated a comparison of this technology with their existing mix design philosophy.

The Paving Asphalt Committee was very active in this period (2000-2006) evaluating PG specifications and Superpave. A Round Robin subcommittee was established to examine the repeatability and reproducibility of several SHRP binder tests used in PG specifications. A series of round robin testing programs involving both Users and Producers from the PCCAS revealed a number of procedural limitations in the test methods, especially the Dynamic Shear Rheometer (DSR). Tightening up these procedures significantly reduced test variability. The findings of this subcommittee have been shared with AASHTO and ASTM.

The Paving Asphalt Committee also created a Fatigue subcommittee to study the contribution of the asphalt binder to pavement fatigue. A "pooled funds" study was initiated that included detailed testing of several unmodified and modified asphalts supplied in the Pacific Coast region and the fatigue testing of mixes made with these asphalts. Analyses of typical pavement structures in different climate regions were also done to compare predicted pavement performance. The results of the study found no correlation between the binder fatigue criteria used in PG specifications or any other binder properties and mix fatigue behavior. However, it was recommended that the fatigue criteria in PG specifications should still be retained at this time since all of the asphalts tested satisfied that criteria.

Conference Co-Chairs in 2000 and 2002 were George Way of the Arizona Department of Transportation and Rick Holmgreen of Conoco/Phillips. Co-Chairs for the 2004 and 2006 Conferences were Michael Dunn of the Nevada Department of Transportation and Don Powell of San Joaquin Refining.

The current working committee structure includes a Paving Asphalt and Mixture Committee since the Asphalt Mix Committee was merged into the Paving Asphalt Committee in 2004, an Asphalt Emulsion Committee, a reactivated Recycling Committee, and a Standing Committee. Active subcommittees within the Paving Asphalt Committee include the Round Robin subcommittee and an Asphalt Rubber subcommittee. In addition to the activities discussed on PG testing and specifications, challenges to these committees include performance based grading of asphalt emulsions, development of performance based specifications for asphalt rubber, and evaluation of new developments in pavement recycling.

### **Concluding Remarks**

Much has been accomplished over the past 50 years by the PCCAS. Representatives from User agencies and Producers have given freely of their time and resources for the benefit of the traveling public. The PCCAS is truly a remarkable organization that has had a major impact on asphalt specifications and technology over the years and has set the standard for other such groups in the United States. It has been an honor working with the PCCAS and its members and we trust that the achievements of the PCCAS over 50 years bode well for the success of the organization in the future.

**Respectfully Submitted,**

**Carl Monismith  
Larry Santucci**

# PCCAS 50-Year Summary

## *Moderators Prior to 2000*



**1950s**  
**B.A. Vallergera, The Asphalt Institute**



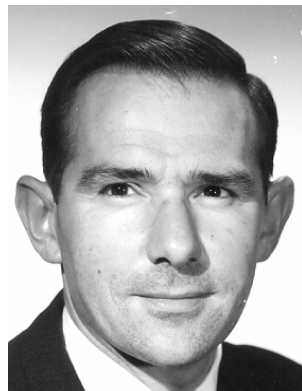
**Current**



**1957**  
**R.G. Hennes**  
**University of**  
**Washington**



**1959, 1961**  
**H. E. Davis**  
**University of California,**  
**Berkeley**

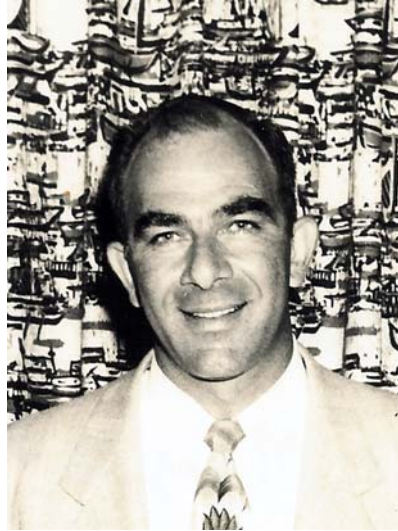


**1963**  
**C.L. Monismith, 1963-1999**  
**University of California, Berkeley**



**Current**

**PCCAS 50-Year Summary**  
***Recorders/Secretaries Prior to 2000***

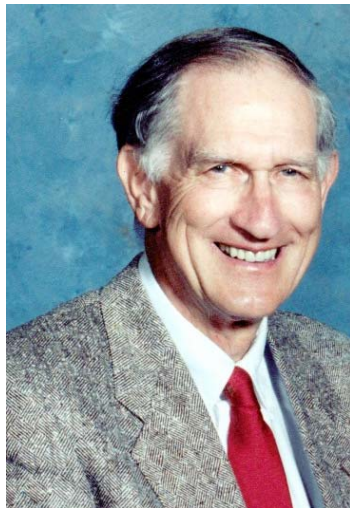


**1956-67, 1971-1973**



**Post-1973**  
**V.P. and Chief Eng.,**  
**The Asphalt Institute**

**Vaughn Marker**



**Glen Kemp, 1969**  
**Caltrans**



**Jack Pearring, 1974-1999**  
**The Asphalt Institute/Consultant**

**PCCAS 50-Year Summary**  
***California Division of Highways***  
***Some Early Participants***



**F. N. Hveem**



**Ernie Zube**



**John Skog**



**Lyman Gillis**



**John Beaton**



**George Sherman**

# PCCAS 50-Year Summary

## *Some Early Participants*



**Carl Minor**  
**Washington Highway Department**



**Roger LeClerc**



**W.J. "Bill" Kari**  
**American Bitumuls  
& Asphalt Co.**



**R.J. "Bob" Schmidt**  
**California Res. Corporation/  
Chevron Research**

**Standard Oil, California/Chevron**



**Early**



**Later**

**D.L. "Don" Nielsen**  
**Union Oil Company/Arizona Refining Company**

**PCCAS 50-Year Summary**  
***Some Early Participants***



**Fred Scott**



**Ross Hanson**

**Union Oil Company**



**Went Lovering**  
**The Asphalt Institute (Pacific Coast Division)**



**Fred "Mickey" Finn**



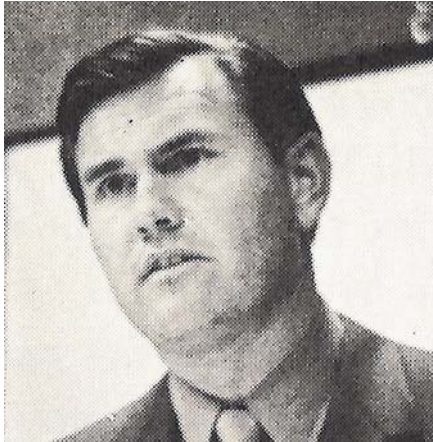
**W. A. "Bill" Garrison**  
**Contra Costa County**



**PCCAS 50-Year Summary**  
***Some Early Participants***

**Douglas Oil Company**

**D. J.  
“Don”  
McNutt**



**R. S. “Roy” Hodgson**



**Juan Forster**

**PCCAS 50-Year Summary**  
***Some Conference Co-Chairs Since 1983***



**L. E. "Larry" Santucci**  
**Chevron Research**  
**(Calif. Research Corporation)**  
**1983-1989**



**R. A. "Ray" Forsyth**  
**Caltrans**  
**1983-1989**



**R. "Bob" Doty**  
**Caltrans**  
**1990-1996**



**S. J. "Steve" Escobar**  
**Golden Bear/Witco**  
**1992-1993**

**PCCAS 50-Year Summary**  
***Some Committee Co-Chairs, 1986-2004***



**T. "Tom" Stone**  
**Douglas Oil Company**  
**Asphalt Emulsion Committee**  
**1986-1987**



**J. "Joe" Massucco**  
**FHWA**  
**Paving Asphalt Committee**  
**1989-2002**



**J. "Joe" Goldhammer**  
**San Diego County**  
**Asphalt Emulsion Committee**  
**1992-1997**



**R. B. "Rita" Leahy**  
**Oregon State University/**  
**Fugro-BRE/Mactec**  
**Asphalt Mix Committee**  
**1994-2004**