

Pacific Coast Conference on Asphalt Specifications

**50 Years
of
Cooperation and Achievement
between
Highway Agencies and Industry**

**35th Meeting
UC Richmond Field Station
May 31 - June 1, 2006**

Moderators

- B. A. Vallerga, Asphalt Institute 1956
- R.G. Hennes, U. Washington 1957
- H.E. Davis, U.C. Berkeley 1959-61
- C. Monismith, U.C. Berkeley 1963-99
- L.E. Santucci, U.C. Berkeley 2000-

Recorders/Secretaries

- V. Marker 1956-67, 1971-73
(with J. Huffman 1973)
- G. Kemp 1969
- J. F. Pearring 1974-99
(with L. Economy 1996-99)
- L. Economy 2000-03
- R. Staugaard 2004-

User Agencies

- **First Meeting (June 1956)**

- Arizona Hwy. Dept.
- California Dept. of Hwys.
- Idaho Dept. of Hwys.
- Nevada Dept. of Hwys.
- Oregon Dept. of Hwys. (CA proxy)
- Washington Dept. of Hwys.
- Bureau of Public Roads, District 7
- Bureau of Public Roads, District 8
- US Army Corps of Engineers, So. Pac. Div.
- US Army Corps of Engineers, No. Pac. Div.
(So. Pac. Div. proxy)

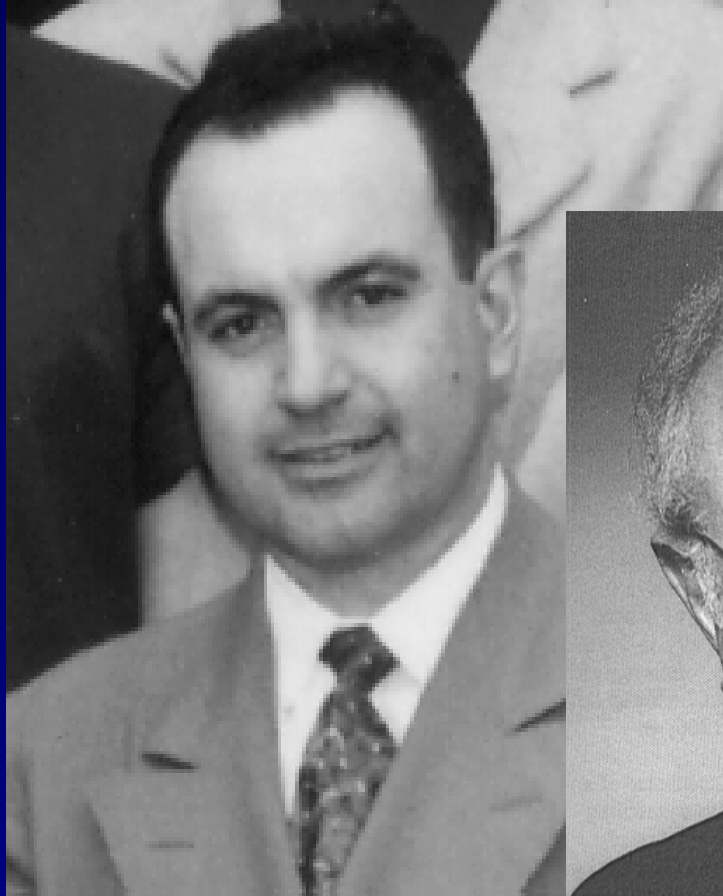
Producer Agencies

- First Meeting (June 1956)
 - American Bitumuls & Asphalt Co.
 - Douglas Oil Co.
 - Envoy Petroleum
 - Macmillan Petroleum Co.
 - Richfield Oil Corporation
 - Seaside Oil Co.
 - Shell Oil Co.
 - Union Oil Co. of California

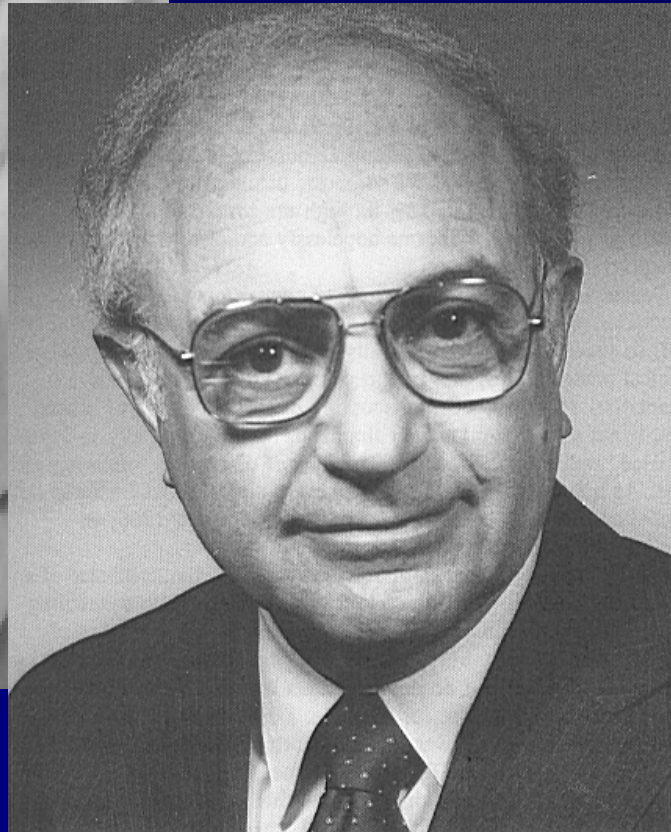
The Beginning Years: 1956-1959

- 1956
 - Move toward uniformity of asphalt cement specifications, Pacific Coast
 - Discussion of the use of the sliding plate microviscometer (Shell) and the use of a capillary viscometer (Zeitfuchs) @ 275 F in lieu of Saybolt Furol viscometer
 - Start of consideration of reduction in grades of liquid asphalts from 6 (grades 0 to 5) to 4

Moderator



Then

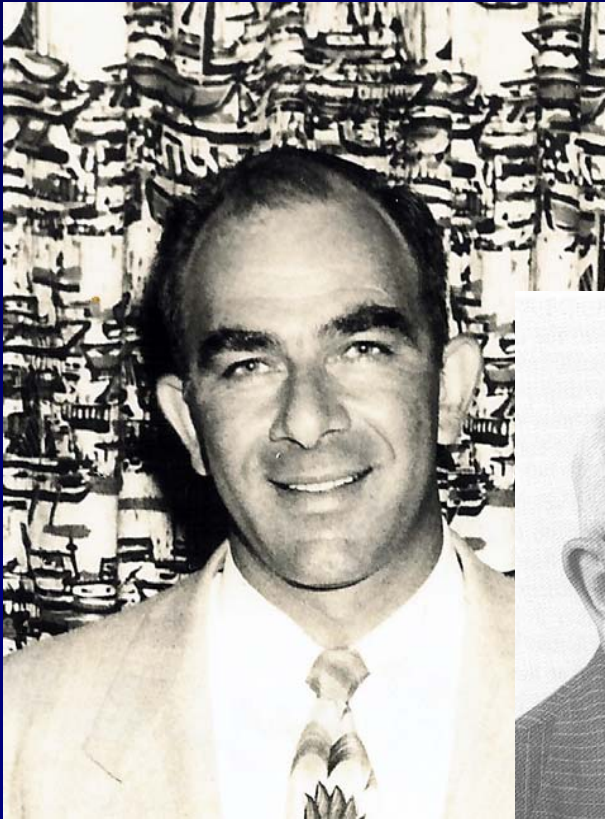


Now

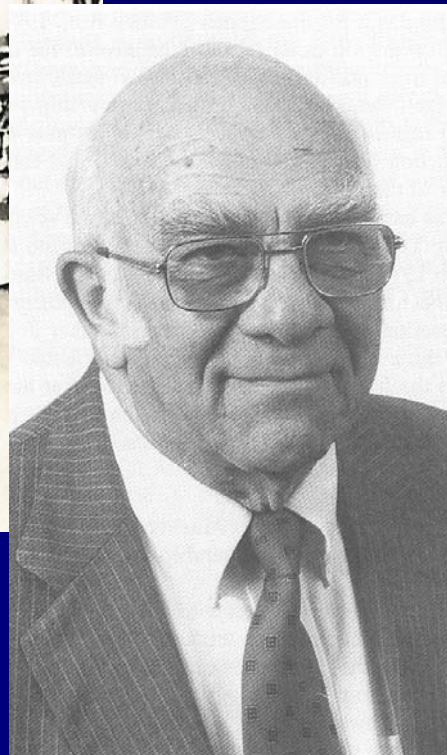
B.A. Vallerga

Recorder/Secretary

Vaughn Marker



1956



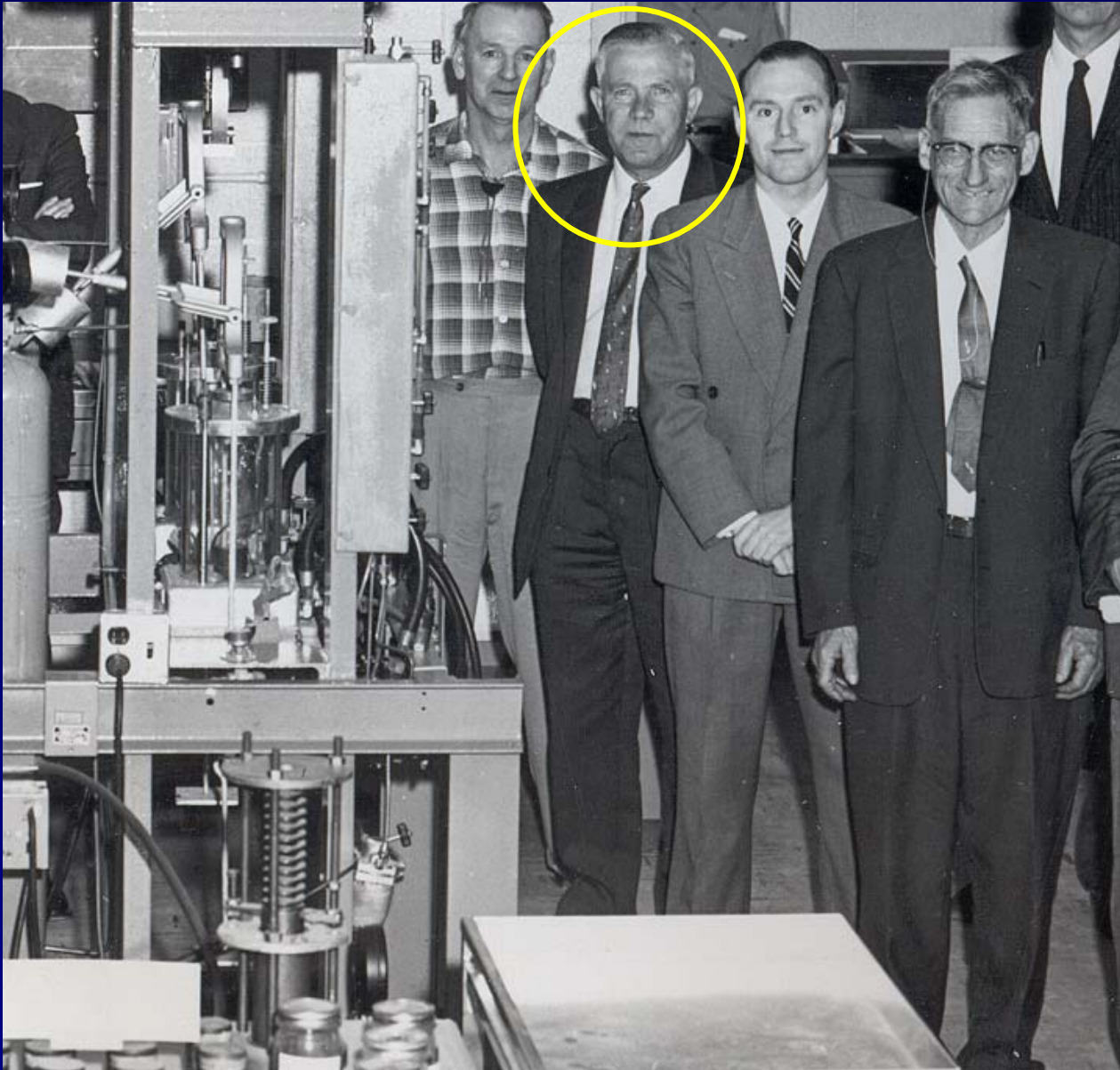
Later, VP-TAI

California Division of Highways



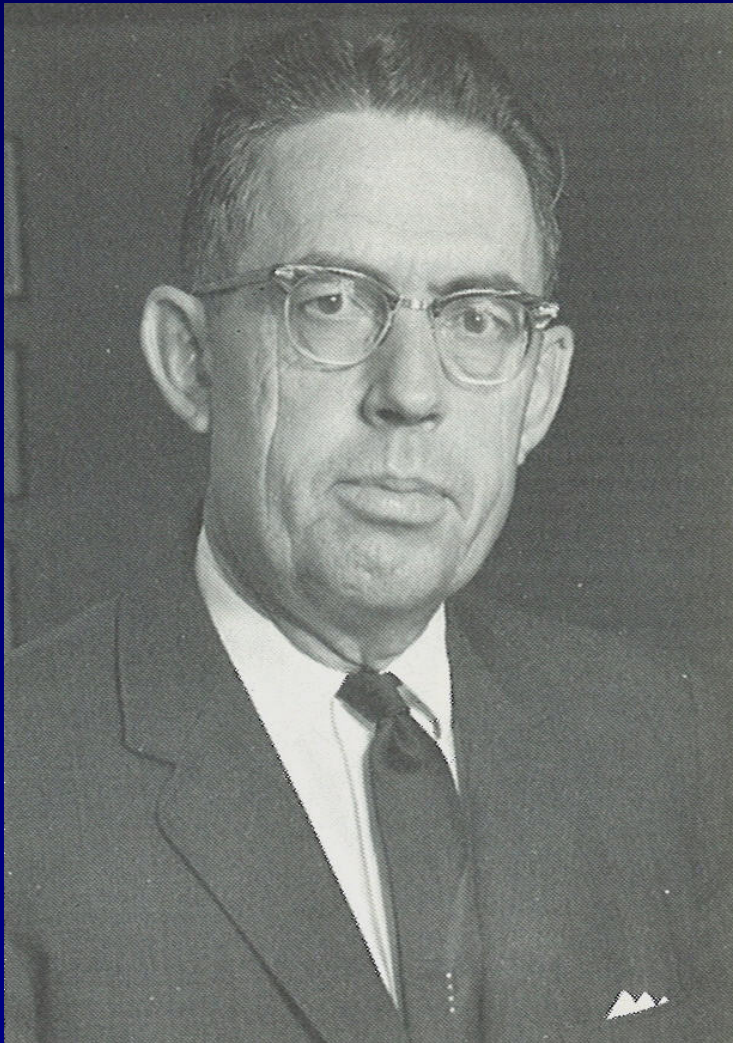
F. N. Hveem

California Division of Highways



Ernest Zube

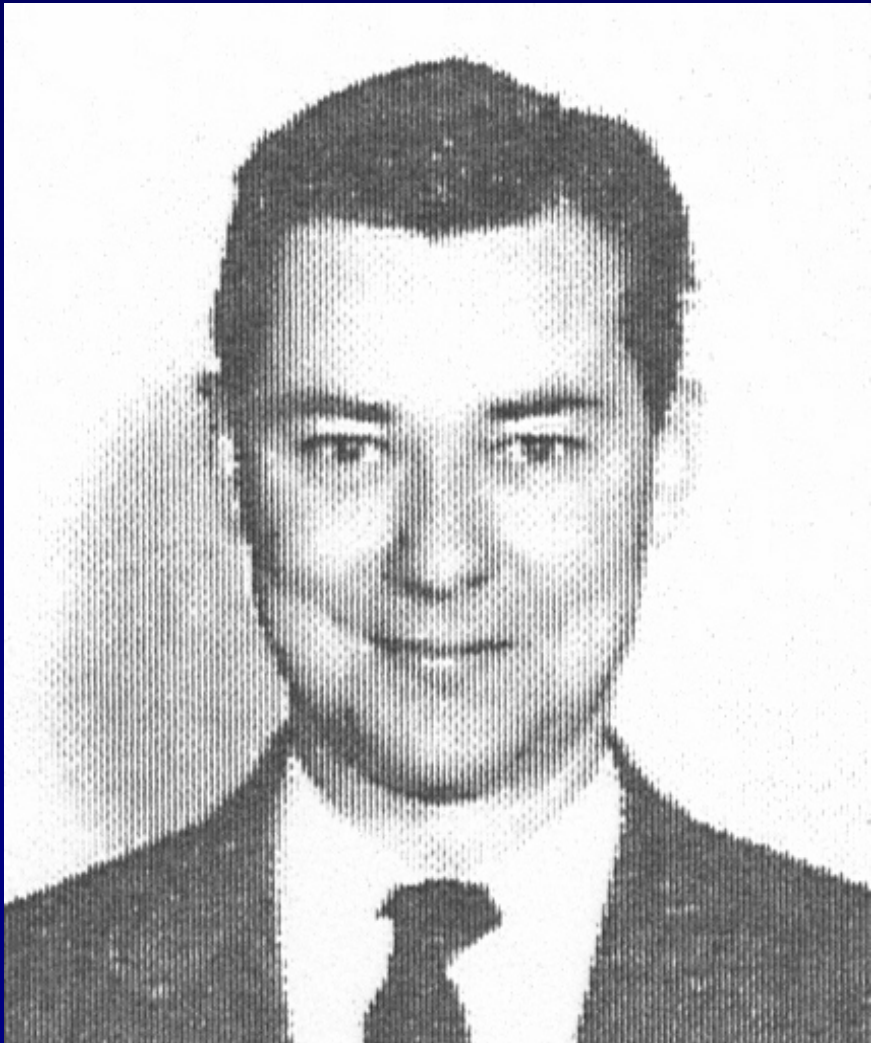
Washington Highway Department



Carl Minor

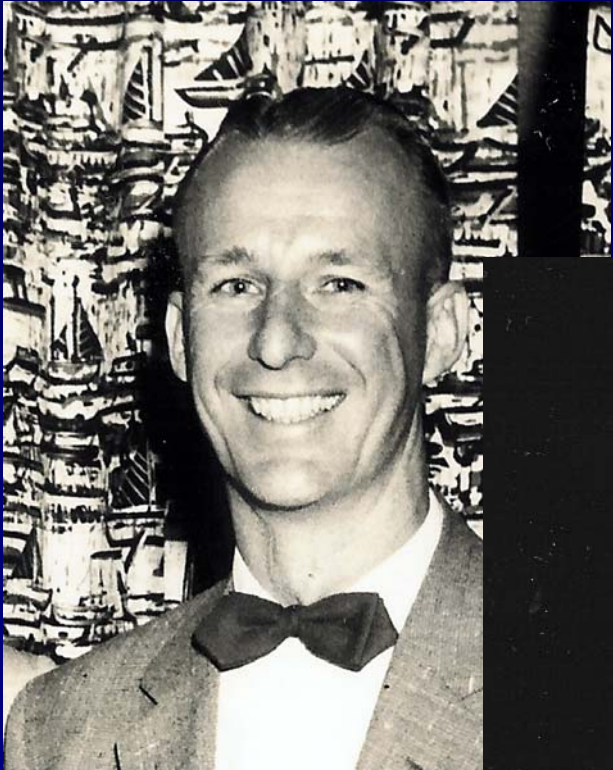
Chevron

(American Bitumuls & Asphalt Co)



W.J. "Bill" Kari

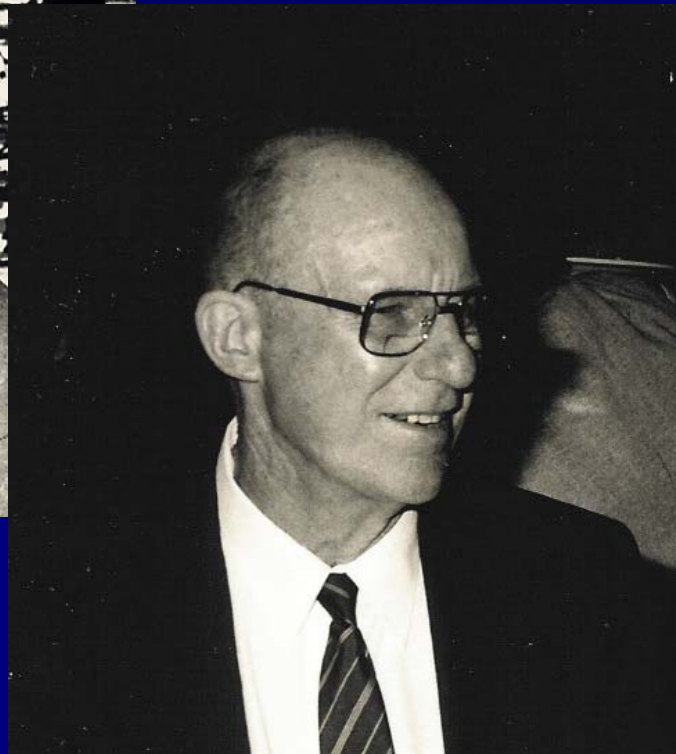
Union Oil Company & Arizona Refining Company



1956

D.L. Nielsen

**(Chairman of
the Board,
TAI, 1958)**



Later

Union Oil Company



F.S. Scott

1956-1959

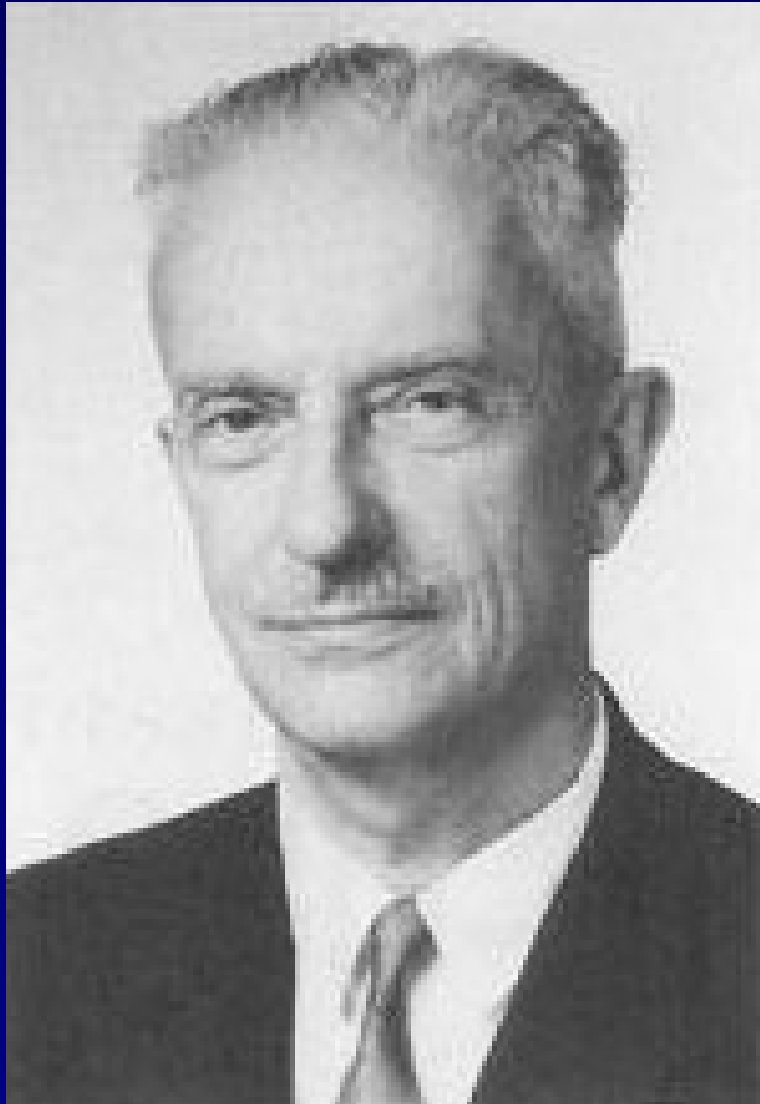
- **1957**

- Adoption of uniform penetration graded asphalt cement specifications; 5 grades: 40-50, 60-70, 85-100, 120-150, 200-300

- Innovations included:

- Use of penetration at 4 C as well as at 25 C; penetration ratio –to control low temperature stiffness
- Pensky-Martens Closed Cup Flash Point Test in lieu of Cleveland Open Cup

Moderator



Robert G Hennes

The Asphalt Institute (Pacific Coast Division)



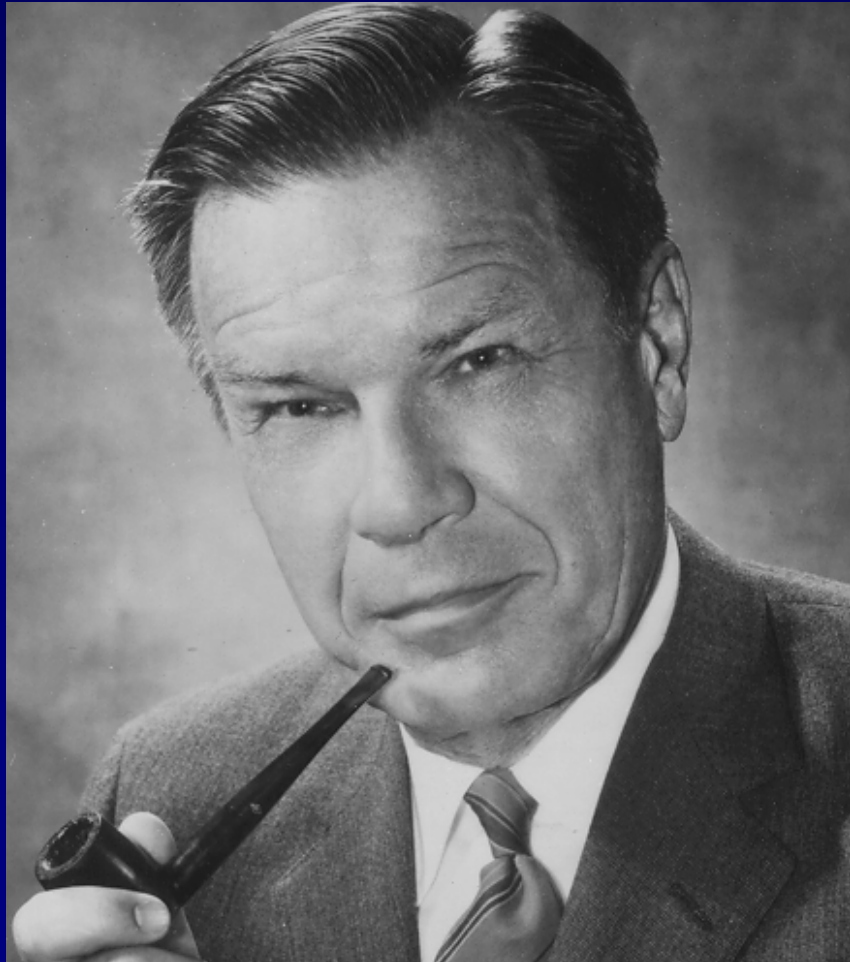
W.R. Lovering

1956-1959

- **1959**

- Development of “new” liquid asphalt grades for better and more uniform products
- Discussion of change from penetration grading to viscosity grading for asphalt cements.

Moderator



Harmer E. Davis

Pen. vs. Vis Grading Of Asphalt: 1960-1969

- **1961**

- Continued discussion of change from penetration to viscosity grading for asphalt cements
- Adoption of “new” liquid asphalt grades: grades 70, 250, 800, 3000, replaced grades 0-5.
- Discussion of test methods to measure properties of residues of liquid asphalts and rate of change in characteristics

1960-1969

- **1961**

- **Other topics**

- Specification compliance; asphalt sampling
 - Tender (slow setting) pavements
 - Field Inspection test methods: air and water permeability measurements

- **Resolution of appreciation by user agencies introduced**

California Division of Highways



L.R. Gillis

Chevron
(California Research Corporation)



R.J. Schmidt

Contra Costa County



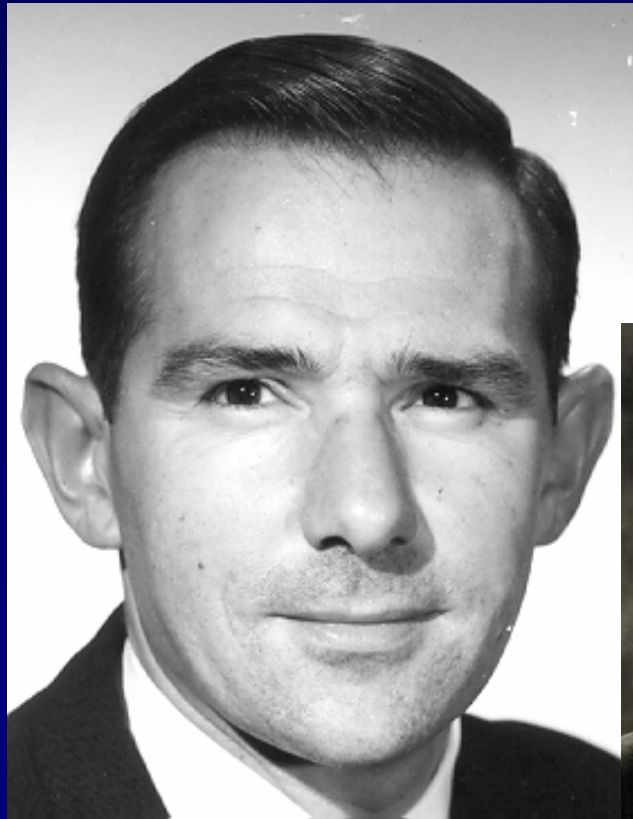
W.A. Garrison
“Bill”

1960-1969

- **1963**

- Continued discussion of penetration vs. viscosity grading of asphalt cements
 - Asphalt Institute study specification (AC grades)
 - Proposed California specification (AAPT 1963, Hveem, Zube, and Skog); use of RTF Test
- Continued discussion of specification compliance, asphalt sampling
- Replacement of Float Test by Viscosity Test (cs units) discussed

Moderator



1963

Carl L. Monismith



Much Later

California Division of Highways



John Skog

1960-1969

- **1965**

- RTFOT cooperative study (6 agencies) and discussion
- AR grading concept introduced by California
- Measurement of low temperature properties
 - BPR/The Asphalt Institute program - use of sliding plate microviscometer (4 C to 15.5 C) and other equipment
 - Calif. Res. Corp. – measurement of glass transition temperature

California Division of Highways



J.L. Beaton

1960-1969

- **1965**

- Continued discussion of specification compliance, asphalt sampling
- Continued discussion of kinematic viscosity in lieu of Float Test for SC liquid asphalt residue (adoption for change recommended for consideration at next conference)
- Asphalt emulsion terminology reviewed

1960-1969

- **1967**

- Continued discussion on improved asphalt cement specifications; experience with viscosity graded asphalt cements
- RTFOT cooperative test program data reported; RTOFT adopted as alternative to TFOT (75 min exposure)
- Kinematic viscosity test @ 140 F adopted to replace Float test eff. January 1968

1960-1969

- **1967**

- Continued discussion of specification compliance and asphalt sampling
- Fatigue of AC discussed and importance of proper mix compaction emphasized
- Mix stripping discussion initiated

Pen. vs. Vis Grading Of Asphalt: 1960-1969

- **1969**

- Considerations of specifications – original vs. aged residue (AR)
- Necessity for a durability test on asphalt to measure longer term durability characteristics emphasized
- PCCAS adopted nomenclature used Nationally for cationic emulsions; e.g. SSk to CSS-1

California Division of Highways

George Sherman

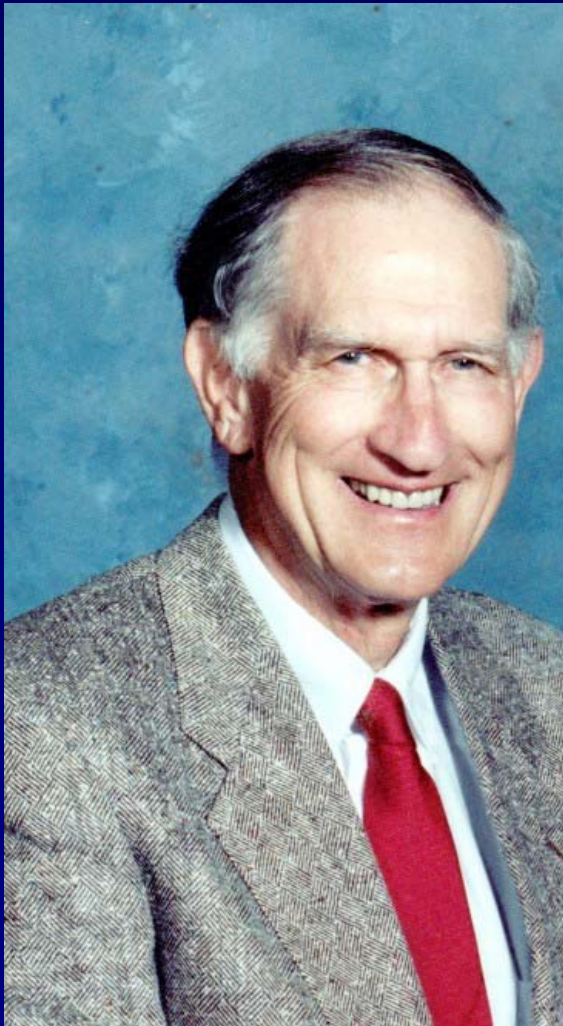


1960-1969

- **1969**

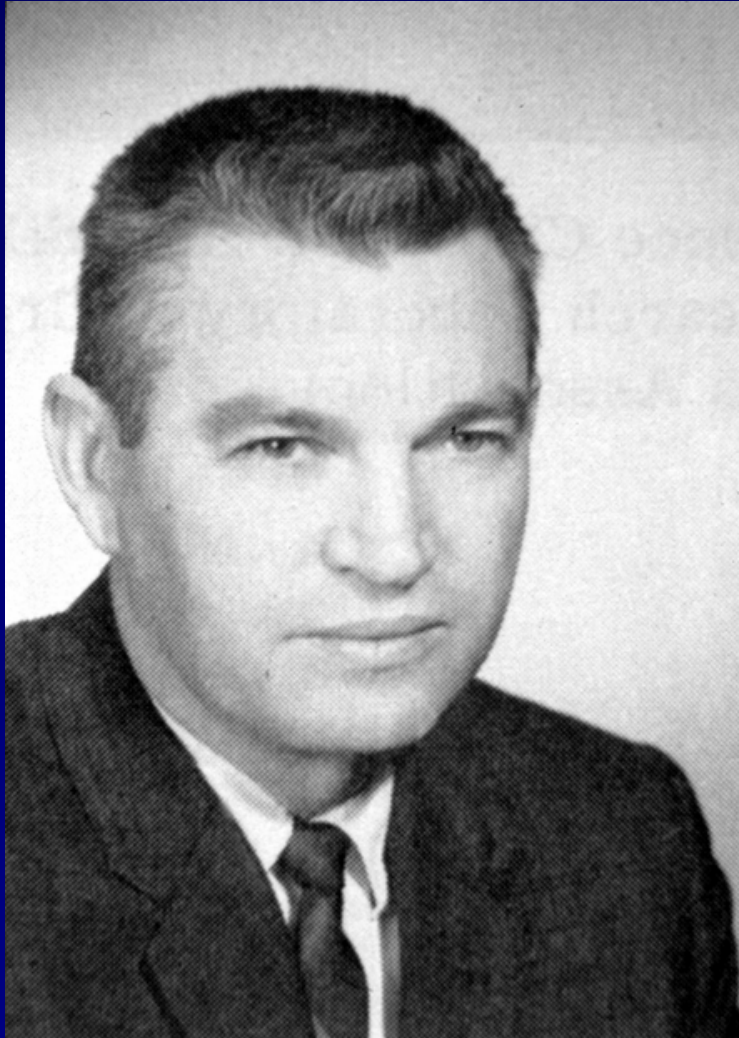
- Stripping in asphalt concrete mixes discussed by Arizona and Idaho (F.N. Finn visited AZ, CA, NV, OR, and WS; only AZ reported problem)
- Committee formed to plan next meeting; 2 users and 2 producers, V. Marker as chairman

Recorder/Secretary



G.R. Kemp

The Asphalt Institute (Pacific Coast Division)



F.N. Finn

Douglas Oil Company



D.J. McNutt

Aged Residue Era Arrives: 1970-1979

- **1971**

- Calif. Div. of Hwys. (CDH) reported results of tests on asphalts manufactured according to proposed 1965 AR grading system (30-50 months in service of 24 field test sections including controls)
- Cooperative study of comparison of RTFC and TFO procedures reported (19 Producers)
- Refinement of RTF oven suggested, cooperative study with CDH coordinating

1970-1979

- **1971**

- Committee formed to develop AR specs. with additional grades (3 included 1969 Meeting spec.) in time for 1972 Meeting
- Modifications adopted to asphalt emulsion specs. (pH and solubility reqmt.)
- Other topics:
 - Stripping studies
 - M_r test considerations (use for moisture sensitivity and mix design)

Washington Highway Department



Roger LeClerc

1970-1979

- **1972**

- RTF-C procedure adopted following results of cooperative study
- AR Specification adopted for implementation 1 January 1974 (5 grades: AR-1000 to 16,000)
- Other topics:
 - Proposed field studies (test roads) for AR graded asphalts
 - Rolling Micro-Film Capillary Durability Test proposed by Chevron; Committee appointed to study the test

Douglas Oil Company



R.S. Hodgson

Union Oil Company



R.A. Hanson

1970-1979

- **1973**

- RTF-C precision study reported (16 participants); reproducibility and repeatability limits established
- Coordination of PCCAS activities for AR grading coordinated with ASTM and AASHTO
- Considerations for implementation:
- Committee established on base asphalts for emulsions
- Committee established to define suitable alternates for liquid grades

Recorder/Secretary



J.F. Pearring

1970-1979

- **1974**

- Conference Co-Chairs established

- G. Allen, ADOT; D. Davidson, Golden Bear/Witco

- Energy crisis/asphalt supply discussion

- Energy requirements for comparable pavement designs

- Low temperature cracking discussion

- Change from PMCT to COC

- Alternates to liquid asphalts; interim guide available

Douglas Oil Company



Juan Forster

1970-1979

- **1977**

- **Conference Co-Chairs**

- R. LeClerc, WSDOT; H. Mangold, Newhall Refining

- **Modification to AR Grading System**

- Washington: AR 4000W and AR 2000W

- **Asphalt Committee, L.E. Santucci, Chairman; “extension of AR Grading System”**

- No changes recommended; use one grade harder for mixing below 300 F
- Recommended study of low temperature cracking problem

1970-1979

- **1977**

- **Committee on asphalt emulsions**

- Subcommittee on quick setting emulsions (formed at 13th meeting) to develop specifications

- **Committee on recycling established**

- To develop softening agent specification

1970-1979

- **1978**

- Conference Co-Chairs

- J. Wilson, ODOT; R. Hovey, US Oil and Refining

- Asphalt Committee, L.E. Santucci, Chairman

- Update on AR usage

- Asphalt Emulsion Committee, update

- Recycling Committee, update

- Discussion of moisture effects on mix performance

Chevron
(California Research Corporation)



L.E. Santucci

1970-1979

- **1979**

- **Conference Co-Chairs**

- N. Anderson, WSDOT; A. Samuels, Emusified Asphalts, Inc.

- **Asphalt Committee, L.E. Santucci, Chairman**

- Updates on AR asphalts usage

- **Asphalt Emulsion Committee**

- QS emulsions specification adopted on provisional basis
 - Subcommittee charge to collect field test data from Users

1970-1979

- **1979**

- **Recycling Committee**

- Hot recycling agents specification on a provisional basis
 - RA used to designate materials, e.g. RA 25
 - Committee charged with developing specifications for cold recycling

- **Updating of TAI PCD table “Asphalts, Paving, Cutback, and Emulsions” started**

Recycling Becomes Important: 1980-1989

- **1981**

- **Conference Co-Chairs**

- P. Pradere, NVDOT; W. Tolonen, Phillips Petroleum Co.

- **Asphalt Committee, L.E. Santucci, Chairman**

- Low temperature cracking procedure introduced; User agencies requested to participate in co-op. program
- Paving asphalt durability test, Tilt Oven Asphalt Durability Test (TOAD) discussed; members requested to evaluate test
- Asphalt recovery procedure (Industrial Asphalt) should continue to be used

1980-1989

- **1981**

- **Recycling Committee**

- Continue use of specification for hot recycling adopted in 1979
 - Work continued on cold and surface recycling
 - Specifications

- **Asphalt Emulsion Committee**

- Retain QS specifications

1980-1989

- **1983**

- **Conference Co-Chairs**

- R. Forsyth, Caltrans; L. Santucci, Chevron Research

- **Asphalt Committee, L.E. Santucci, Chairman**

- Continue asphalt durability study
- Examine effects of different climates on asphalt performance

- **Recycling Committee**

- Continue use of hot mix recycling (RA) specifications
- Recommended use of asphalt emulsions for cold mix recycling

California Department of Transportation



R.A. Forsyth

1980-1989

- **1983**

- Conference supports change; pay as you go agreed to by Conference participants (Users and Producers)
- Joint Committees established
 - Asphalt Specifications, Asphalt Emulsions, Cold Mix Recycling, Asphalt Durability, Standing
- J. Pearring appointed as “coordinator” for 19th Conference

1980-1989

- **1985**

- **Conference Co-Chairs**

- R. Forsyth, Caltrans; L.E. Santucci, Chevron Research

- **Strategic Highway Research Program (SHRP) introduced**

- Both overall and asphalt research programs

- **Asphalt Specification Committee**

- G.R. Kemp, Co-Chairman

- **Activities**

- Pen. and vis. at 140 and 275 F for original and RTF-C aged asphalts furnished by producers
- Some polymer modified asphalts produced to meet TOAD test requirements.

1980-1989

- **1985**

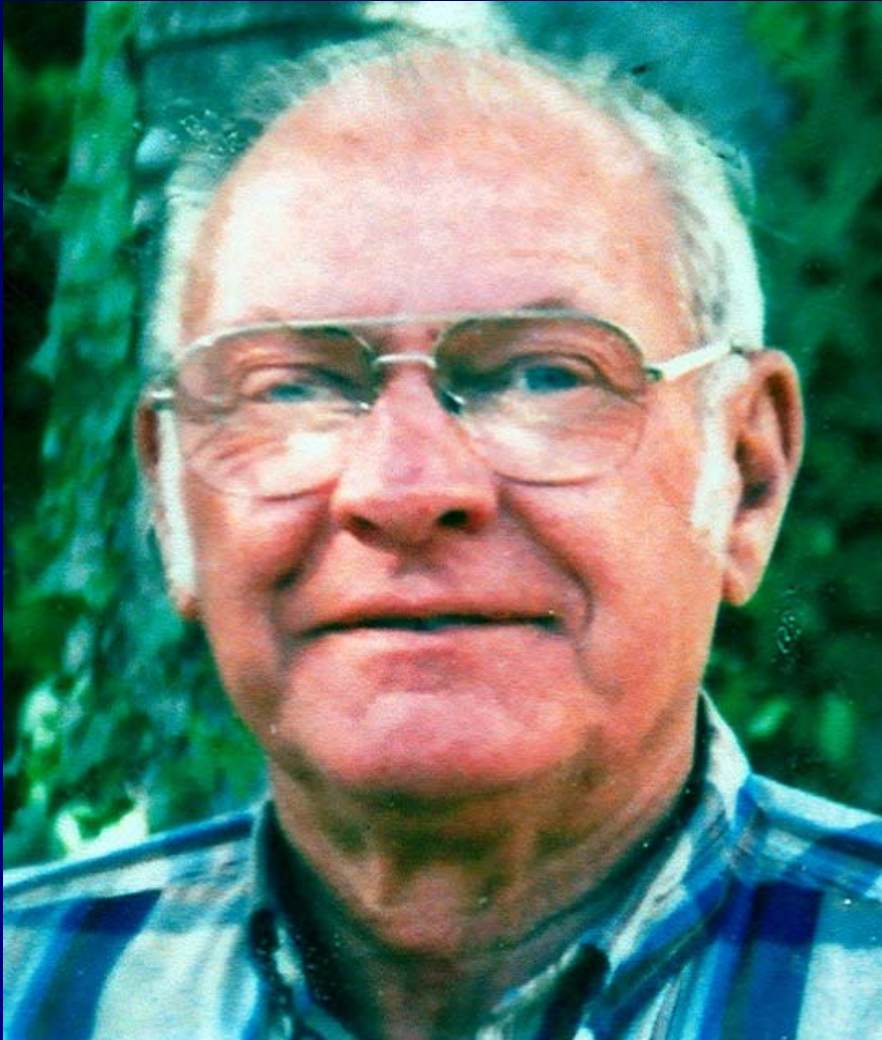
- Asphalt Emulsion Committee

- T. K. Stone, Co-Chairman

- Activities

- Quick set emulsions - recommendation made that usable specifications be developed
 - Committee requested to expand activities to include investigation of base stock characteristics desired for all emulsions (including polymer modifiers, additives and other asphalt systems)

Douglas Oil Company



T. Stone

1980-1989

- **1985**

- **Cold Mix Recycling Committee**

- S.J. Escobar, Co-Chairman
- Activities
 - Consider only emulsions
 - Collect performance data in PCCAS States

- **Standing Committee (asphalt pavement problems)**

- R.A. Bridges, Chairman
- Activities
 - Construction problems in Nevada
 - Committees effectiveness study (funding requirements to increase member participation)

Golden Bear Oil Company/Witco



S.J. Escobar

1980-1989

- **1987**

- **Conference Co-Chairs**

- R. Forsyth, Caltrans; L.E. Santucci, Chevron Research

- **Strategic Highway Research Program (SHRP)**

- Asphalt Research and LTPP programs; role of PCCAS

- **Asphalt Specification Committee**

- G.R. Kemp, Co-Chairman
- Committee charged with developing specifications for modified binders

1980-1989

- **1987**

- **Asphalt Emulsion Committee**

- T. K. Stone, Chairman
- Committee charged to identify performance of modified emulsion systems as compared to conventional systems; and functional limiting values for modified emulsions

- **Other:**

- Recycling Committee reactivated and charged to develop guide specifications for cold emulsified agents
- Standing Committee; guidelines for activity established

1980-1989

- **1989**

- **Conference Co-Chairs**

- R. Forsyth, Caltrans; L.E. Santucci, Chevron Research

- **Paving Asphalt Committee**

- J. Massucco, Chairman
- Committee charged to compare AASHTO M226 Tables 2 and 3 for possible development of core specification for climate extremes
- Committee charged to continue development of performance based specifications for modified asphalts

Federal Highway Administration



J. Massucco

1980-1989

- **1989**

- **Asphalt Emulsion Committee**

- R. Reese, Co-Chairman
- Tentative specification for Quick Set emulsified asphalt adopted
- Charged to continue work on emulsions containing modified binders
- Continue updating of emulsion section of “Recommended Uses of Asphalts (1985 Conference version)”

- **Recycling Committee**

- D. Allen, Co-Chairman
- Tentative specification for asphalts for “Partial Depth Cold In-Place Recycling” accepted
- Committee requested to collect data related to use of materials meeting these specifications and report results at 1991 Conference

Performance Based Specifications

Evolve: 1990-1999

- **1990**

- **Conference Co-Chairs**

- R. Doty, Caltrans; R.S. Hodgson, Conoco

- **Paving Asphalt Committee**

- J. Massucco, Chairman
- Performance based asphalt specification introduced; accepted for evaluation or optional use. (Subcommittee: S. Escobar, T. George, J. Goodrich, and R. Reese)
- Committee agreed to coordinate its work with SHRP (T. Kennedy, SHRP A-001 Contractor)

- **Emulsion, Recycling, and Standing Committees continued**

California Department of Transportation

R.N. Doty



PBA Concept

Performance



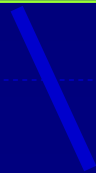
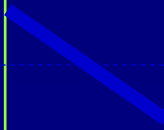
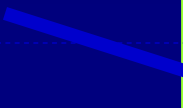
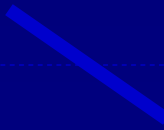
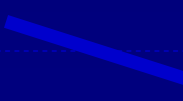


Rutting, Fatigue & Low Temp Cracking

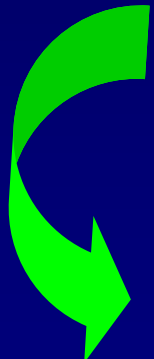
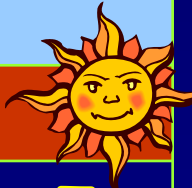
Safety
Environment
Purity
Compatibility

Climate

PBA Grade

Binder Tests

						
Red			Red			Brown
1	2	3	4	5	6	7
						
Test Criteria						



1990-1999

- **1991**

- **Conference Co-Chairs**

- R. Doty, Caltrans; R.S. Hodgson, Conoco

- **Paving Asphalt Committee**

- J. Massucco, Chairman
- PBA Evaluation process adopted; included Tasks of Retrospective Analysis, SHRP Test Method Evaluation and Validation, and Definition of Environmental Guidelines

- **Discussion of asphalt mixes/role of Conference**

1990-1999

- **1991**

- **Asphalt Emulsion Committee**

- R. Reese
- Update of “Recommended Uses of Asphalt” accepted by Conference for use in PCCAS region

- **Recycling and Standing Committees continued**

- R. Smith (TAI) to serve as Chair of Standing Committee

1990-1999

- **1992**

- **Conference Co-Chairs**

- R. Doty, Caltrans; S. Escobar, Golden Bear/Witco

- **Paving Asphalt Committee**

- J. Massucco, Chairman
 - Modified PBA specification presented; recommended for use
 - Users encouraged to use asphalt rubber binders to permit performance based tests on these materials to be developed.

California PBA Spec

Test on Original Material

Absolute Vis at 60°C (Poise), AASHTO T202

Kinematic Vis at 135°C (cSt), AASHTO T201

Flash Point, COC (°F), AASHTO T48

Solubility in TCE (%)

Test on RTFO Residue (CT 346)

Pen at 4°C & 25°C (dmm), AASHTO T49

Absolute Vis at 60°C (Poise), AASHTO T202

Kinematic Vis at 135°C (cSt), AASHTO T201

Absolute Vis Ratio = (RTFO Vis ÷ Orig Vis)

Ductility at 7.2°C & 25°C (cm), AASHTO T51

California PBA Spec

Test on CaTOD Residue (CT 374)

Pen at 25°C (dmm), AASHTO T49

Absolute Vis at 60°C (Poise), AASHTO T202

Ductility at 25°C (cm), AASHTO T51

1990-1999

- **1992**

- **Asphalt Emulsion Committee**

- J. Goldhammer, Chairman
 - Continue work with modified asphalt emulsion systems and test for base asphalts

- **Recycling Committee**

- G. Way, Chairman
 - For hot recycling system develop an intermediate grade between PBA 1 and RA 500; continue work on previous charges

San Diego County

J. Goldhammer



1990-1999

- **1993**

- **Conference Co-Chairs**

- R. Doty, Caltrans; S. Escobar, Golden Bear/Witco

- **Paving Asphalt Committee**

- J. Massucco, Chairman
- Began validating SHRP PG specification using Conference developed performance data
- Established formal contact with FHWA technical Group and increased effort to implement SHRP binder research
- Encouraged Users to construct pavements mixes containing asphalt rubber to permit Users and Producers to evaluate/test this binder

1990-1999

- **1993**

- Liaison appointed to interact with other User Groups being formed
- **Standing Committee**
 - Roger Smith, Chairman
 - Task added to keep abreast of Superpave developments
- **Emulsion and Recycling Committes**
 - Continued work on earlier charges

1990-1999

- **1994**

- **Conference Co-Chairs**

- R. Doty, Caltrans; R. Holmgren, Shell

- **Paving Asphalt Committee**

- J. Massucco, Chairman
- TOAD test residue-rheologic testing for shear susceptibility; PAV as alternative to TOAD test
- Adopted revised system for evaluation and optional use
- PBA/PG evaluation plan to evaluate SHRP research and specifications

1990-1999

- **1994**

- **Standing Committee**

- R. Smith, Chairman
 - Fumes investigations

- **Asphalt Mix Committee formed**

- R. Leahy, Chair; R. Holmgreen, Vice Chair
 - Interact with FHWA, other User-Producer Groups and Superpave Regional Centers regarding SHRP technology relating to mix design and evaluation

OSU/Fugro-BRE



- **R.B. Leahy**

1990-1999

- **1995**

- **Conference Co-Chairs**

- R. Doty, Caltrans; R. Holmgren, Shell

- **Paving Asphalt Committee**

- J. Massucco, Chairman
- Trial use of PG binders on field projects encouraged to develop validation data

- **Asphalt Mix Committee**

- R. Leahy, Chair
- Began interactions with other User-Producer groups and Superpave Regional Centers on mix design an evaluation

1990-1999

- **1996**

- **Conference Co-Chairs**

- J. Walters, WSDOT, R. Holmgren, Shell

- **Paving Asphalt Committee**

- J. Massucco, Chairman
- Continued validation of PG specifications; some states indicated PG usage in 1997 (AZ, WA)
- Continued work on evaluation and development performance based specifications for asphalt rubber binders

- **Both asphalt and mix committees concerned with test temperatures, fatigue and rutting measures**

1990-1999

- **1997**

- **Conference Co-Chairs**

- J. Walters, WSDOT, R. Holmgren, Shell

- **Paving Asphalt Committee**

- J. Massucco, Chairman
- PG binders adopted for optional use and evaluation
- Evaluation of certified supplier standard practice continued

- **Mix Committee**

- R. Leahy, Chair
- Agencies encouraged to experiment with SHRP and other new technology and implement along with current technology

- **At future meetings, Asphalt and Mix Committees agreed to meet together**

1990-1999

- **1998**

- **Conference Co-Chairs**

- J. Walters, WSDOT, R. Holmgren, Shell

- **Asphalt Committee**

- Standard practice for asphalt suppliers that certify PG asphalts for use by Conference participants adopted

- **Mix Committee**

- User Members started to report status of Superpave use

1990-1999

- **1998**

- **Asphalt Emulsion Committee**

- S. TeceleMariam, Chair
 - Cooperative study on testing emulsion residue

1990-1999

- **1999**

- **Conference Co-Chairs**

- J. Walters, WSDOT, R. Holmgren, Shell

- **Asphalt Committee**

- Continued with previous charges

- **Mix Committee**

- Added considerations of mix compaction and pavement smoothness to mix evaluation and design activities

PG and Superpave Arrive: 2000-2006

- **2000**

- Conference Co-Chairs

- G. Way, AZDOT, R. Holmgren, Shell

- Asphalt Committee

- Moderator, L.E. Santucci

- Co-Chairs: B. Neitzke, FHWA, R. Staugaard, Golden Bear/Witco

- Mix Committee

- R. Leahy, Chair, R. Holmgren, Vice Chair

- Emulsion Committee

- S. TecleMariam, Chair

- Standing Committee

- R. Humer, Chair

2000-2006

- **2002**

- **Conference Co-Chairs**

- G. Way, AZDOT, R. Holmgren, Shell

- **Asphalt Committee**

- **Moderator, L.E. Santucci**

- Co-Chairs: B. Neitzke, FHWA, R. Staugaard, Golden Bear/Witco

- **Mix Committee**

- R. Leahy, Chair, R. Holmgren, Vice Chair

- **Emulsion Committee**

- S. TecleMariam, Chair

- **Standing Committee**

- R. Humer, Chair

2000-2006

- **2004**

- **Conference Co-Chairs**

- G. Way, AZDOT, R. Holmgren, Shell

- **Asphalt Committee**

- **Moderator, L.E. Santucci**

- Co-Chairs: B. Neitzke, FHWA, R. Staugaard, Golden Bear/Witco

- **Mix Committee**

- R. Leahy, Chair, R. Holmgren, Vice Chair

- **Emulsion Committee**

- S. TecleMariam, Chair

- **Standing Committee**

- R. Humer, Chair

- **Steering Committee**

Concluding Remarks

- Much has been accomplished in the past 50 years through user/producer cooperation
- Representatives from both groups have given freely of their time and resources for the benefit of the traveling public
- The PCCAS is truly a remarkable organization; it has set the standard for other such groups in the US and continues to do so.

Concluding Remarks

- Both Larry Santucci and I consider it a privilege to be associated with the PCCAS and its members. We thank you for this opportunity to look back over 50 years of significant achievements on your part. We sincerely hope that you will build on these accomplishments for the future to insure that our transport system will continue to provide the access and mobility to enhance the quality of life for all of our citizenry