

HEAVY-DUTY ENGINE OIL CLASSIFICATION PANEL
OF
ASTM D02.B0.02
December 10, 2002
Anaheim Marriott Hotel

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ACTION ITEMS

- | | | |
|-----------|---|-----------------|
| 1. | Issue exit ballot on 13% Noack volatility limit. | McGeehan |
| 2. | Bring data on using CI-4 tests in place of CH-4 tests. | All |
-

MINUTES

- 1.0 Call to Order
 - 1.1 Chairman Jim McGeehan called the meeting to order at 2:00 p.m. on December 10, 2002, in Salon F of the Marriott Hotel in Anaheim, California. There were 11 members present or represented and approximately 43 guests present. The attendance list is shown as Attachment 2.
- 2.0 Agenda
 - 2.1 The published agenda (Attachment 1) was reviewed and Pat Fetterman was added with regard to the T-10A.
- 3.0 Previous Meeting Minutes
 - 3.1 Minutes of the June 18, 2002 meeting were approved (sort of...at least no one raised any concerns) as distributed and posted on the ASTM TMC web site.
- 4.0 Membership
 - 4.1 No official membership changes yet although Warren Totten will probably be replacing Dave Stehouwer of Cummins and Abdul Cassim will probably replace Dwayne Tharp of Caterpillar. See Attachment 3.
- 5.0 Chairman's Comments
 - 5.1 Chairman McGeehan briefly reviewed PC-10 concerns and emphasized the need to bring it in on time.
- 6.0 PC-10 Status
 - 6.1 Greg Shank and Bill Runkle reviewed the need for PC-10 and the currently envisioned tests to cover anticipated concerns. See Attachment 4. There were several areas identified where task force work could start without delay, so the following task forces were formed:

- 6.2 For the 'Turbo Coking / Crankcase Deposits' Task Force, Jim McGeehan volunteered to serve as chairman...after a long period of deathly silence in the room. Additional members of the task force will be: Frank Bondarowicz, Pat Fetterman, Tom Franklin, Steve Kennedy, Mark Rees, Greg Shank and a player yet to be named from Oronite.
- 6.3 For the 'HTHS & Shear Stability' Task Force, Bill Kleiser will serve as chairman. Task force members will be: Frank Bondarowicz, Gordon Cox, Pat Fetterman, Steve Herzog, M. S. Saini, Matt Urbanak and Lew Williams.
- 6.4 For the 'ULSD Reference Fuel' Task Force, Pat Fetterman will serve as chairman. Task force members include Frank Bondarowicz, Tom Cousineau, Tom Franklin, Greg Shank, Jim Wells and Lew Williams.
- 6.5 For the 'Elastomer' Task Force, hope springs eternal that Becky Grinfield, chairman of an existing elastomer task force, will be able to accommodate inclusion of a new elastomer into the existing protocol. Hap Thompson reported that B7 is looking into assigning a facilitator to the elastomer procedure effort.
- 6.6 Comments on some of the potential PC-10 engine tests were as follows:
- Cat C-12, labs need at least two engines by March.
 - Cat 1N, may drop if a passing C-12 always passes a 1N.
 - Mack, possibly one or two new tests with new hardware.
 - EOAT and RFWT to carry over.
 - Cummins, ISM probably replaces the M-11 and ISB used for a new test.
 - Oxidation, probably the Seq. IIIG, but still some concern that oxidation protection not the same as in a lower temperature diesel test.
- 7.0 CI-4 Concerns
- 7.1 Frank Bondarowicz presented field test data they have accumulated with CI-4 oils in their 6 liter engine. These oils are shearing out of grade and are a concern to International. See Attachment 5.
- 7.2 Greg Shank showed similar data in Mack Engines with CI-4 oils. See Attachment 6.
- 8.0 Exit Ballots
- 8.1 Chairman McGeehan will send an 'Exit Ballot' on the proposed 13% Noack volatility limit for PC-10 oils to all 'HDEOCP' and 'B' members.
- 9.0 HDEOCP Vote Requirements
- 9.1 Greg Shank raised the question on behalf of the EMA as to just how large a majority would be required in the HDEOCP for a vote on an issue to be considered sufficiently passing to be forwarded to 'B'. See Attachment 7. This will be discussed at the next meeting.
- 10.0 CAT 1M-PC
- 10.1 Jim McCord, chairman of the CAT Surveillance Panel, reported the panel recommended eliminating "Loss of Side Clearance" as a pass/fail parameter from the CF category, since it appears to be random and redundant. See Attachment 8. His motion to that effect, seconded by Lew Williams, passed by voice vote with no negatives or abstentions.
- 11.0 T-10A

- 11.1 Pat Fetterman reported for Chris May that the MRV-TP1 alternate procedure will be issued its own "D" number.
- 12.0 Next Meeting
 - 12.1 The next meeting is scheduled for Wed., Feb. 19, 2003 in Chicago, with the new task forces to try and meet on Tues., Feb. 18, 2003.
- 13.0 CH-4 Tests
 - 13.1 Greg Shank reminded everyone again that there is a need to establish limits for CI-4 tests which would correspond to CH-4 test limits because key CH-4 tests may soon no longer be available. Jim Wells added that new PC-10 tests will displace the older tests for the limited test stand capacity available.
- 14.0 Adjournment
 - 14.1 The meeting was adjourned at 3:48 p.m.

Submitted by:

Jim Wells
Secretary to the HDEOCP

ASTM
SECTION D.02.BO.02
HEAVY-DUTY ENGINE OIL CLASSIFICATION PANELS

Marriott Anaheim Hotel, Anaheim, California
December 10, 2002
Room: Salon F
2:00-4:00 PM

Chairman/ Secretary: **Jim Mc Geehan/Jim Wells**
Purpose: **PC-10**
Desired Outcomes: **PC-10 Tests and Time-line**

TOPIC	PROCESS	WHO	TIME
Agenda Review	<ul style="list-style-type: none"> • Desired Outcomes & Agenda 	Group	2:00-2:05
Minutes Approval	<ul style="list-style-type: none"> • June 16th 2002 	Group	2:05-2:10
Membership	<ul style="list-style-type: none"> • Changes • Chairman's comments 	Jim Mc Geehan	2:10-2:15
PC-10 tests and timing	<ul style="list-style-type: none"> • Tests • Timing • Number of Labs to be used in process • Test limits approval process 	Greg Shank Bill Runkle	2:15-3:15
Ultra Low Sulfur Fuels Task Force	<ul style="list-style-type: none"> • Team and Chairman required. 	Jim Mc Geehan	3:15-3:30
Cat IMPC Test	<ul style="list-style-type: none"> • SCOTE Recommendation: Eliminate Loss of side clearance 	Jim Mc Cord	3:30-3:45
New or Old business	<ul style="list-style-type: none"> • 		3:45-4:00

**HDEOCP Members Present
December 10, 2002**

ATTACHMENT 2, 1 OF 7

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December 10, 2002**

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December 10, 2002**

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December 10, 2002**

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December 10, 2002**

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December 10, 2002**

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December 10, 2002**

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Voting Members of HDEOCP

◆ OEMs

- G. Shank, Mack Trucks
- D. Stehouwer, Cummins Inc.
- B. Mesfin, Detroit Diesel Corporation
- D. Tharp, Caterpillar Inc.
- F. Bondarowicz, International Truck and Engine Corporation
- K. Chao, John Deere
- R. T. Stockwell, GM Powertrain Engineering Center

◆ Oil and Additive Companies

- J. A. Mc Geehan, Chairman (HDEOCP), ChevronTexaco
- S. Kennedy, ExxonMobil
- M. Urbanak, Shell Global Solutions, US
- T. Cousineau, Ethyl Corporation
- W. Kleiser, Chevron Oronite Company LLC
- L. Williams, Lubrizol Corporation
- P. Fetterman, Infineum USA

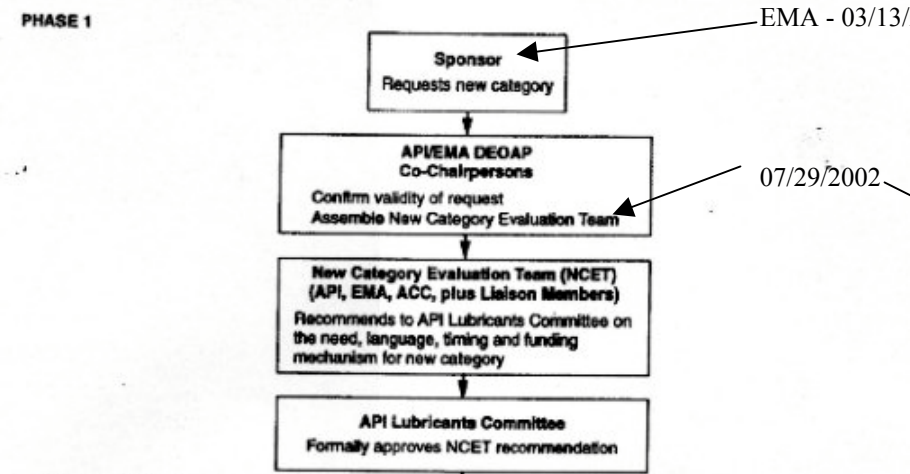


PC-10 New Category Evaluation Team

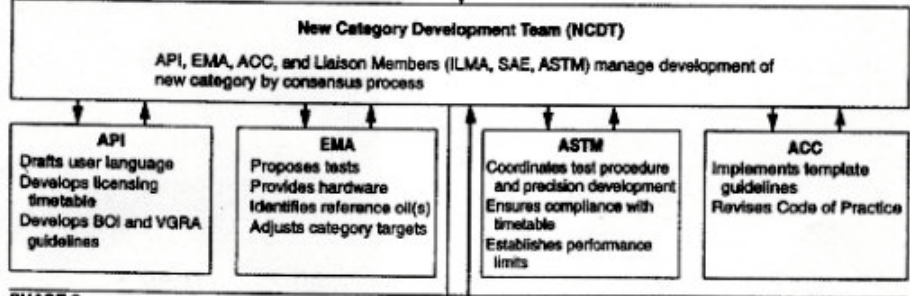
Progress Summary Report to ASTM
HDEOCP

12/10/2002

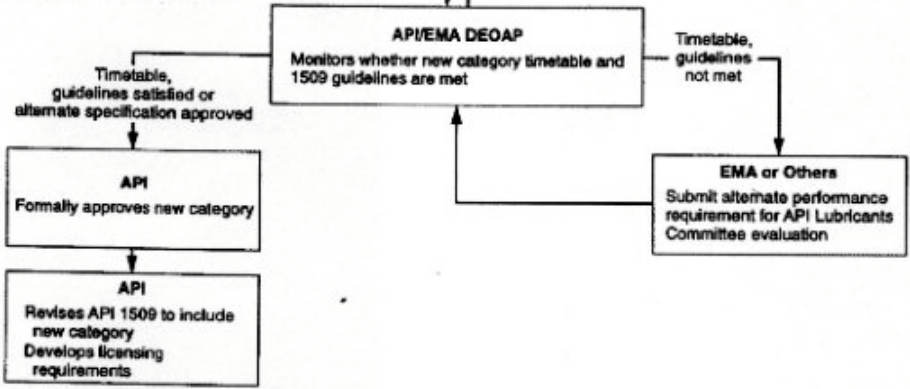
PHASE 1



PHASE 2

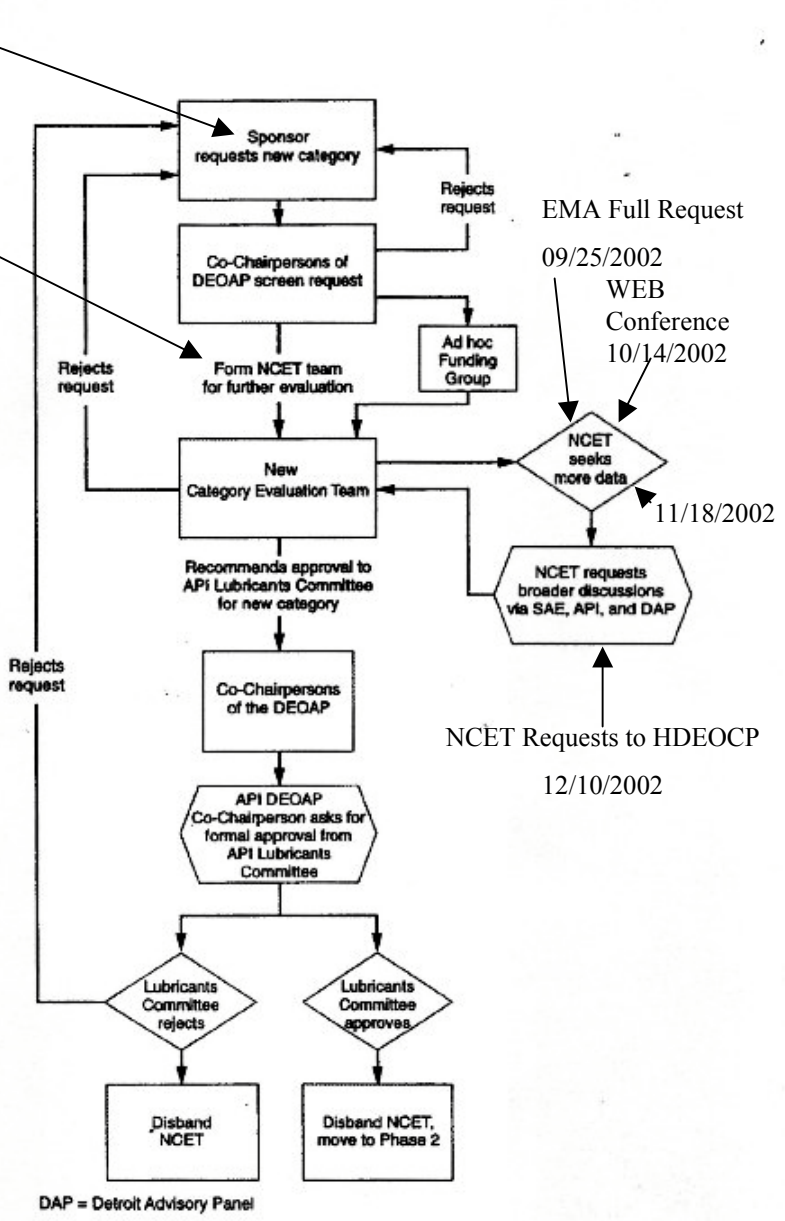


PHASE 3



- ACC = American Chemistry Council
- ASTM = American Society for Testing and Materials
- BOI = Base Oil Interchange
- DEOAP = Diesel Engine Oil Advisory Panel
- EMA = Engine Manufacturers Association
- ILMA = Independent Lubricant Manufacturers Association
- SAE = Society for Automotive Engineers
- VGRA = Viscosity Grade Read-Across

Figure D-1—Heavy Duty Category Request/Approval Process



DAP = Detroit Advisory Panel

Figure D-2—Phase 1: Category Request/Evaluation

Consensus Positions

- What is the proposed change?
 - Compatible with Engines Meeting 2007 Emissions Requirements
- Why is it required?
 - EPA required 90% reduction of NOX & PM
- Does data presented support the request?
 - Published industry data indicates potential aftertreatment durability issues related to engine oil ash, sulfur and phosphorus

Consensus Positions

- When is it needed in the marketplace?
 - ~3Q - CY2006
- What are the potential impacts on engines?
 - Enable use of aftertreatment, with ULSD
 - Use of pre-2006 fuel may reduce 2007 engine life
- What are potential impacts on consumers?
 - Drain intervals may be reduced

Consensus Positions

- What are the potential impacts on the environment?
 - Emissions should be reduced
 - More used oil may be generated
- How could the change affect existing API categories?
 - Backward compatibility may not be possible
 - Some prior category tests may not be available.If So, Alternatives Will Be Sought

Consensus Positions

- Are performance tests available that properly evaluate the performance needs requested?
 - Some current tests can be carried forward
 - Additional new tests need to be developed

Consensus Positions

- Do the perceived benefits outweigh the projected costs?
 - How much will it cost to develop test procedures, determine precision, and define, if necessary, BOI & VGRA guidelines?
 - Determine later in process.
 - What is the estimated total cost to carry out projected work for the new category, if the need is approved?
 - Determine later in process.

September 24, 2002

VIA ELECTRONIC MAIL

API/EMA Diesel Engine Oil Advisory Panel
c/o Steven Kennedy, Co-Chair
ExxonMobil Research & Engineering
Paulsboro Technical Center
P.O. Box 480
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Re: Request for New Category

Dear Steve:

In accordance with the procedures established in API 1509 Appendix D, the Engine Manufacturers Association requests that the API/EMA Diesel Engine Oil Advisory Panel (DEOAP) proceed with the development of a new heavy-duty diesel engine oil category (referred to as "PC-10").

As you are aware, the U.S. Environmental Protection Agency (EPA) has adopted regulations which will mandate an additional 90% reduction in nitrogen oxide (NOx) and particulate matter (PM) emissions from heavy-duty on-highway diesel engines and vehicles, beginning in 2007 (the "2007 Rule"). The 2007 Rule also mandates a phase-in of cleaner, ultra-low sulfur diesel fuel. Significant oil performance changes are critical if engine manufacturers are to have the ability to introduce the advanced aftertreatment devices and use the ultra-low sulfur fuel needed to achieve EPA's emission goals.

A table outlining proposed performance requirements for PC-10 is attached as Exhibit A. Please note that the proposal calls for PC-10 oils to include the performance properties of the earlier diesel engine oil service categories when used with either 500 ppm or 15 ppm sulfur fuel. As the category development process proceeds, EMA expects to provide information regarding the performance tests that may be available to evaluate the performance needs requested.

We look forward to working together again with API as we undertake this very important project.

Very truly yours,

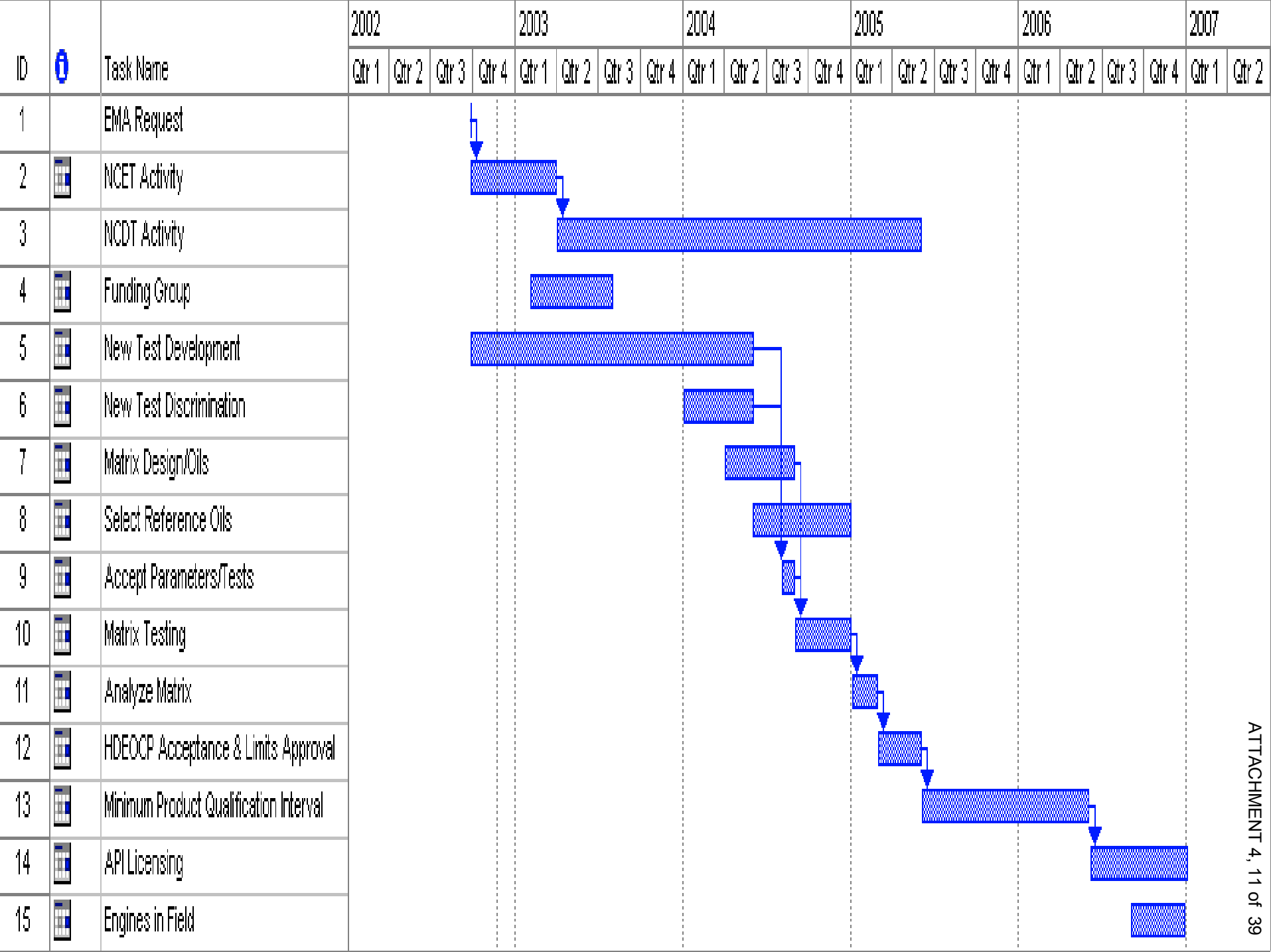
Greg Shank

Greg Shank
Engine Lubricants Committee Chair

cc: EMA Engine Lubricants Committee
Richard C. Clark, API

PC-10 Proposed Performance Requirements

Characteristic	Carryover from PC-9	New for PC-10
Piston Deposits, Fe Oil Consumption	X	
Piston Deposits, Al Oil Consumption	X	
Ring and Liner Wear (Corrosive), Bearing Corrosion	X	
Soot Valvetrain Wear (Abrasive and Rolling)	X	
Soot Valvetrain Wear (Sliding Wear)		X
Soot / EGR Valvetrain Wear Valve Stem / Guide Wear (Abrasive and Corrosive)	X	
Thermal Stability (Oxidation)	X	
Oil Aeration	X	
Turbo Coking Deposits		X
Closed Crankcase Deposit Control		X
Soot/Viscosity	X	
Soot/Viscosity in EGR Engines		X
Elastomer Compatibility	X	
Used Oil Viscometrics (Low Temp)	X	
Catalyst Aftertreatment Compatibility		X
High Temperature Corrosion Bench Test	X	
High Temperature/High Shear Limit (for New Oil)	X	
High Temperature/High Shear Limit (for Used Oil)		X
Shear Stability	X	
Shear Stability (Improved)		X
Volatility	X	
Foaming	X	
Ash Limit		X
Phosphorus Limit		X
Sulfur Limit		X
Backward Compatability with 15 ppm and 500 ppm Sulfur Fuels in pre-2007 Engines		X



Iron Piston Deposits, Oil Consumption

- CI-4 Requirement
- New Test
- New Engine - Caterpillar C-12
- Length - 500 - 650 hours
- Transient (Cyclic) Test
- Matrix Required
- Hardware Available ~ March 2003

Aluminum Piston Deposits, Oil Consumption

- CI-4 Requirement
- Caterpillar 1N/1K (Caterpillar Prefers 1N)
- Required for Backward Compatibility
- Matrix Not Required
- May Be Dropped, if Industry Shows No Harm

Ring & Liner Wear (Corrosive), Bearing Corrosion

- Mack T-10
- T-10 With New Hardware
- T-10 With ULS Fuel?
- Length - ~ 300 Hours
- Low Temp Used Oil Viscosity?
- Matrix Required

Soot Related Valvetrain Wear (Abrasive & Rolling)

- RFWT
- CI-4 Level
- Matrix Not Required

Soot Related Valvetrain Wear (Sliding Follower)

- New Test
- CUMMINS ISB
- 100 Hours Aftertreatment Compatibility
- Plus 250 Hours Wear
- Matrix Required
- Hardware & Procedure Late 2003/Early 2004

EGR Soot Related Valvetrain Wear (Abrasive & Corrosive)

- CUMMINS ISM EGR (May Replace M-11)
@ Lower Soot
- 5% to 6% Soot
- ~ 200 Hours Length
- Fuel Sulfur Level?
- Matrix Required
- Hardware & Procedure Late 2003/Early
2004

Thermal Stability (Oxidation)

- Sequence III G Probable
- Viscosity Increase Only
- PCEO Procedure
- Matrix Not Required

Turbo Coking Deposits

- European Bench Test?
- Added Test Parameter for Engine Test?
- Matrix?
- Request to HDEOCP to Form Task Force

Closed Crankcase Deposit Control

- European Bench Test?
- Added Parameter for Engine Test?
- Matrix?
- Request to HDEOCP to Form Task Force

Soot Related Viscosity Increase

- Mack T-8E?
- Mack Ring & Liner Wear Test or Other Test?
- CI-4 Level (If T-8E)
- (Separate) Matrix Not Required?

EGR Soot Related Viscosity Increase

- New Test (Mack)
- Mack Ring and Liner Wear Test or Other Test?
- (Separate) Matrix?

Elastomer Compatibility

- Carryover from CI-4
- EMA to Review Elastomers Used
- Request HDEOCP Form Task Force

Used Oil Viscometrics (Low Temperature)

- Mack T-10A
- Carryover from CI-4
- May Be Redundant, With Soot/Viscosity

Catalyst Aftertreatment Compatibility

- Caterpillar C-12
- CUMMINS ISB
- Other New Test (Caterpillar Looking at Bench Test)
- Select Two Most Severe Catalyst Systems
- EMA Monitor European Tests
- Additional Matrix?

High Temperature Corrosion Bench Test

- CI-4 Carryover

HT/HS Limit for Used Oil

- New Requirement
- TBS?
- Ravenfield?
- Other Test?
- Request HDEOCP Form Task Force (Test Method and Used Oil Generation)

Shear Stability (Improved)

- CI-4 Test Method (Modified?)
- Correlate to New Engines
- EMA to Provide Correlation Data
- Request HDEOCP Form Task Force to Evaluate Method and Correlation

Volatility

- NOACK
- 13% Maximum

Foaming

- CI-4 Carryover
- Same Test
- Same Limits

Chemical Property Limits

- Sulfated Ash Limit
- Phosphorus Limit
- Sulfur Limit
- Limits Required, if Aftertreatment Test Not Developed and Accepted
- EMA to Provide Additional Information ~ March 2003

Backward Compatibility

- Pre-2007 Engines
- <15 PPM Sulfur Fuel
- <500 PPM Sulfur Fuel
- Catalyst Compatibility May Preclude

Draft User Language

Version 1 - Backward Compatible

The PC-10 requirements describe oils for use in those high-speed four-stroke cycle diesel engines designed to meet exhaust emission standards being implemented between 2007 and 2010. These oils are compounded for use in all applications with diesel fuels ranging in sulfur content up to 0.05% by weight.

These oils are especially effective to sustain emission control system durability, where NOX adsorbers, particulate filters and other advanced aftertreatment systems are used. Optimum protection is provided control of catalyst poisoning, particulate filter blocking, piston deposits, low and high temperature stability, soot handling properties, oxidative thickening, foaming, and viscosity loss due to shear.

PC-10 oils are superior in performance to those meeting API CI-4, CH-4, CG-4 and CF-4 and can effectively lubricate engines calling for those API Service Categories.

Draft User Language

Version 2 - Backward Compatible, 15 ppm fuel

The PC-10 requirements describe oils for use in those high-speed four-stroke cycle diesel engines designed to meet exhaust emission standards being implemented between 2007 and 2010. These oils are compounded for use in all applications with diesel fuels ranging in sulfur content up to 0.0015% by weight.

These oils are especially effective to sustain emission control system durability, where NOX adsorbers, particulate filters and other advanced aftertreatment systems are used. Optimum protection is provided control of catalyst poisoning, particulate filter blocking, piston deposits, low and high temperature stability, soot handling properties, oxidative thickening, foaming, and viscosity loss due to shear.

When using diesel fuel with less than 0.0015% sulfur, PC-10 oils are superior in performance to those meeting API CI-4, CH-4, CG-4 and CF-4 and can effectively lubricate engines calling for those API Service Categories.

Draft User Language

Version 3 - Not Backward Compatible

The PC-10 requirements describe oils for use in those high-speed four-stroke cycle diesel engines designed to meet exhaust emission standards being implemented between 2007 and 2010. These oils are compounded for use in all applications with diesel fuels ranging in sulfur content up to 0.0015% by weight.

These oils are especially effective to sustain emission control system durability, where NOX adsorbers, particulate filters and other advanced aftertreatment systems are used. Optimum protection is provided control of catalyst poisoning, particulate filter blocking, piston deposits, low and high temperature stability, soot handling properties, oxidative thickening, foaming, and viscosity loss due to shear.

Since PC-10 oils are compounded for optimum in engines with advanced aftertreatment systems, they may not be suitable for use where API CI-4, CH-4, CG-4 and CF-4 are recommended. Consult your oil supplier regarding use in equipment calling for those API Service Categories.

NCET Proposal Elements

- Need for category validated ✓
- Feasibility (WAR review 11/18/02 minutes & draft position statement)
- Preliminary Timeline Established ✓
- Category language drafted - EMA Review Pending ✓
- Funding proposal (Report initiation of funding group activity)

NCET Draft Proposal and Recommended Guidelines

- To Be Completed, before DEOAP Phase 2
Proposal to API Lubricants Committee
- Target Date March 2003

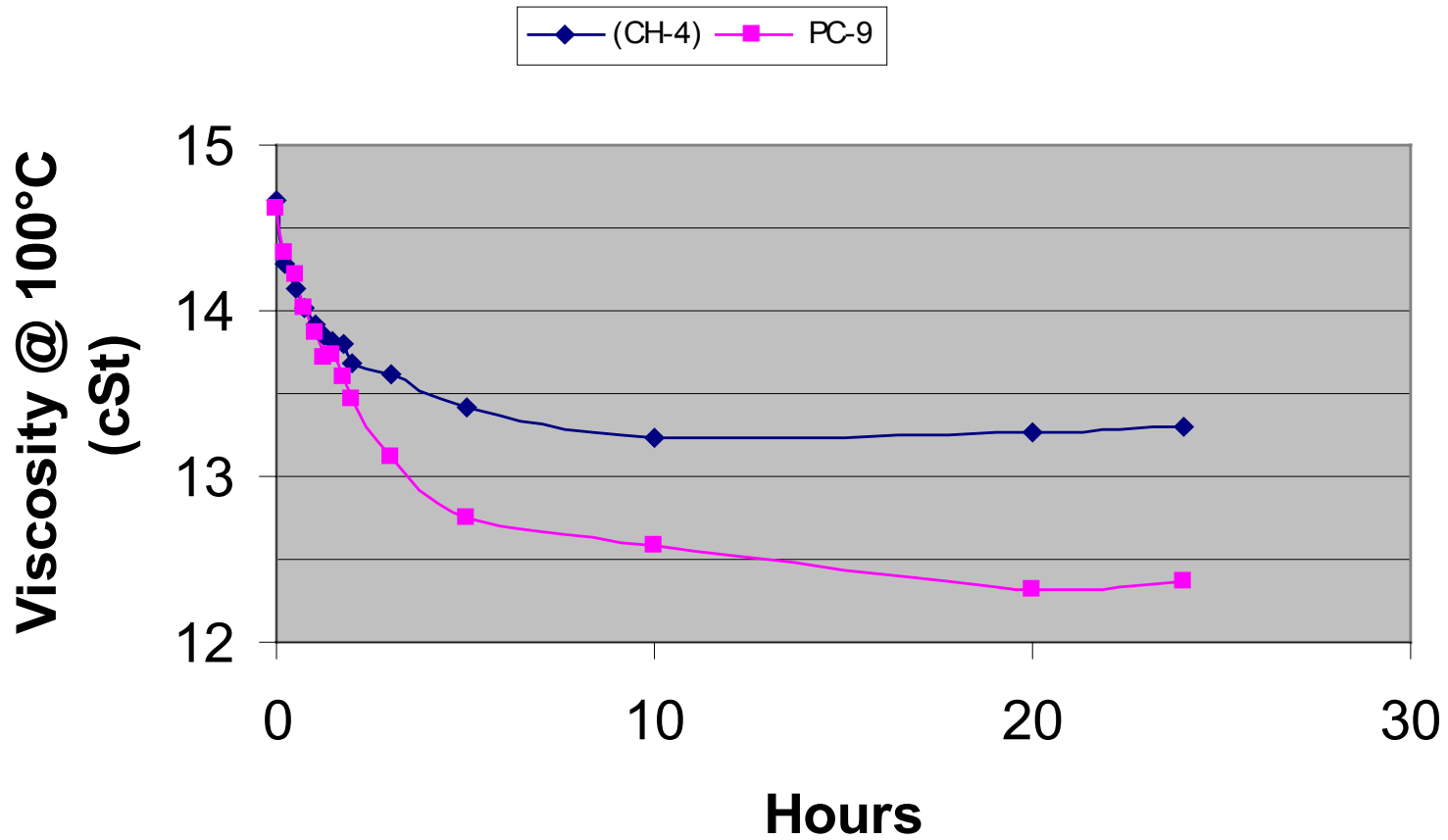
NCET Requests to ASTM HDEOCP

- Form Task Force to Evaluate Methods for Measuring Turbo Coking and Closed Crankcase Ventilation Deposit Control
- Form Task Force to Evaluate Elastomer Compatibility Control Methodology for PC-10 Oils
- Form Task Force to Evaluate Used Oil HT/HS Method and Used Oil Source

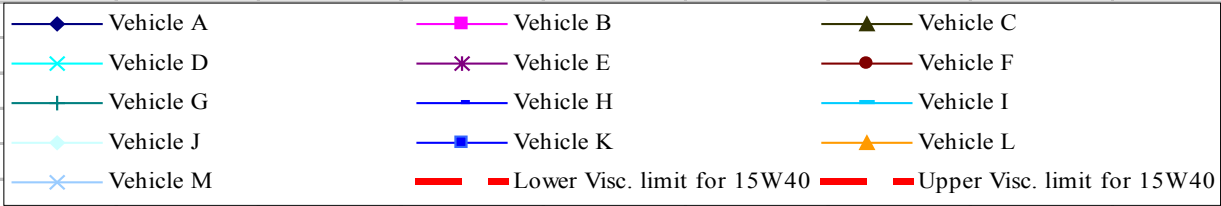
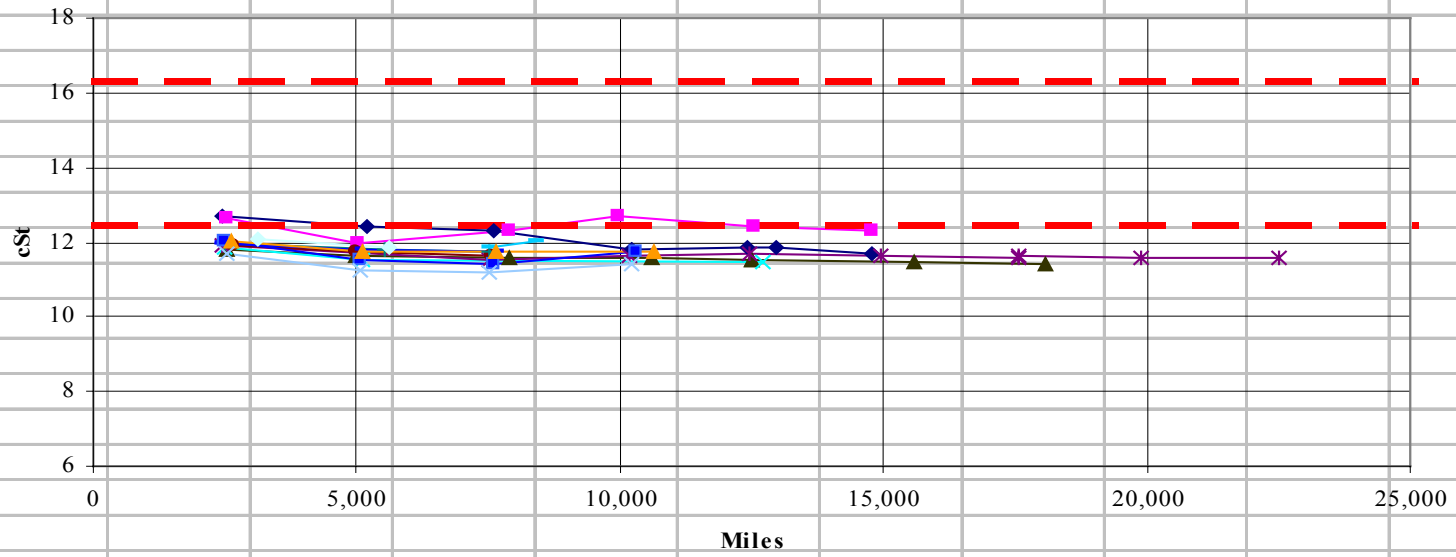
NCET Requests to ASTM HDEOCP

- Form Task Force to Evaluate Shear Stability Test Method for PC-10 and Correlation Data
- Form Task Force to Develop an Ultra-Low Sulfur Test Fuel Specification for PC-10 Engine Testing.

6.0L-3564 3300RPM 330 HP Full Load Shear Comparison (15W40)

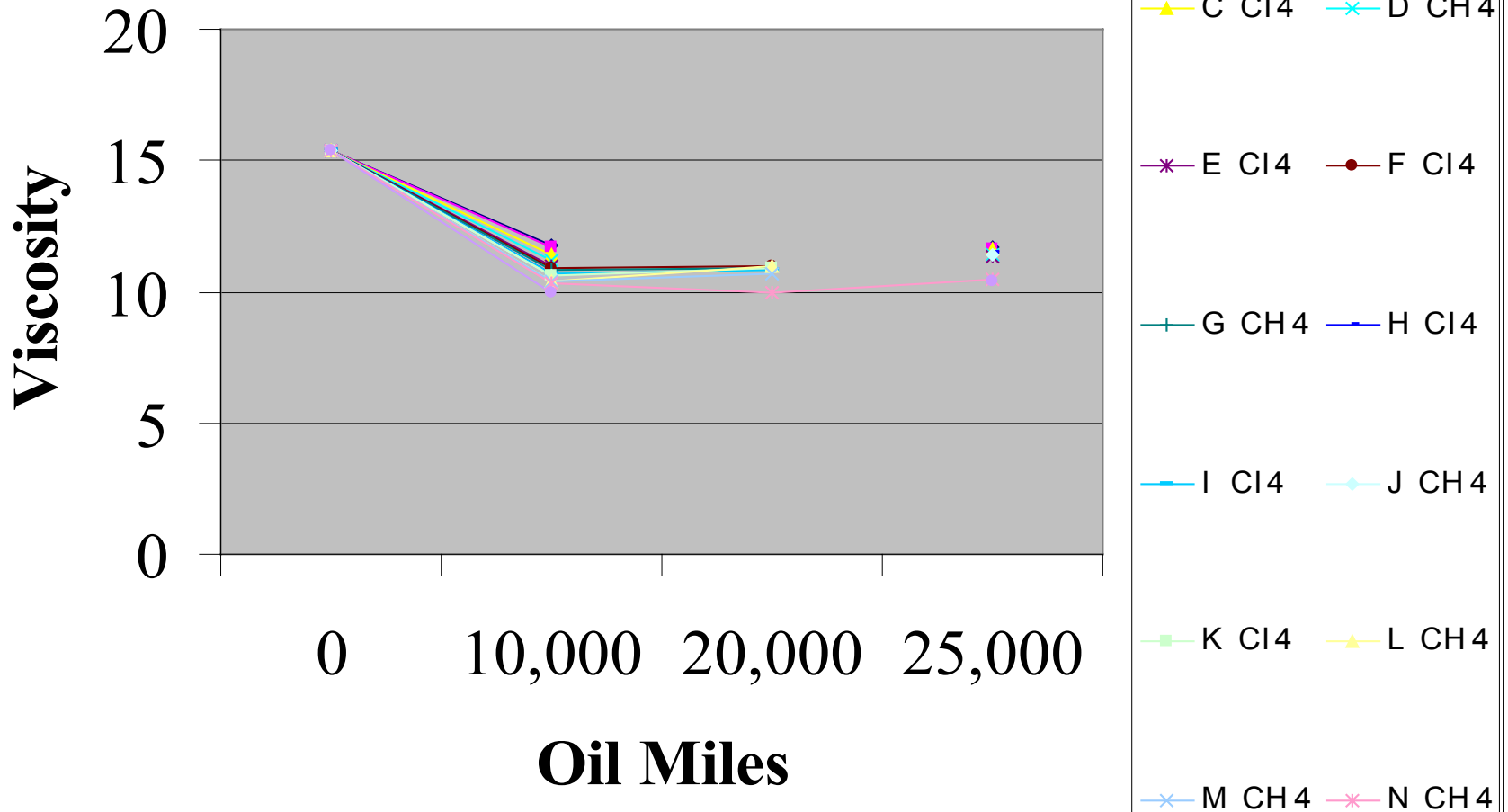


**6.0L V8 Fleet
Viscosity @ 100 C**



Mack Field Experience

Engine Oil Shear





Two North LaSalle Street
Suite 2200
Chicago, Illinois 60602
Tel: 312/827-8700
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Heavy Duty Engine Oil Class Panel Voting

EMA Ok With Current 7 Producers & 7 Users

If Membership Changes in Future, EMA Would Like
To Maintain Same Voting Balance (Weighted)

EMA Would Prefer Class Panel as Final Ballot

However for Ballot to Move from Class Panel to
Ballot we Would Need to Define Voting Rules
(What Percentage of Positive Votes Required)
51 % or 66% ?

SOUTHWEST RESEARCH INSTITUTE™

FUELS AND LUBRICANTS RESEARCH
DEPARTMENT

CAT 1MPC

Loss of Side Clearance

Presented by
Jim McCord



Caterpillar 1MPC LSC

- LSC parameter appears to be random and redundant.
- Approximately 25% of references and candidates experience LSC
- 98% of candidates that have failed LSC had failed at least one other critical parameter.
- The surveillance panel agreed (9 to 0) to recommend that LSC be eliminated as a Pass/Fail parameter for the CF category.

