# HEAVY-DUTY ENGINE OIL CLASSIFICATION PANEL

OF

ASTM D02.B0.02

April 2, 2003

DoubleTree Hotel – O'Hare, Rosemont, IL



## ACTION ITEMS

| | | |
|---|---|---|
| **1.** | **Send requests for panel voting membership to Jim McGeehan.** | **Interested Participants** |
| **2.** | **Investigate / Recommend appropriate volatility limit for PC-10.** | **CCV / TC Task Force** |
| **3.** | **Determine funding available for PC-10 matrix work.** | **Steve Kennedy/Greg Shank** |
| **4.** | **Recommend old categories to obsolete.** | **DEOAP** |

## MINUTES

1.0 Call to Order

1.1 Chairman Jim McGeehan called the meeting to order at 8:03 a.m. on April 2, 2003 in the Mr. Lincoln room of the DoubleTree Hotel O'Hare in Rosemont, Illinois. There were 12 members present or represented and 18 guests present. The attendance list is shown as Attachment 2.

2.0 Agenda

2.1 The published agenda (Attachment 1) was reviewed and EMA requested time to talk about the T-11 and aftertreatment before the matrix cost discussion.

3.0 Previous Meeting Minutes

3.1 The minutes from the February 19, 2003 meeting were approved as distributed.

4.0 Membership

4.1 Charlie Passut has replaced Tom Cousineau as the voting member from Ethyl. See Attachment 3.

5.0 NCET Report

5.1 Bill Runkle reported that in accordance with Appendix D of API document 1509 (Attachment 4), the PC-10 NCET has been dissolved and a PC-10 NCDT formed by the API Lubricants Committee.

6.0 Voting Rules

6.1 The topic of voting rules for the HDEOCP to move items to sub-committee B ballot and thus provide approval for API action if needed, was reopened. Tom Franklin provided an Excel chart which listed the percentages of affirmative votes cast as a function of total votes and negative votes (Attachment 5).

6.2 The EMA stated they felt comfortable going forward with as many as 3 negative votes. Since there seemed to be support for a minimum fixed percent positive, Greg Shank moved and Steve Kennedy seconded a motion to the effect that a 75% affirmative (or positive) vote would be sufficient to move an HDEOCP issue forward to ballot. The motion passed with 11 affirmative, 0 negative & 0 abstain.

6.3 Considerable discussion ensued regarding the addition of new members to the panel. In the past Chairman McGeehan has tabled requests for membership because the panel is balanced as it now stands. Given the potential to keep voting balanced like the PCEOCP, he now agrees to accept written requests from those interested in becoming voting members. This issue will be addressed at the June meeting.

7.0 Ballot Results

7.1 Chairman McGeehan displayed the results of the “exit ballot” for the proposed 13% NOACK volatility limit for PC-10 oils (See Attachment 6). There were 9 affirmative returns, 1 negative and 4 abstentions. The main concern expressed seemed to center on the ability to blend 10W-30 oils which would pass the limit. Lew Williams suggested moving the issue to the CCV/TC Task Force to determine if 13% is appropriate or best. EMA wants the issue resolved before any matrix test oils are blended.

8.0 PC-10 Aftertreatment Issues

8.1 Dave Stehouwer indicated he felt Cummins would have a test developed by the end of this year which could discriminate oil effects on catalysts.

8.2 Mike Quinn reviewed the PC-10 timeline and indicated the Caterpillar view to be that any aftertreatment compatibility tests should be ready to go by 2004 or the panel should go forward with chemical limits.

8.3 Jim McGeehan presented a slide (Attachment 7) to illustrate the box chemical limits will force on oil formulation.

8.4 Greg Shank suggested that a task force be formed to explore the issues with chemical limits and make recommendations on what they should be. He volunteered the EMA staff to collect, sanitize and disseminate available data. Bill Kleiser made and Abdul Cassim seconded a motion to form a task force to recommend chemical limits to protect aftertreatment devices exposed to PC-10 oils. The motion passed via voice vote with no negatives or abstentions. Rick Finn agreed to chair the task force, consisting of Bill Kleiser, Mark Rees, Charlie Passut, Dave Stehouwer, Glenn Mazzamaro, Greg Shank, Mesfin Belay, Ted Selby, Abdul Cassim, Jim McGeehan, Scott Zechiel, Bill Runkle and Chris Laroo. There was a request to ask Shawn Whitacre of NREL to participate if he could.

9.0 Matrix Costs

9.1 Jim McGeehan displayed a slide (Attachment 8) which listed some “ballpark” cost estimates of four potential PC-10 tests.

9.2 Lew Williams presented an analysis of matrix costs they had done, using various assumptions (See Attachment 9).

9.3 There was considerable discussion of the projected matrix costs and whether the Mack T-11 should be included in the matrix testing. At this time, it looks like there would be a Caterpillar C-12/13 test; a Mack T-XX(probably 12) test; a Cummins ISM and an ISB test.

9.4 Steve Kennedy and Greg Shank are to report at the June meeting how much funding is anticipated to be available for PC-10 matrix work.

10.0 Mack T-11

10.1 Greg Shank displayed slides showing the T-11 reference oil data accumulated so far (Attachment 10). The test seems to be working well.

11.0 Fuel Sulfur and Old Categories

11.1 Mike Quinn reminded the panel of the wide variety of fuel sulfur levels that engines could be exposed to on a world wide basis…anywhere from 10 to 5000 ppm of sulfur. He would like someway to make sure the end user is able to easily match an appropriate engine lubricant with the fuel being used. He would also like to obsolete as many old categories as possible, to cut down on potential confusion.

11.2 The DEOAP was requested to meet and make recommendations on the old category issue before the June HDEOCP meeting.

12.0 Shear Stability / HTHS Task Force

12.1 Bill Kleiser presented the task force report (Attachment 11) and indicated the group is close to picking a test which should evaluate the concerns regarding shear stability and high temperature / high shear.

13.0 Closed Crankcase Ventilation / Turbo Coking Task Force

13.1 Jim McGeehan gave the task force report (Attachment 12). They are requesting any MTU bench test data available and also any other data that might relate to the problem. Frank Bondarowicz has suggested a small engine test with a heated plate in the engine blow-by stream. Additional suggestions are welcome.

13.2 Ted Selby presented TEOST data from the IOM database and showed distinctly different responses from 40 grades, 30 grades and 15W-40 oils. See Attachment 13. Dave Stehouwer suggested trying to correlate available MTU data with the TEOST data.

14.0 Next Meeting

14.1 The next meeting is scheduled for Tuesday afternoon, June 17, 2003 in Norfolk, Virginia.

15.0 Adjournment

15.1 This meeting was adjourned at 11:16 a.m.

Submitted by:

Jim Wells
Secretary to the HDEOCP

ATTACHMENT 1

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

**Double Tree Hotel O'Hare Rosemont, Chicago**
**(Tel# 1-847-292-9100: ASTM rate $99.00)**
**April 2nd 2003**
**8:00 am-12:30 PM**

**Chairman/ Secretary:** **Jim Mc Geehan/Jim Wells**
**Purpose:** **PC-10**

**Desired Outcomes:** **PC-10 Tests and Time-line**

**Note all presentations will be made from the computer to Focus projector. Bring discs or CD's for minutes.**
**Also need money for the rooms and other room items**

| TOPIC | PROCESS | WHO | TIME |
|---|---|---|---|
| Agenda Review | • Desired Outcomes & Agenda | Group | 8:00-8:05 |
| Minutes Approval | • February 19th 2002 | Group | 8:05-8:10 |
| Membership | • Changes<br>• Chairman's comments | Jim Mc Geehan | 8:10:8:15 |
| NCET report | • PC-10 Up-date---any changes since last report | Bill Runkle | 8:15-8:30 |
| HDEOCP voting | • Define voting rules to move to ballot within HDEOP | Group | 8:45-9:30 |
| Exit –Criteria ballot for 13% Noack | • Ballot results | Jim Mc Geehan | 9:30-9:45 |
| PC-10 after-treatment devices | • Provide data on systems proposed for PC-10.<br>• Chemical limits or Catalysts tests?<br>• Timing issues for matrix and products timing | EMA | 10:00-10:30 |
| Task-Force Reports | • :HT/HS and Shear Stability<br>• Turbo-coking and closed crankcase deposit control | Bill Kleiser<br>Jim Mc Geehan | 10:30-12:30 |
| New or Old business | • Next meeting date | | |

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# Voting Members of HDEOCP

- **OEMs**
  - G. Shank, Mack Trucks
  - W. Totten, Cummins Inc.
  - M. Belay, Detroit Diesel Corporation
  - A Cassim, 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 Company
  - S. Kennedy, ExxonMobil
  - M. Urbanak, Shell
  - C Passut, Ethyl Corporation
  - W. Kleiser, Chevron Oronite Company LLC
  - L. Williams, Lubrizol Corporation
  - P. Fetterman, Infineum USA

ATTACHMENT 3

# APPENDIX D—DEVELOPING NEW DIESEL OIL PERFORMANCE STANDARDS FOR API C SERVICE CATEGORIES

## D.1 General

One of the objectives of API's voluntary Engine Oil Licensing and Certification System (EOLCS) is to help consumers identify lubricants that meet the needs of their vehicles. This is accomplished through the use of category designations within the API Service Symbol. These categories are based on engine oil performance specifications that require close coordination and consensus among the affected parties. Technical societies, trade associations, lubricant and additive marketers, vehicle and engine manufacturers, independent testing laboratories, and consumers play essential roles in defining and developing new minimum lubricant performance standards. This appendix outlines the roles and responsibilities of each organization in the heavy-duty diesel oil specification development process for API licensing.

API is responsible for licensing engine oil marketers against and enforcement of lubricant performance standards adopted for use in EOLCS. The API Lubricants Committee must grant final approval to any new category and recommend its inclusion in EOLCS.

## D.2 API C Service Categories for Diesel Oils

The C Service Category Development Process for diesel oils is designed to accomplish the following:

a. Justify and validate the need for a new category.
b. Achieve stakeholder consensus early in the process.
c. Establish funding sources for all necessary category components.
d. Optimize the process for developing and approving new categories.

A new C category is developed in three phases, as summarized in Figure D-1.

## D.3 Category Development Phases

### D.3.1 PHASE 1: CATEGORY REQUEST/ EVALUATION

#### D.3.1.1 Sponsor

A new definition of oil performance that may eventually result in a new category can be requested by any individual, company, or association (see Figure D-2). This party is referred to as the sponsor of the request.

#### D.3.1.2 Evaluation Process

The purpose of the evaluation process is to determine whether there is a need for the proposed category. To invoke the evaluation process, a sponsor must submit a new category request to the Chairpersons of the Joint API/EMA Diesel Engine Oil Advisory Panel (DEOAP).

The DEOAP is a formally constituted committee composed of representatives from API and EMA member companies who deal with heavy-duty lubricant matters affecting the two trade associations. The DEOAP will guide and facilitate the introduction of proposed heavy-duty performance categories. In addition to DEOAP members, liaison representatives from allied organizations—for example, ACC, SAE, ASTM, ILMA, and the U.S. Army—may also participate.

The Chairpersons of the DEOAP will acknowledge the receipt of the new category request and will work with the category sponsor to furnish the DEOAP with the information necessary to make a decision. The DEOAP has 6 months from the date that all the requested information has been presented to make a decision to either accept or reject the request for a new category. If no decision on the request is made within 6 months, it is automatically forwarded to the API Lubricants Committee for its members' information and disposition.

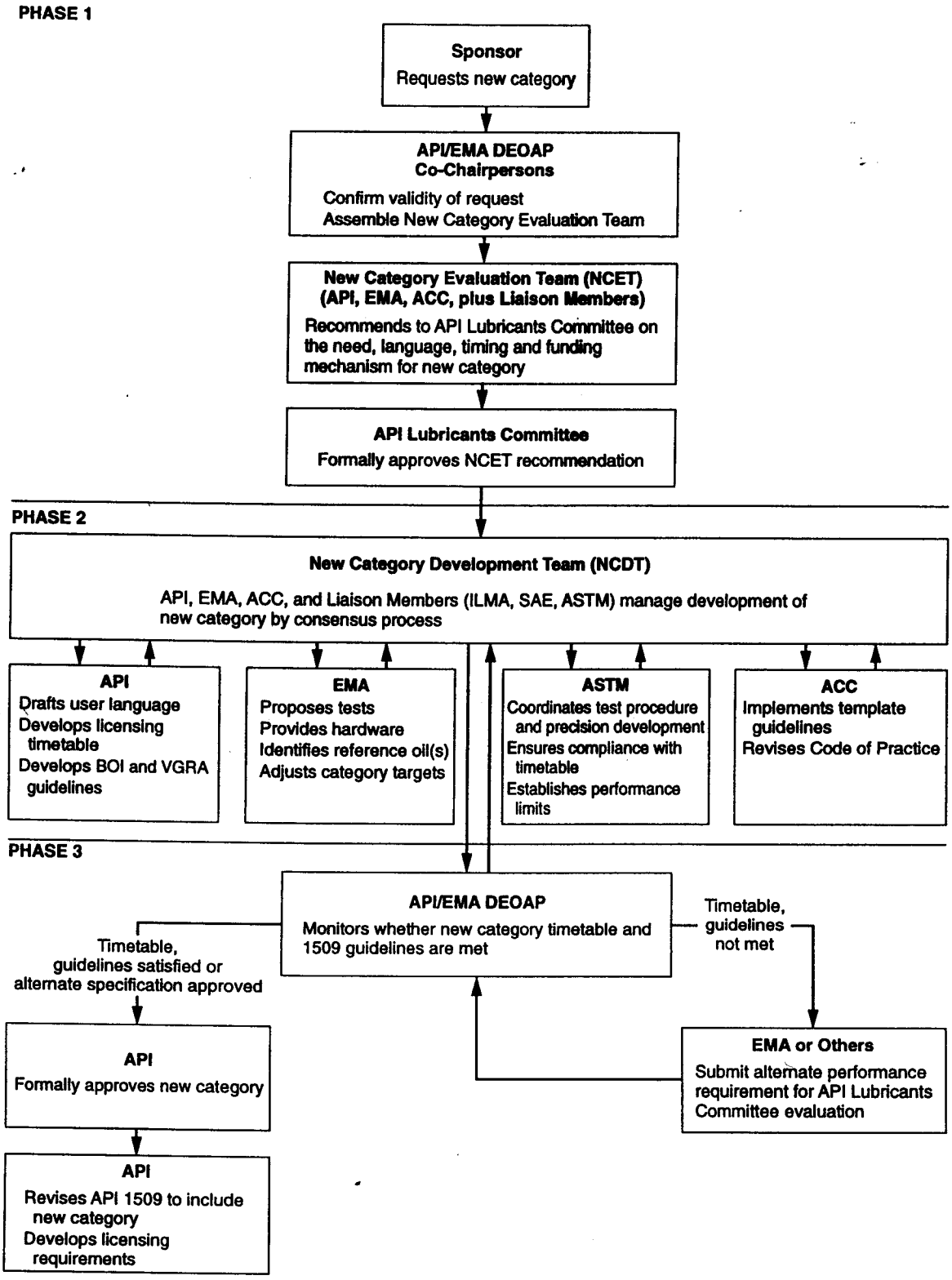
The sponsor must provide adequate data and justification for the proposed category. The request must demonstrate a need for significant oil performance changes to meet requirements not met by existing categories. Justification should include, but is not limited to, one or more of the following:

a. Likely or impending government regulations.
b. Consumer-driven needs.
c. New hardware design or service requirements.

#### D.3.1.3 New Category Evaluation Team (NCET)

The Chairpersons of the DEOAP will ask API, EMA, and ACC to appoint representatives to serve on an ad hoc review team that will formally evaluate each request for a new category—a New Category Evaluation Team (NCET).

NCET membership will be limited to the minimum number needed to accomplish the work while remaining consistent with full technical representation. This number may vary depending on the requested category. API, EMA, and ACC may each have up to three representatives on the NCET. At the first meeting the NCET will develop working rules, elect a chairperson, decide who to invite as liaison representatives, and request a meeting with the sponsor. The API, EMA, and ACC representatives are equal participants and decision making by consensus will be strongly encouraged. However, if that is not possible, decision making will be assumed by API and EMA representatives through majority vote. In the case of a tie vote, the request will be addressed by the DEOAP. All NCET meetings will be open to API, EMA, and ACC member company representatives and others.




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

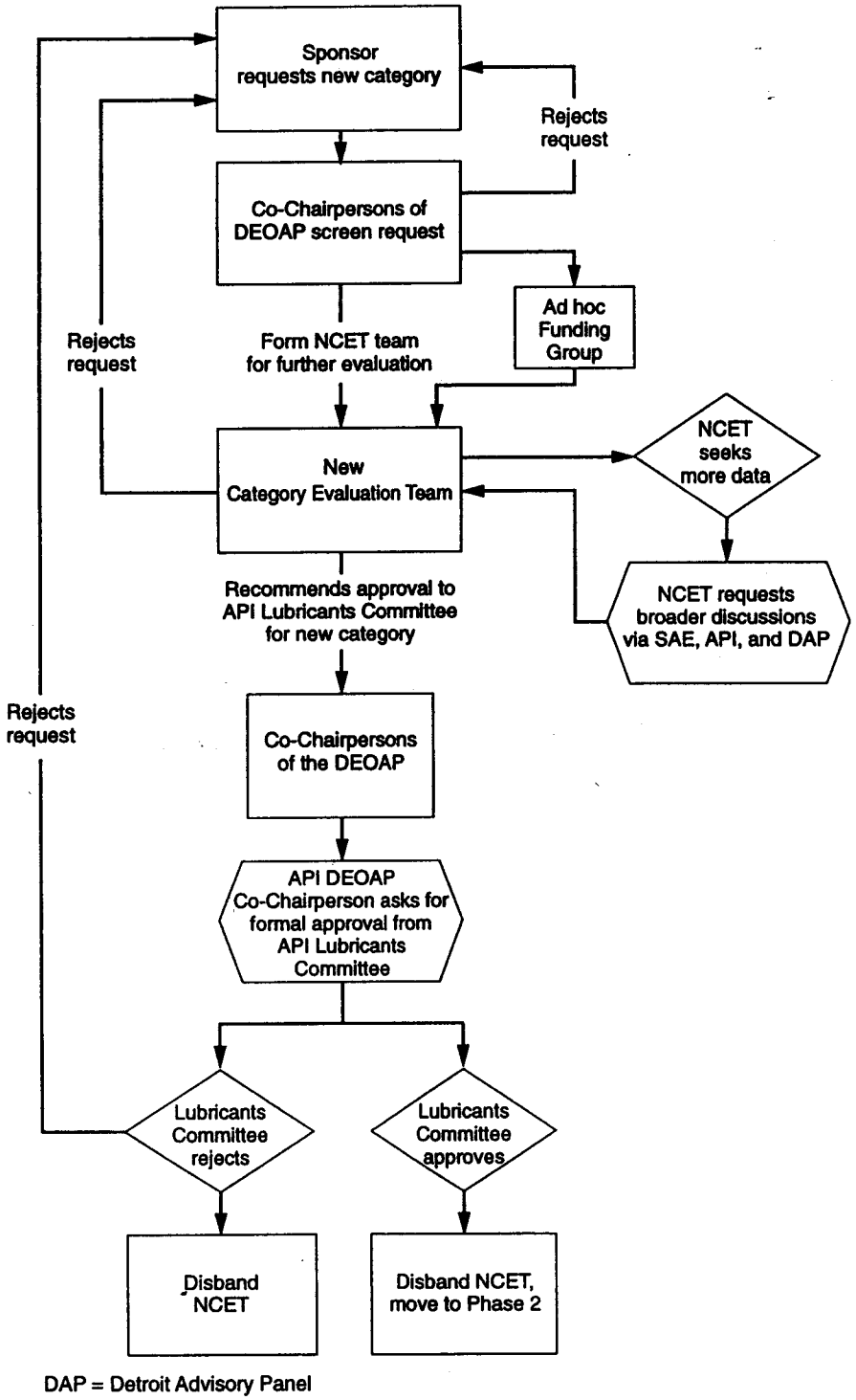



Figure D-2—Phase 1: Category Request/Evaluation

#### D.3.1.3.1 NCET Evaluation Responsibilities

The NCET will work to reach consensus positions on the following questions:

a. What is the proposed change and why is it required?
b. Does data presented support the request?
c. When is it needed in the marketplace?
d. What are the potential impacts on engines?
e. What are the potential impacts on consumers?
f. What are the potential impacts on the environment?
g. How could the change affect existing API categories?
h. Are performance tests available that properly evaluate the performance needs requested?
i. Do the perceived benefits outweigh the projected costs?
   1. How much will it cost to develop test procedures and determine precision and define, if necessary, Base Oil Interchange (BOI) and Viscosity-Grade Read-Across (VGRA) Guidelines for the proposed category?
   2. What is the estimated total cost to carry out projected work for the new category if the need is approved?

Note: The DEOAP is responsible for calculating an estimated total cost for developing the proposed category and ensuring that an agreement in principle is reached on category development funding before submitting the request to the API Lubricants Committee. To that end, the DEOAP Co-Chairpersons will establish an ad hoc Task Force for that specific purpose. This group should include representatives from the principal stakeholders in the process: API, EMA, ACC, independent test laboratories, and other parties deemed appropriate.

The NCET may solicit additional industry input and data at any time to assist it in reaching a decision. Any industry group (e.g., SAE, API Detroit Advisory Panel [DAP], and EMA) can be asked to provide supplemental information.

The NCET's specific charge is to evaluate the request and to make one of the decisions below:

a. Support the request for the new category and recommend to DEOAP that the request be forwarded to the API Lubricants Committee for consideration to proceed with category development. This recommendation shall identify the need for the category, recognize its feasibility, provide a timetable for category development, suggest draft language for the category, and identify the proposed method for funding development of the new category. The API Co-Chairperson of the DEOAP shall present the DEOAP recommendation, along with appropriate documentation, to the API Lubricants Committee for consideration at its next meeting.

or

b. Deny the request, explaining to the sponsor in writing the reasons for the denial. The sponsor has the option of resubmitting the request with additional information.

or

c. Not reach consensus. If the NCET cannot reach consensus on the request for a new performance category, the API Co-Chairperson shall provide the API Lubricants Committee with the vote outcome and a summary of the reasons for the action.

#### D.3.1.3.2 API Lubricants Committee

The API Lubricants Committee must approve or deny the recommendation by formal vote. If denied, the API DEOAP Co-Chairperson will provide the sponsor with a written explanation outlining the Lubricants Committee's reasons for disapproval. The sponsor may then make a new request with modifications based on the Lubricants Committee actions.

If the API Lubricants Committee approves the NCET recommendation for the new category, the API DEOAP Co-Chairpersons will move the process forward, and development of the new category will commence. Independent of whether the Lubricants Committee approves or denies the request, the ad hoc NCET disbands at this point in the process.

### D.3.2 PHASE 2: CATEGORY DEVELOPMENT

#### D.3.2.1 New Category Development Team (NCDT) Responsibilities

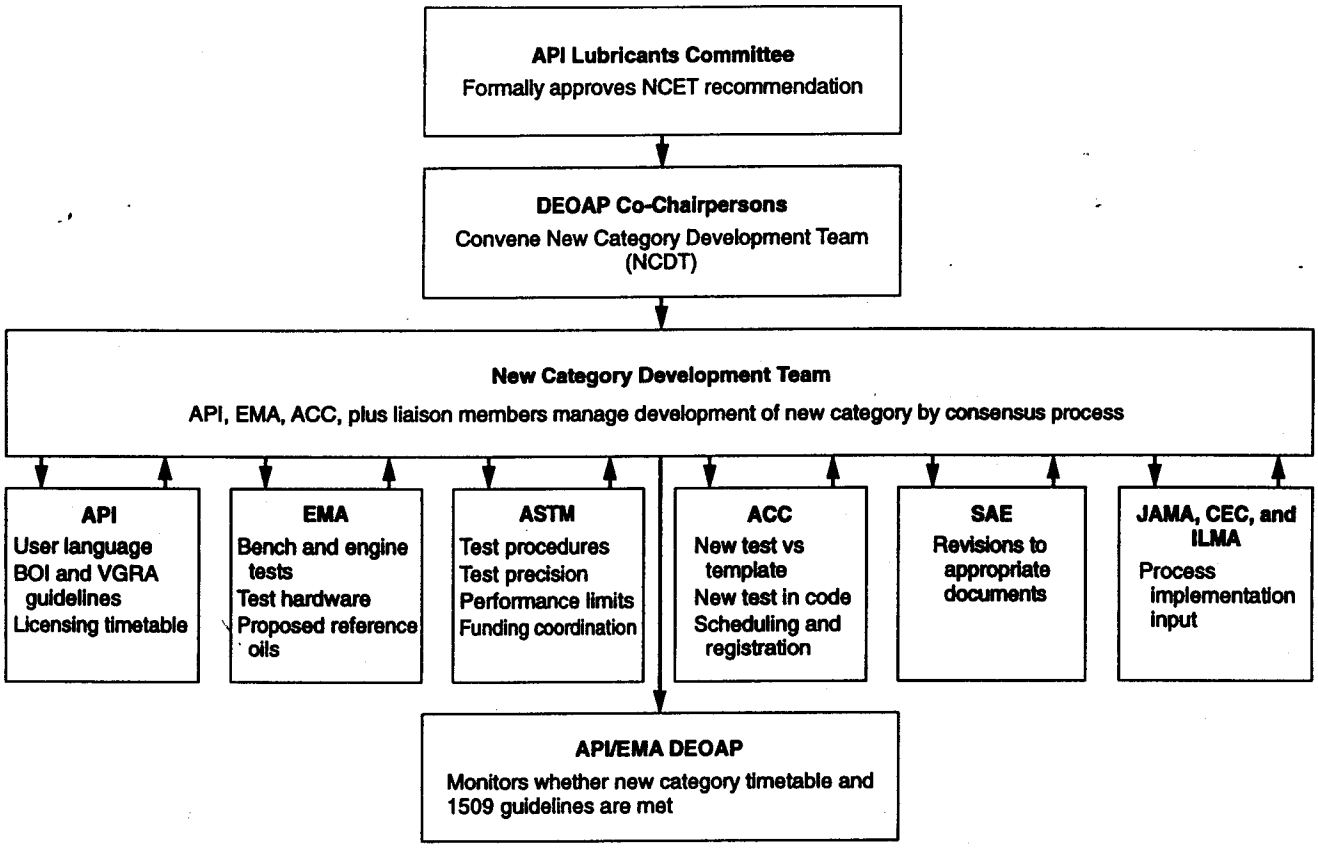
When the API Lubricants Committee approves the request for new category development, the API DEOAP Co-Chairpersons will convene an ad hoc New Category Development Team (NCDT) (see Figure D-3).

The NCDT will function under the same guidelines as the NCET (see D.3.1.3). However, the API, EMA, and ACC representatives need not be the same as those on the NCET. The NCDT will decide on working rules, select a chairperson or facilitator, and, as with the NCET, invite liaison representatives from other groups or affected parties: ASTM, SAE, ILMA, independent test laboratories, or others as required. Other national, regional or international bodies—for example, JAMA—may also be asked for input during category implementation.

The DEOAP Co-Chairpersons will explain to the NCDT any conditions established by the Lubricants Committee, including, but not limited to, the following:

a. The proposed draft language for the category.
b. The proposed timetable.

The DEOAP Co-Chairpersons are responsible for ensuring that funding sources are established to cover the specific costs for all necessary category components. These components, which may include development of new engine and bench tests and precision matrix testing, are identified and confirmed during Phase 2 by the functional work groups: for example, ASTM and the NCDT, respectively. The DEOAP Co-Chairpersons will establish a new ad hoc funding Task Force or reconvene the Task Force used to arrive at the agreement in principle on funding (see D.3.1.3.1). The composition of this Task Force will be constituted in the same manner as the original one and function in a similar way.




JAMA = Japan Automobile Manufacturers Association
CEC = Coordinating European Council

Figure D-3—Phase 2: Category Development

The NCDT will manage and coordinate the new process working toward final approval within the timetable and budget. The Co-Chairpersons will monitor the process on behalf of the EMA and API Lubricants Committees and periodically report on progress to them. In addition, the Co-Chairpersons will carry out any other liaison functions that are not covered by the responsibilities of the NCDT.

### D.3.2.2 Specific Duties of NCDT

The NCDT will manage all phases of category development through four functional work groups chaired by NCDT members: an API member will manage the API function, an EMA member the EMA function, an ACC member the ACC function, and another NCDT member the ASTM and SAE functions.

#### D.3.2.2.1 API Function

a. Ensure that no conflicts develop between existing categories and the one proposed.

b. Coordinate with the API BOI/VGRA Task Force on its development of base oil interchange and viscosity-grade read-across guidelines based on data (including ASTM matrix testing), engineering judgment, and field experience.

1. Ensure that matrix testing is conducted for the new engine tests in accordance with the plan developed by the NCET (see D.3.1.3.1) so that sufficient data is available to allow the establishment of appropriate BOI and VGRA Guidelines simultaneous with the establishment of the category performance criteria.

2. Review proposed BOI/VGRA Guidelines with the NCDT before formal approval. These guidelines will be embodied in the new category request when it is forwarded to the API Lubricants Committee to consider for inclusion in API 1509, *Engine Oil Licensing and Certification System.*

c. Draft a timetable to enable licensing at the earliest practicable date. That timetable will indicate the dates at which first allowable licensing can occur for the new category. Normally, the first allowable licensing date for a new category is 1 year after ASTM Subcommittee B formally approves the new performance standard used to define the category. This delay allows all oil marketers equal opportunity to meet the category requirements.

d. Develop draft Consumer User Language. The final version of that language will be approved by the API and EMA Lubricants Committees.
e. Ensure that emergent marketing or consumer issues that arise during category development are brought to the attention of responsible groups for resolution.

#### D.3.2.2.2 EMA Function

a. Guide the selection process for appropriate reference oils as well as low and high discrimination oils. At least one reference oil must be identified that meets all the bench and engine tests contained in the new category. The oil shall be used in test development and reformulated as necessary to ensure the best measure of performance. Before any new minimum performance category can be established by ASTM, at least one reference oil must be able to meet all category requirements. This reference oil shall have been engine tested in accordance with the *ACC Code of Practice*.

The new category sponsors or their designee will have the primary responsibility for recommending oil selections. The DEOAP will provide feedback and formally approve the selections, and the selections will be reviewed with ASTM.

Note: "Discrimination" oils should be available for each test. It is highly desirable that the minimum performance reference oil represent the performance level of the oil category being superseded and the high performance reference oil meet the expected performance level of the new category.

b. Recommend and/or provide relevant engine tests and hardware, with or without a test procedure.
c. Stay abreast of changes that may occur (government-, industry-, or consumer-generated) and, when necessary, suggest modifications to the new category to ensure that it will meet the predetermined target (see D.3.1.3.1). Coordinate any necessary modifications in language and tests with the NCDT.

#### D.3.2.2.3 ACC Function

a. Assess the new tests against the criteria of the *ACC Code of Practice* Template with the objective of optimizing cost-effective engine testing quality. Test precision and discrimination are examples of qualities to be assessed. Provide analysis of these assessments to the DEOAP and NCDT.
b. Incorporate the new engine tests that meet the Template into the ACC Code together with accompanying test scheduling and registration procedures.

#### D.3.2.2.4 ASTM and SAE Function

a. Work through ASTM Section D02.B0.02 Heavy-Duty Engine Oil Classification Panel to select or develop test methods that evaluate the needs defined by the NCET.
b. Ensure that the bench and/or engine tests selected for the new category will satisfy the requirements of the draft consumer language approved by the API Lubricants Committee. The NCDT and ASTM will also develop a timetable that contains, among other things, planned dates for reference oil selection, bench and engine test selection, and test method completion. Dates must agree with those approved by the Lubricants Committee (see D.3.2.1). Tests should correlate with field experience.
c. Provide input, as requested, to the new category sponsors in the selection of appropriate discrimination reference oils for the individual tests in the new proposed category (see D.3.2.2.2).

1. Coordinate with other appropriate technical societies, such as SAE, to develop and approve written test procedures and limits for tests not within the ASTM system that will be published as standards and specifications.
2. Once a test shows satisfactory discrimination of oil performance, conduct matrix testing to determine test precision and assess base oil and viscosity-grade effects. If, for example, an engine test is being developed by ASTM, it is ASTM's responsibility to have a functioning task force or surveillance panel in place to coordinate activities and analyze test data. For bench tests, ASTM must provide a method for referencing and/or calibrating each bench test that does not have an assigned surveillance panel.

d. Implement and coordinate through the appropriate ASTM group the funding mechanism recommended by the NCET and approved by the API Lubricants Committee for the development of tests, precision, and base oil interchange. Also establish the high reference/"passing" category oil for the Test Monitoring Center.
e. Establish pass/fail limits for each test and the entire category.
f. Update SAE "J" documents as appropriate.

### D.3.2.3 Category Completion

At or near the end of the development of the new category, the NCDT must undertake a number of actions to bring the process to a successful conclusion. In general, these actions are to review the output of the four functional groups and advise as necessary to ensure completion as well as harmony among the discrete parts. Specific actions are as follows:

a. For the ASTM functional group, review the appropriateness of the test data developed for discrimination and precision. Agree on the final description for each new performance test and that the optimum test methods and performance limits have been chosen. (At least one "demonstration" reference oil capable of meeting all minimum performance criteria is required.)
b. For the ACC functional group, ensure that the ACC Code includes each of the new engine performance tests.
c. Obtain from SAE and other cooperating agencies any standards, codes, and publications that are necessary parts of the new category.

When the NCDT is in agreement that all of its original goals and objectives have been met, the team will forward all procedures, facts, data, and information that is pertinent to the new category to the DEOAP. The DEOAP will promptly convene and together with the NCDT ensure that (1) the tests developed under NCDT guidance satisfy the need expressed by the original sponsor, (2) the performance targets contained in the proposed consumer language are met by the tests proposed for the category, (3) the timetable is acceptable, (4) and the test methods chosen to define the new standard represent the most cost-effective means of establishing the new performance level. All input is evaluated, including API BOI and VGRA Guidelines. The complete package is then presented by the DEOAP Co-Chairpersons, with a recommendation for formal approval, to the API Lubricants Committee. API must approve the complete package including the final consumer language.

### D.3.3 PHASE 3: CATEGORY IMPLEMENTATION

#### D.3.3.1 Alternate Category Development Process

As stated in D.3.2.1, the Co-Chairpersons will monitor the category development process to ensure adherence to the timeline as well as other applicable API1509 new category guidelines (see Figure D-4).

If unanticipated problems or situations arise that cannot be overcome and that unduly delay category development or prevent original plans from meeting expectations, EMA may choose to develop minimum performance requirements or a new category for API consideration through a process of their own choosing outside of the processes herein described. However, before this or any new minimum API performance category is adopted, it must be approved by the API Lubricants Committee at which time it may be incorporated into API1509.

#### D.3.3.2 Normal Category Development Process

Upon agreement between the NCDT and DEOAP that all parameters of the new category that were approved by the API Lubricants Committee during the evaluation phase have been met (see D.3.2.3), the final approval procedure is implemented. However, if for some reason, full, complete approvals have not been obtained, the DEOAP will carry out the necessary negotiations to resolve differences.

When all differences are resolved, the final specification will include its API Category Designation, a description of performance parameters, pass/fail limits, BOI and VGRA Guidelines, ACC Code requirements, and consumer language. Timelines for licensing will also be designated by API.

After final approval is obtained, API staff will be responsible for issuing revisions to API 1509 and advising oil marketers and other affected parties of the new licensing standard.

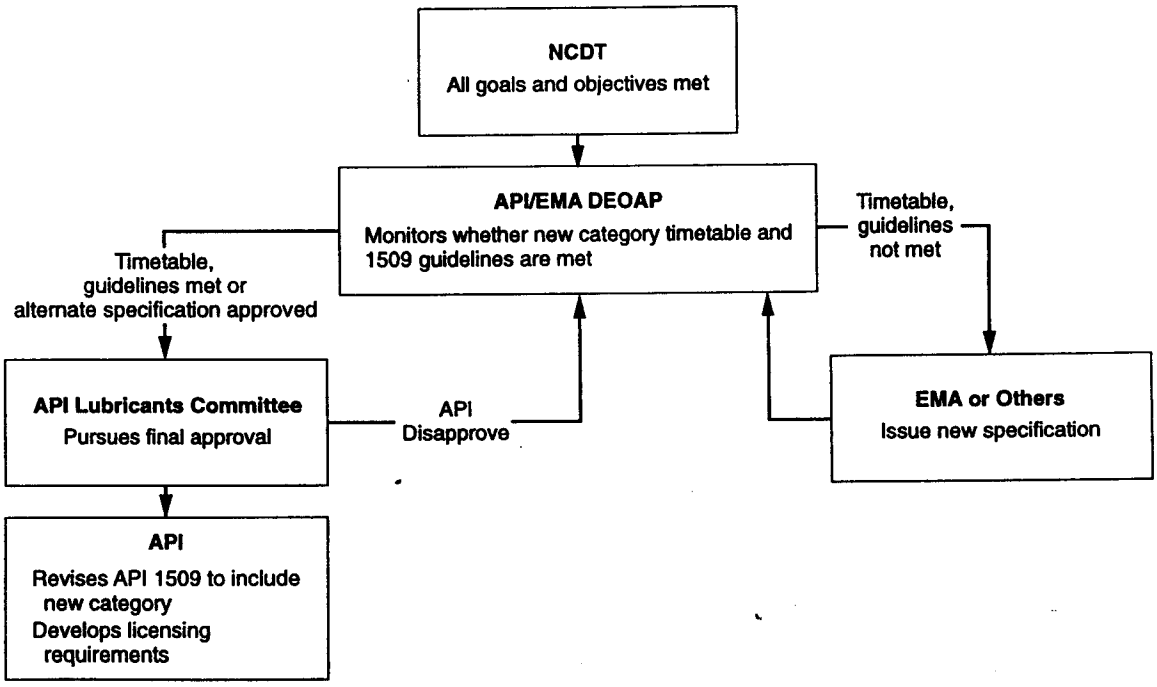



Figure D-4—Phase 3: Category Implementation

TOTAL VOTES OR TOTAL AFF + NEG

| NO. NEG | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 94% | 93% | 93% | 92% | 92% | 91% | 90% | 89% | 88% |
| 2 | 88% | 87% | 86% | 85% | 83% | 82% | 80% | 78% | 75% |
| 3 | 81% | 80% | 79% | 77% | 75% | 73% | 70% | 67% | 63% |
| 4 | 75% | 73% | 71% | 69% | 67% | 64% | 60% | 56% | 50% |
| 5 | 69% | 67% | 64% | 62% | 58% | 55% | 50% | 44% | 38% |
| 6 | 63% | 60% | 57% | 54% | 50% | 45% | 40% | 33% | 25% |
| 7 | 56% | 53% | 50% | 46% | 42% | 36% | 30% | 22% | 13% |
| 8 | 50% | 47% | 43% | 38% | 33% | 27% | 20% | 11% | 0% |

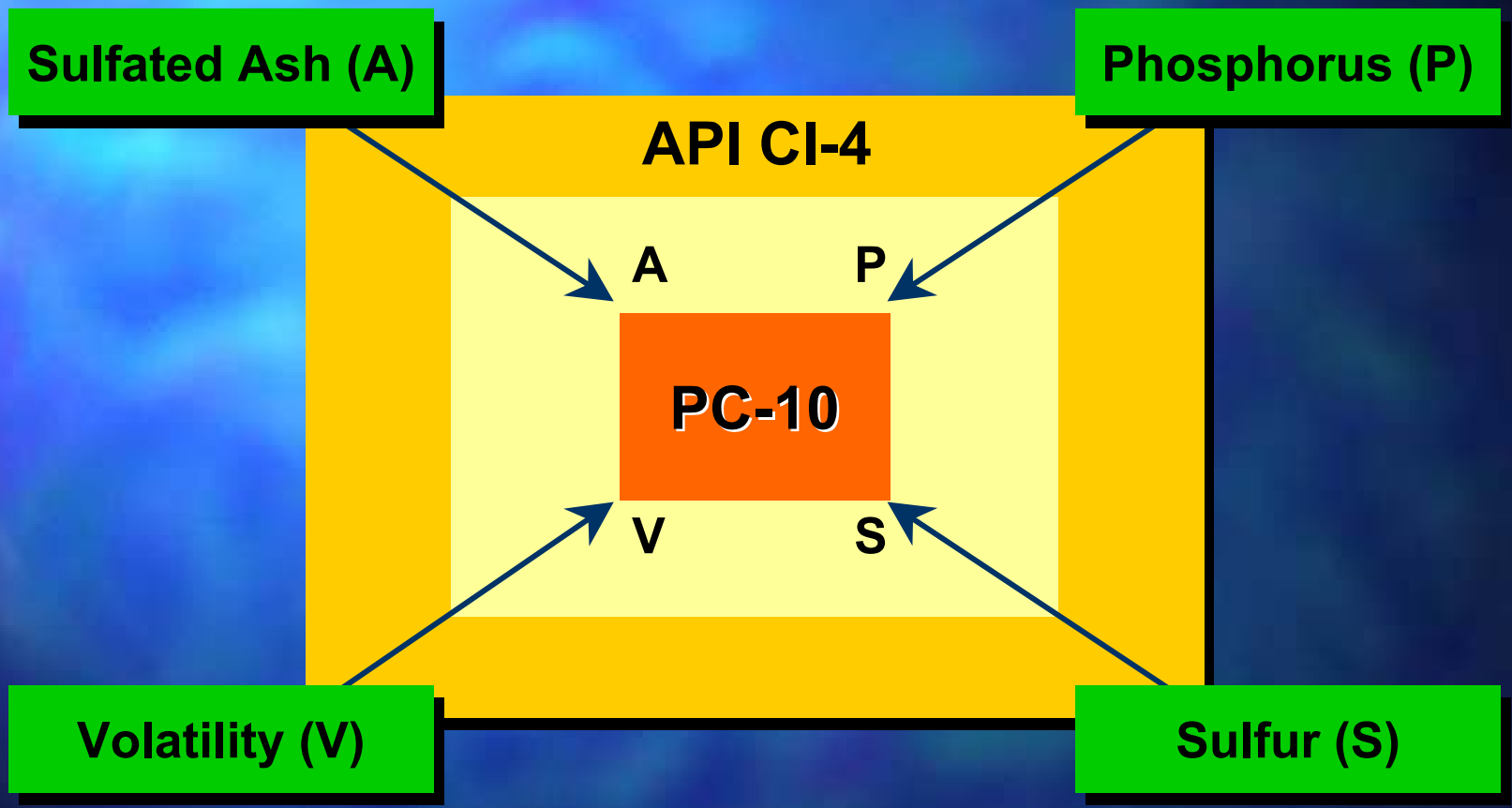
ATTACHMENT 5

**ASTM-HDEOCP EXIT CRITERIA BALLOT** March 28, 2003
**VOLATILITY - 13% NOACK FOR ALL GRADES**

| Company | Name | Affirmative | Negative | Abstain | Comments |
|---|---|---|---|---|---|
| | | | | | |
| ChevronTexaco | Jim McGeehan | X | | | |
| Int'l Truck & Eng Corp | Frank Bondarowicz | X | | | |
| Caterpillar Inc | Abdul H. Cassim | X | | | |
| Deere & Company | Ken Chao | X | | | |
| PerkinElmer | Thomas M. Franklin | X | | | X |
| ExxonMobil | Steve Kennedy | | X | | X |
| ChevronOronite Co. LLC | William Kleiser | | | X | X |
| Ethyl Corp | Charles Passut | X | | | X |
| The Valvoline Company | Wm. A. Runkle Jr | X | | | |
| Cummins Inc | Warren Totten | X | | | |
| SwRI | Jim Wells | | | X | |
| Lubrizol | Lewis Williams | | | X | X |
| Infineum | Pat Fetterman | | | X | |
| Detroit Diesel | Mesfin Belay | X | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Totals | | 9 | 1 | 4 | |

ATTACHMENT 6

# No Catalyst Test!: Chemical Box For Matrix?




ATTACHMENT 7

# NCET Matrix Required

| Performance | Test | Hours | Cost, $ |
|---|---|---|---|
| Iron Piston Deposit and Oil Consumption | Cat C-12 | 650-500 | 120,000 |
| Ring and Liner/Bearing Corrosion | “Mack T-10” | 300 | 90,000 |
| Soot Related Valve Train Wear (VTW) | Cummins ISM-EGR | 300 | 100,000 |
| Soot Related Valve Train Wear (Slider Follower) | Cummins ISB | 250 | 60,000 |

ATTACHMENT 8

# PC-10 Feasibility

***Question:***

***Is it feasible to fund the matrix testing needed to develop the PC-10 Category as currently proposed with six new tests?***

## Assumptions

- 6 new PC-10 tests
- Average cost per test -- $100,000
- Two labs in the matrix
- 5 stands -- 2 stands Lab A
  3 stands Lab B
- 3 featured oils in the matrix
- Precision/BOI/VGRA necessary
- Tests needed – 28 to 40 tests per each new engine test

## Calculations

- 6 new tests at $100,000 per test. $600,000 for one run in all new tests.
- $600,000 x 28 tests per engine test type -- $16,800,000 is the minimum total matrix cost – **Case A**
- $600,000 x 40 tests per engine test type -- $24,000,000 is the likely upper total matrix cost limit – **Case B**

**Funding Splits**

**Case A – Total Matrix Cost $16,800,000**
**Case B – Total Matrix Cost $24,000,000**

1) Each stakeholder (EMA, API, ACC) pays 1/3 of the total cost
   **Case A:** $5,600,000 for API and ACC each
   **Case B:** $8,000,000 for API and ACC each

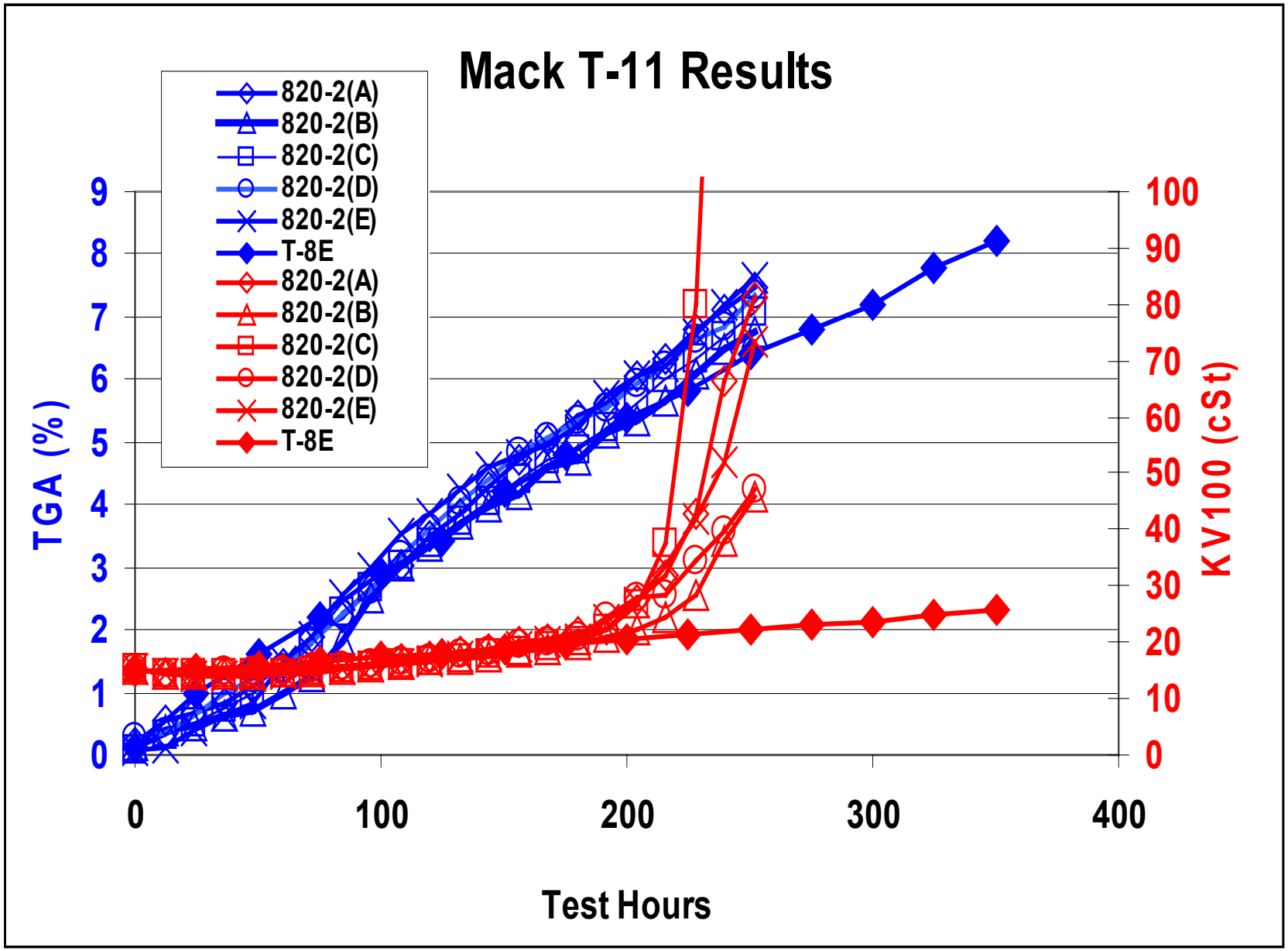
2) EMA pays a fixed amount -- API and ACC split the balance
   **EMA:** $500,000
   **Case A:** $8,150,000 for API and ACC each
   **Case B:** $11,750,000 for API and ACC each

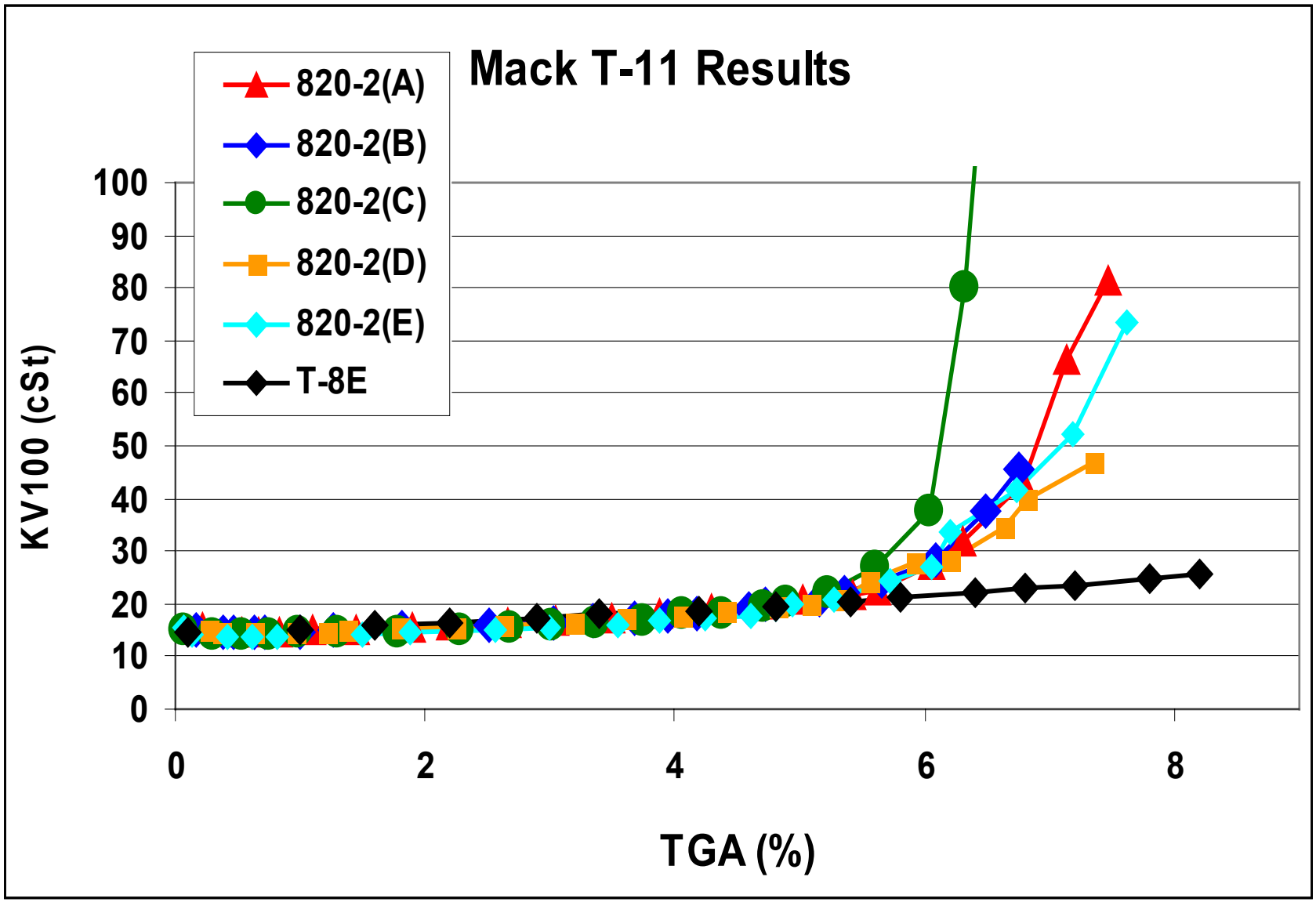
3) A scheme similar to PC-9
   - Labs donate tests for calibration, 3/2/2
   - EMA pays a fixed amount
   - API and ACC split the balance

| **Case A** | | **Case B** | |
|---|---|---|---|
| $16,800,000 | Total Cost | $24,000,000 | Total Cost |
| 7,200,000 | Labs | 7,200,000 | Labs |
| $9,600,000 | Funding | $16,800,000 | Funding |
| $500,000 | EMA | $500,000 | EMA |
| $9,100,000 | | $16,300,000 | |
| **$4,550,000** | **API & ACC each** | **$8,150,000** | **API & ACC each** |

4) Bare Bones – Precision only of 18 tests – Labs donate tests for calibration, EMA pays a fixed amount, and API and ACC split the balance

| | |
|---|---|
| 18 x $600,000 = $10,800,000 | Total Cost |
| 7,200,000 | Labs |
| $3,600,000 | Funding |
| 500,000 | EMA |
| $3,100,000 | |
| $1,550,000 | API and ACC each |


Mack T-11 Results
820-2(A)
820-2(B)
820-2(C)
820-2(D)
820-2(E)
T-8E
820-2(A)
820-2(B)
820-2(C)
820-2(D)
820-2(E)
T-8E
TGA (%)
KV100 (cSt)
0
1
2
3
4
5
6
7
8
9
0
10
20
30
40
50
60
70
80
90
100
0
100
200
300
400
Test Hours


Mack T-11 Results
820-2(A)
820-2(B)
820-2(C)
820-2(D)
820-2(E)
T-8E
KV100 (cSt)
100
90
80
70
60
50
40
30
20
10
0
0
2
4
6
8
TGA (%)

# ASTM HDEOCP Shear Stability and Used Oil HTHS Viscosity Task Group

April 1, 2003

# Meetings

- Teleconference March 20
- Full Meeting April 1

# Summary of Progress - 1

- Matrix Design Proposal
  - 8 15W-40 oils
    - One base oil – XOM Am core-common source
    - Blend targets agreed
    - VM SSI ranging from 10-37
  - 1 to 4 additional 10W-40
    - At discretion of supplier to supply
    - EHC base oil
  - To measure
    - KO at 30,60,90,120,150 cycles
    - Used oil HTHS Visc. on used oil samples
    - Base blend viscosity with VII diluent included

# Summary of Progress - 2

- First Stage Testing Proposal
  - International 6.0L
  - Vehicle based
  - Approximate conditions
    - 1-2 trucks
    - 3000-3500 mile test duration
    - Road or MAD
    - Cost anticipated to be ~$5000 including analysis.

# Issues

- Desire to expand scope beyond only 6.0L
  - Proposal to follow initial 6.0L work with confirmation testing in another engine (to be determined)
- Funding: ACC to revert by end of April with final decision on use of individual or industry funding.

# HTHTS Viscosity Measurement

- Used oil HTHS viscosity will be measured during shear stability field testing
- Further definition of deliverables to be clarified in future meeting

# Turbo-Coking and close crankcase task-force report to HDEOCP on February 19th 2003

# Brain Storming Ideas

- OM 441LA and MTU deposit test
- Caterpillar C-12 with closed crankcase
- Caterpillar C-12: measure blow-by
- Caterpillar C-12: direct blow-by to a deposit surface
- Caterpillar C-12 filter system
- Caterpillar C-12 measures oil consumption
- Oil consumption effective by Noack
- DC TEOST test at 33 degrees C with oil mist and aluminum parts

# Box-In with Chemical limits

- 13% Noack
- Possible chemical limits on Ash; P and S
- Limits oil formulating  effects
- Focus is on deposits and oil consumption

# Need OEM inputs

- Caterpillar's opinion on filter use or open crankcase for test.
- Caterpillar's opinion on test with closed crankcase
- Cummins, Mack and Navistar's approach to the problem
- Literature search on the problem
- Cummin's Turbo charger group opinions

# Action Items

- Need to search data base on OM 441LA on good and poor performing oils in regard turbo-charger deposits.
- Need to correlate any bench test to engine test.

ATTACHMENT 12, 5 OF 5

# Further Studies of Heavy-Duty Engine Oils Related to Turbo-Coking

## Using ASTM Method D 6335

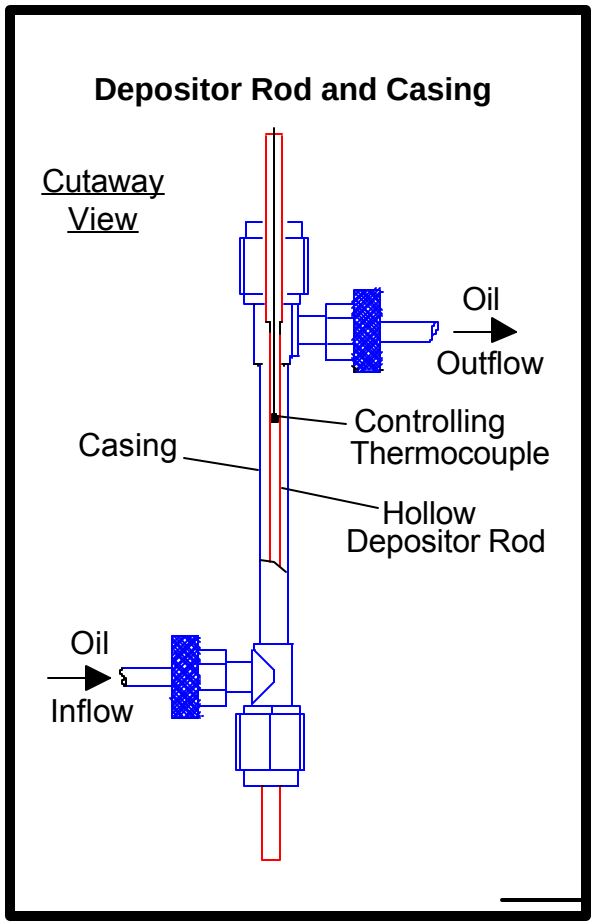
Presented at the HDEOCP Meeting
Rosemont, Illinois Holiday Inn

2003 March 2

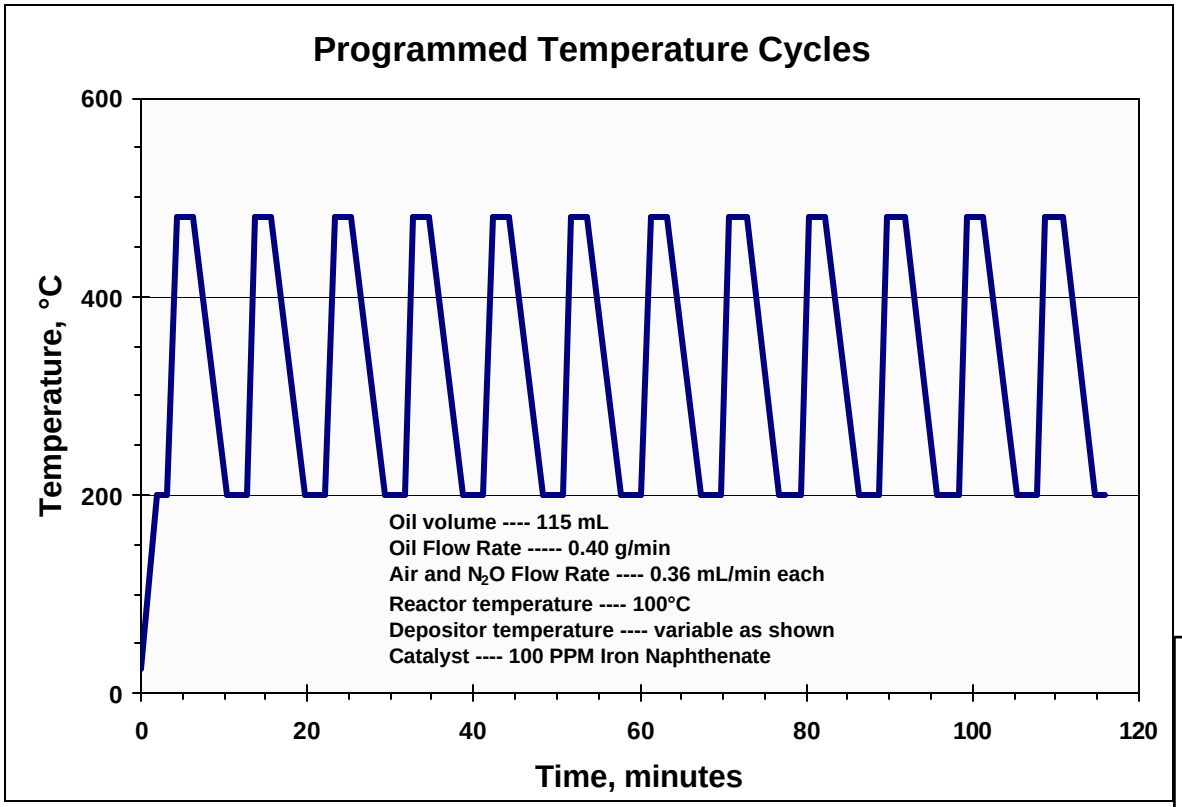
By Ted Selby, Savant Inc.

# Continued Turbo-Coking Studies

• In February presentation background on passenger car turbocoking test development was given. Test has variety of possible modifications: Test duration, sample size, temperatures, catalyst, depositor rod material, flow rate, etc.




Depositor Cell

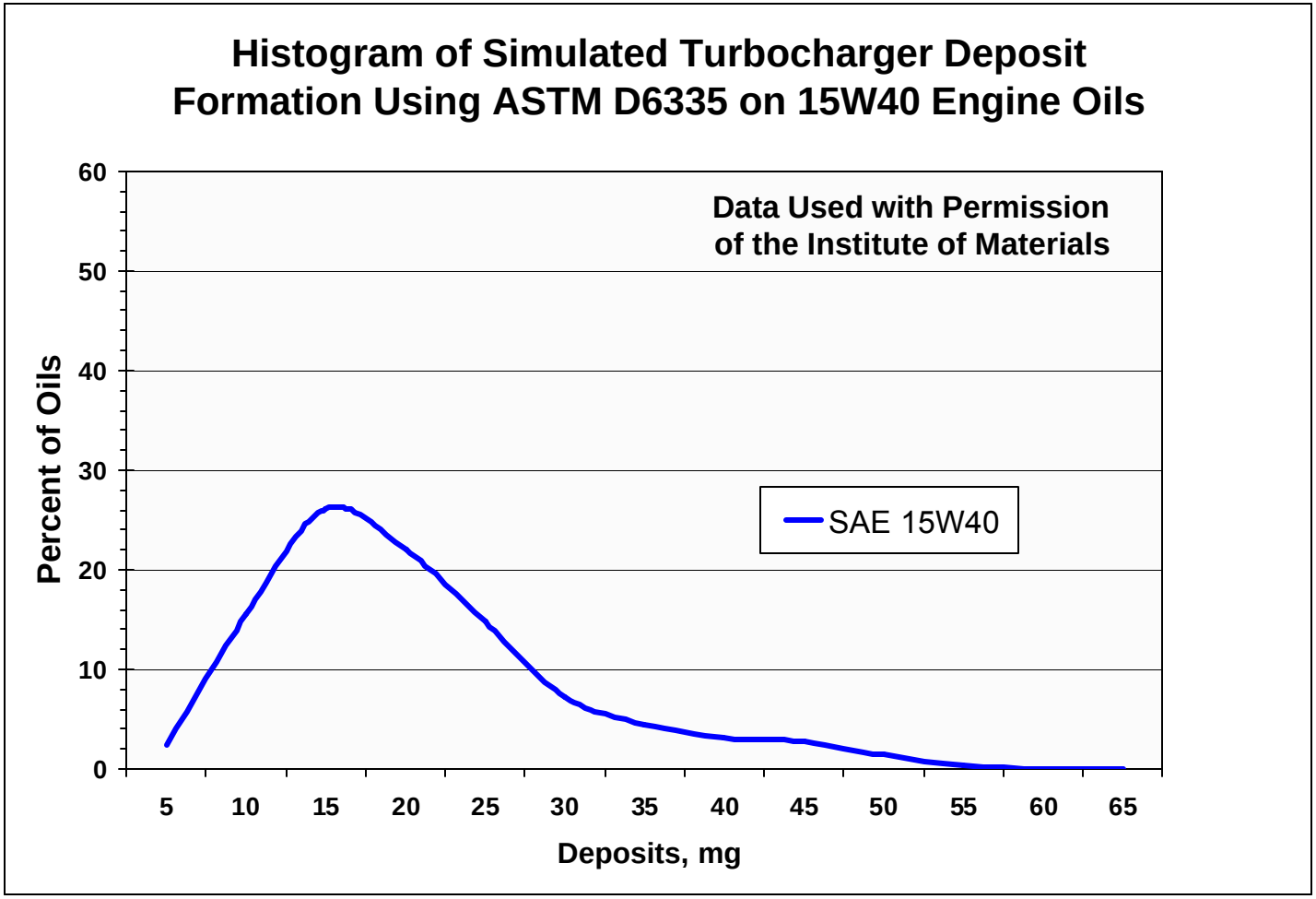



Depositor Temperature-Cycling Program

ATTACHMENT 13, 2 OF 4

# Continued Turbo-Coking Studies

• The resulting test, ASTM D6335, is used in passenger car engine oil specification. Analysis of data on 291 SAE 15W40 in the IOM Database from 1996 to 2002, was reported at the HDEOCP February meeting:




ATTACHMENT 13, 3 OF 4

## Continued Turbo-Coking Studies

• Expectations of several participants at the February meeting that lower deposit levels would be shown by single grade SAE 30 and 40 oils were found to be correct in further study of the IOM data: