

# PC-10 NCET UPDATE

ASTM HDEOCP MEETING

Holiday Inn O'Hare

February 19, 2003

# 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/April 2003

# Aluminum Piston Deposits, Oil Consumption

- CI-4 Requirement
- Caterpillar 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
- Hardware Currently Available

# 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
- ULSD
- 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?
- New Bench Test?
- Matrix?
- HDEOCP Has Formed Task Force

# Closed Crankcase Deposit Control

- European Bench Test?
- New Bench Test?
- Matrix?
- HDEOCP Has Formed Task Force

# Soot Related Viscosity Increase

- Mack T-10 Hardware
- Mack Ring & Liner Wear Test or Other Test?
- CI-4+ Level
- (Separate) Matrix Not Required?

# EGR Soot Related Viscosity Increase

- Same New Mack Test as Soot Related Viscosity Increase
- Mack Ring and Liner Wear Test or Other Test?
- Same Matrix?

# Elastomer Compatibility

- Carryover from CI-4
- EMA to Add One Elastomer Used
- Existing HDEOCP Task Force to Evaluate

# 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?
- HDEOCP Has Formed 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
- HDEOCP Has Formed Task Force to Evaluate Method and Correlation

# Volatility

- NOACK
- 13% Maximum

# Foaming

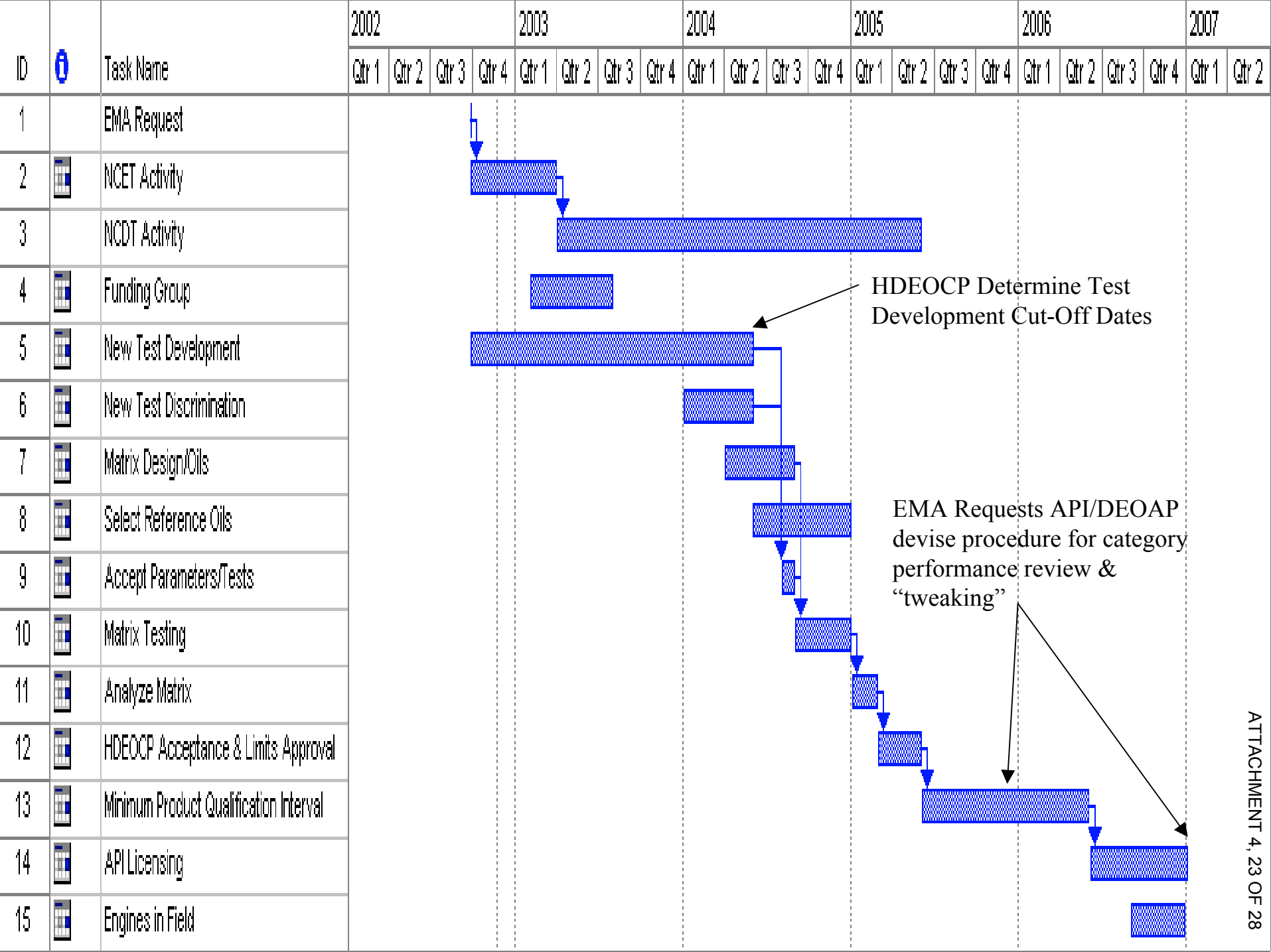
- CI-4 Carryover
- Same Test
- Same Limits

# Chemical Property Limits

- Sulfated Ash Limit
- Phosphorus Limit
- Sulfur Limit
- Limits Required, if Aftertreatment Test Not Developed and Accepted
- EMA to Provide Additional Information ~ April/May 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 for 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 for 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. They are not recommended for use in engines using diesel fuel with higher sulfur content.

# 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 for 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 performance in engines with advanced aftertreatment systems, they may not be suitable for use in pre-2007 engines 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 ✓
- The Category Is Feasible ✓
- Preliminary Timeline Established ✓
- Category language drafted, reviewed by EMA, and accepted, with modifications ✓
- Funding proposal - Funding Group is Being Established & will determine funding method ✓

# NCET Proposal

- NCET, by consensus, supports the request for a new category
- All NCET recommendation elements except funding method have been completed
- EMA will provide test cost estimate
- Funding Group will determine method
- NCET requests DEOAP to forward its recommendation to proceed with category development to API Lubricants Committee