NCWM
Premium Diesel Definition

Informal Focus Group Report

Interim Meeting

January, 2018

Members

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Barbara Goodrich	John Deere
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Dennis Hess	Infineum
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Shailesh Lopes	GM
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Objective

- Update the NCWM Premium Diesel Definition to align fuels with current requirements of the engines and injection equipment

Background

- NCWM Objective is to Develop Meaningful Model Language for Laws and Regulations Concerning “Regular” and “Premium” Diesel Fuel So That These Fuels Can Be Accurately and Clearly Identified Through Dispenser Labeling and Other Means

Current Definition

- Cetane Number: 47 Minimum
- Lubricity: 520 Micron
- Low Temperature Operability: Requiring the ASTM Guideline Using the Tougher LTFT Method
- Stability: 80% Reflectance, 180-Minute Test

Application

NST Handbook 130

- “2.2.1. **Premium Diesel Fuel**. - All diesel fuel identified on retail dispensers, bills of lading, invoices, shipping papers, or other documentations with terms such as premium, super, supreme, plus, or premier must conform to the following requirements.”

Criteria and Process

- Properties should have
  - A functional benefit (with supporting technical data)
  - A standard test method (ASTM or other)
  - Statistically significant difference, if a minimum ASTM specification exists, at least the reproducibility of the test method
- Decisions are made by consensus
- Minority opinion/statements are included in the main report
- This group makes a recommendation only, states make the final decision

Proposed Properties

- Cetane Number, ASTM D613: 47 minimum
  - *ASTM D613 is the referee method; however, the following methods may be used to determine cetane number:*
    - *D6890 (IQT)*
    - *D7170*
    - *D7668*
- Corrosion, NACE TM0172-2015: B+ rating minimum
- Filter Blocking Tendency, ASTM D2068, procedure B: 1.6 maximum
- Injector Deposit, CEC DW-10 B: 2 % maximum power loss
- Low Temperature Operability, Cloud Point, LTFT, or a restricted CFPP: ASTM D975 Guideline
  - *CFPP should be limited to a maximum of 6 C below the cloud point of the fuel.*
- Lubricity Wear Scar Diameter, ASTM D6079: 460-micron maximum

Proposed Application

NST Handbook 130

- 2.2.1. Premium Diesel Fuel. -- All diesel fuels identified on retail dispensers~~, bills of lading, invoices, shipping papers, or other documentation~~ with ~~terms such as premium, super, supreme, plus, or premier~~ **an additional term incorporated directly in the product or grade name that differentiates the fuel and implies the fuel provides properties that exceed minimum specification limits or performance properties** must conform to the following **minimum** requirements.
- ***EXCEPTION NOTE: It is permissible to include a clearly-defined fuel property that has a functional benefit, established test method, and a level, if stated as such. Example is winterized diesel which provides an operability benefit and is discussed in detail in ASTM D975 as a recommended guideline***.

More detail if needed

Categories Considered

- Aromatics
- Cetane Number
- Cleanliness
- Corrosion
- Energy Content
- Filter Blocking Tendency
- Injector Deposit
- Low Temperature Operability
- Lubricity
- Metals
- Stability

Groups

yes/no/abstain

- Ready to go
  - Cetane Number 18/0/1
  - Corrosion 16/0/2
  - Deposit 17/1/1
  - Low Temperature Operability 17/0/1

- Supporting data or decision needed
  - Filter Blocking Tendency 9/7/2
  - Lubricity
    - Drop 2/14/2
    - Keep the same 2/13/3
    - Change to 460 micron 13/4/2
  - Stability 9/4/5

- Do not consider at this point
  - Aromatics
  - Cleanliness
  - Energy Content
  - Metals

Cetane Number

Shawn Broughton

- Benefits were demonstrated previously and is part of the current definition.
- Methods
  - D613 (referee)
  - D6890 (IQT)
  - D7170
  - D7668
- Keep the existing requirement (47)
- New test methods have been added.

Corrosion

Rick Chapman

- OEM's continue to experience corrosion in their diesel fuel systems and report it to be one of their top concerns
- OEM's generally believe that the NACE TM-0172 test suits their needs at a B+ or better rating
- Fuel steel corrosion should be a part of the revised NCWM Premium Diesel Specification
- NACE TM0172-2015, "Determining Corrosive Properties of Cargoes in Petroleum Product Pipelines" is the de facto petroleum industry test and the method preferred by most OEM's
- Premium diesel results in nearly no corrosion.

Injector Deposit

Joan Axelrod

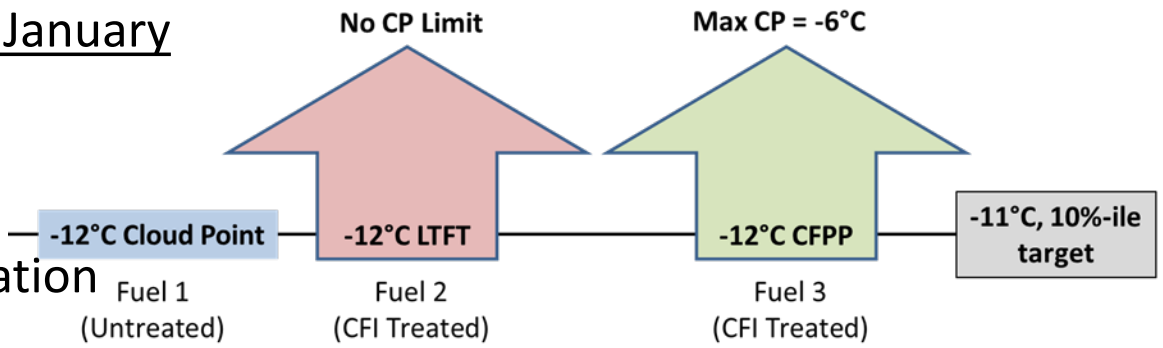
- Benefits
  - Helps maintain or restore lost power and combustion efficiency
  - Reduces deterioration in exhaust gas and particulate emissions
  - Helps prevents premature hardware failure & drivability issues
- Test method to determine additive effectiveness: CEC DW-10B
- Level: <2% power loss in keep-clean mode
- Premium keeps injectors clean
- Additive use can be used as enforcement

Low Temperature Operability

Dennis Hess

- Continue requirement of Cloud Point, LTFT fuel test properties
  - **Add 'restricted CFPP'**
  - (CP-CFPP) $\leq$ 6°C
  - Limiting CFPP to a maximum of 6°C below diesel fuel cloud point aligns LTO protection of HDDs with LTFT
- As for CP or LTFT, 'restricted CFPP' must meet ASTM 10th percentile temperature for the geographic location

  Example: Tennessee in January
- Supporting Data
  - Team Report
  - ASTM Recommendation



Filter Blocking Tendency

Hind Abi-Akar

- Benefits
  - Reduce the occurrence of premature filter plugging on vehicles
  - Support injectors performance and durability
  - Potentially reduce frequent dispensing filter changes at the final dispensing point
- ASTM D2068, procedure B
- Proposed limit ≤1.6

Lubricity

Paul Biggerstaff

- Now in D975
- Injection equipment is the same for regular and for premium
- Choices
  - Drop
  - Keep the same as ASTM but with limit of 550 (average of two tests of the same sample) independent of r and R
  - Change to 460 (513 limit)

Stability

Scott Fenwick

- Benefits
  Longer storage
  Prevents formation of insoluble and Polymers

- Current requirements and method are outdated.

- Proposed Methods and limits
  S15 without biodiesel
    - 60-min min. by D7545 for S15 without biodiesel

  Biodiesel Containing Diesel
    - 8-hr min. induction by EN 15751 for B100 blend stock
      - or
    - 24-hr min. induction by EN 15751 for up to B5
    - 20-hr min. induction by EN 15751 for B6 to B20

- **Supporting Data?**

Aromatics

Hind Abi-Akar

- Affects
  - White Smoke
  - Energy Content
  - Emissions
  - Elastomers
- Fungible fuel, no additive or other ways to adjust
- Cannot be adjusted at the terminal or dispenser
- **DO NOT PURSUE** at this time

Cleanliness

Roger Gault

- Water and particulate levels are important
- Should apply to all diesel fuel
- Methods are available
- Many suggest that 10-micron dispenser filters should be required
- **DO NOT PURSUE** *(Supporting data does not exist to set levels)*

Energy Content

Joan Axelrod

- Cannot be adjusted at the terminal or dispenser
- Biodiesel, renewable diesel, GTL, etc. introduce complication
- **DO NOT PURSUE** at this time

Metals

Shailesh Lopes

- Benefits
  - Protect the catalyst
  - Injector deposit
- After treatment systems are designed anticipating certain efficiency loss due to low levels of metal exposure. Fuel with metal levels below detectable limits **will not translate to customer benefit**.
- Any metal limits if require by the OEMs should be part of the ASTM specifications.
- **DO NOT PURSUE** at this time