



Prepared for:



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The Center for Quality Assurance

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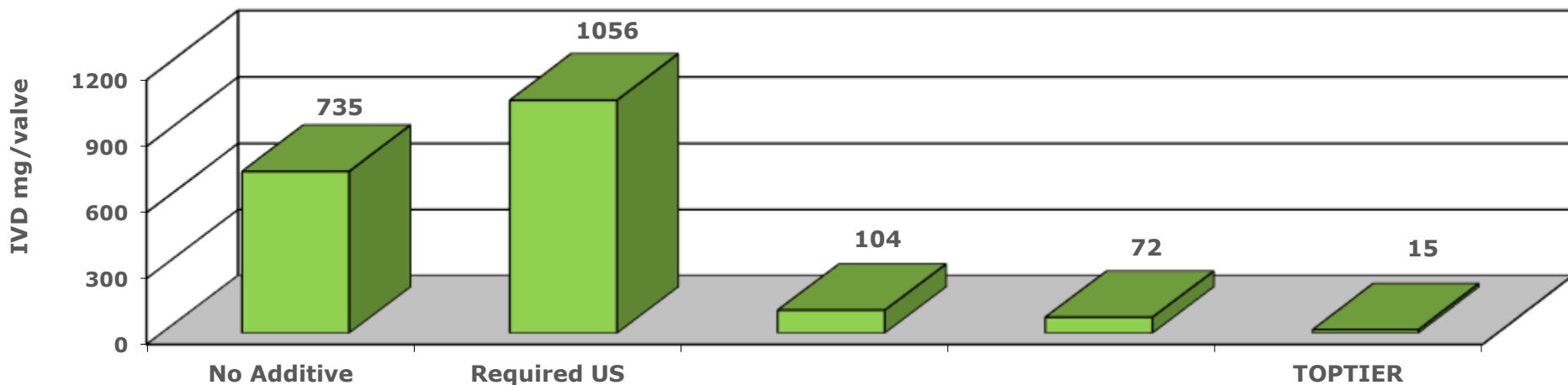
Program Objectives

- Customer satisfaction is the primary goal!
 - Optimal power & performance
 - Optimal maintenance schedule/cost and reduced downtime
 - Consistent engine operation over time
- Same message from Fuel Marketer **AND** Vehicle Manufacturer!
- Fuel quality plays very important role to meet the combined customer and regulatory requirements

The Need for a Detergent Gasoline Program

Gasoline with the U.S. mandated minimum deposit control additive produced higher valve deposits than the same fuel containing no additive in ASTM D6201 Valve Deposit Tests.

100 hr. Keep Clean Cycle in ASTM D6201 (Ford 2.3L Dyno Engine Test)



Increasing Detergency Concentration



History of TOP TIER™

OEMs, working with Fuel Marketers, create a **voluntary** program to address global fuel detergency needs without mandatory **regulation** changes-



EPA Treat Rate
100 hrs.
ASTM D6201

TOP TIER gasoline
100 hrs.
ASTM D6201

Program Start: April 2004

Nine auto company sponsors:



HONDA TOYOTA



Ford Motor Company



Mercedes-Benz



Volkswagen

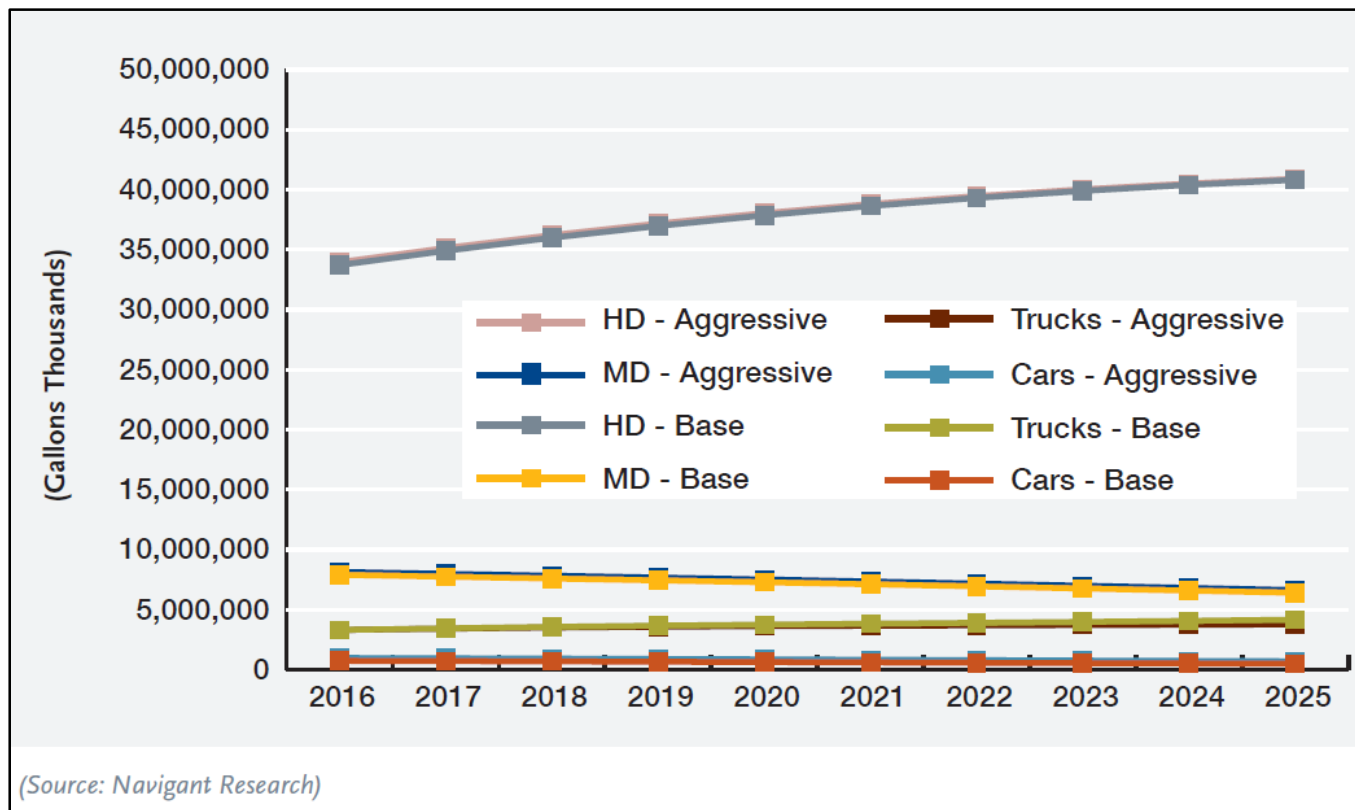


Audi

Development of TOP TIER™ Diesel Fuel



Findings: Diesel and Biodiesel Consumption by Equipment Type, North America: 2016-2025



- **Consumption of diesel & biodiesel expected to increase by 14% and 12% higher than 2016 levels in the Base and Aggressive scenarios**
- *Increase in consumption is expected to be driven primarily by gains made from heavy-duty class consumption*

TOP 11

TRENDS FOR 2017

brought to you by:



Oil Express

3. Support for Additized Diesel Grows

3 SUPPORT FOR ADDITIZED DIESEL GROWS

TOP TIER detergency standards supported by several of the world's major automakers, soon will apply to diesel in addition to gasoline. Officials with the TOP TIER program are finalizing the performance standard and defining the process, according to the Center for Quality Assurance, of Midland, Mich., which administers the licensing process for TOP TIER. Two majors – ExxonMobil and Shell – already have been testing additized diesel.

www.opisnet.com | 301-284-2000

Performance Standard Overview

Benefit >>> Reduces Injector Deposits



#1. Injector Deposits

Benefit >>> Increases Lubricity



#2. Lubricity

Benefit >>> Improves Fuel Stability



#3. Fuel stability

Benefit >>> Cleaner Diesel Fuel



#4. Water and particulate

Overview of TOP TIER™ Diesel Performance Standard

- **Fuel must meet relevant country/regional standards (e.g., ASTM D975 or ASTM D7467) and these additional requirements:**

Property	Test Method	Limit
Oxidation Stability (Rancimat IP method)	EN15751 (Rancimat IP method)	>8 hours for B100 as blend component OR
		>24 hours for up to B5 Biodiesel blend at retail OR
	ASTM D7545 (PetroOxy Test)	>20 hours on > B5 the biodiesel blends at retail
Lubricity	ASTM D6079	> 60 minutes for B0 fuel 460 micron max
Detergency -Injector Cleanliness	DW-10B (CEC F-98-08)	< 2% power loss
	DW-10C (CEC F-110-16) <i>Place holder until approved by CEC</i>	Rating of > 9 on Demerits Scale
	Qualified engine/vehicle test from fuel marketer or additive company to demonstrate performance to prevent IDID deposits	Results on the qualified test as approved by OEM sponsors
	Refueling Station Housekeeping	Water detection media filter or approved water detection process
Water	ASTM D6304	To be monitored during audits
Particulate Contamination, Size Distribution	<i>Retailer dispenser filter</i>	< 10 microns absolute for low speed pumps (30 micron accepted for high flow)
	ISO 4406	To be monitored during audits

NOTE: Additive package will have to pass 'no-harms' testing in addition to above performance requirements with fuel containing biodiesel at highest blend rate, lubricity, conductivity, stability additives tested with each deposit control additive. See official Performance Standard for full details regarding the TOP TIER™ Diesel requirements.

Implementing the program...

- The program technical requirements focus on quality improvements from additives use and dispenser filter media.
- Minimum detergent levels are based on “keep clean” levels.
- Fuel marketers can compare to “the minimum treat rate” in order to differentiate their diesel product offering.
- The program is not designed to sort base diesel or biodiesel fuels.
- Unlike the gasoline program, the diesel program allows the enrollment of site specific retail locations.
- All grades of diesel (No.2 and “additized diesel”) sold at the site must meet the TOP TIER™ Diesel Performance Standard.
- Audit testing will be done by the program.
- Enrolled fuel marketers may use TOP TIER™ logo for advertising.

The logo features the words "TOP TIER" in large, bold, black capital letters. To the left of "TIER" is a blue graphic consisting of two overlapping circles with white spiral patterns inside. Below "TIER" is the word "Diesel Fuel" in a smaller, blue, sans-serif font. A small "TM" trademark symbol is positioned to the upper right of "TIER".

TOP TIER™ Diesel Fuel

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The TOP TIER™ program is managed by:

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