

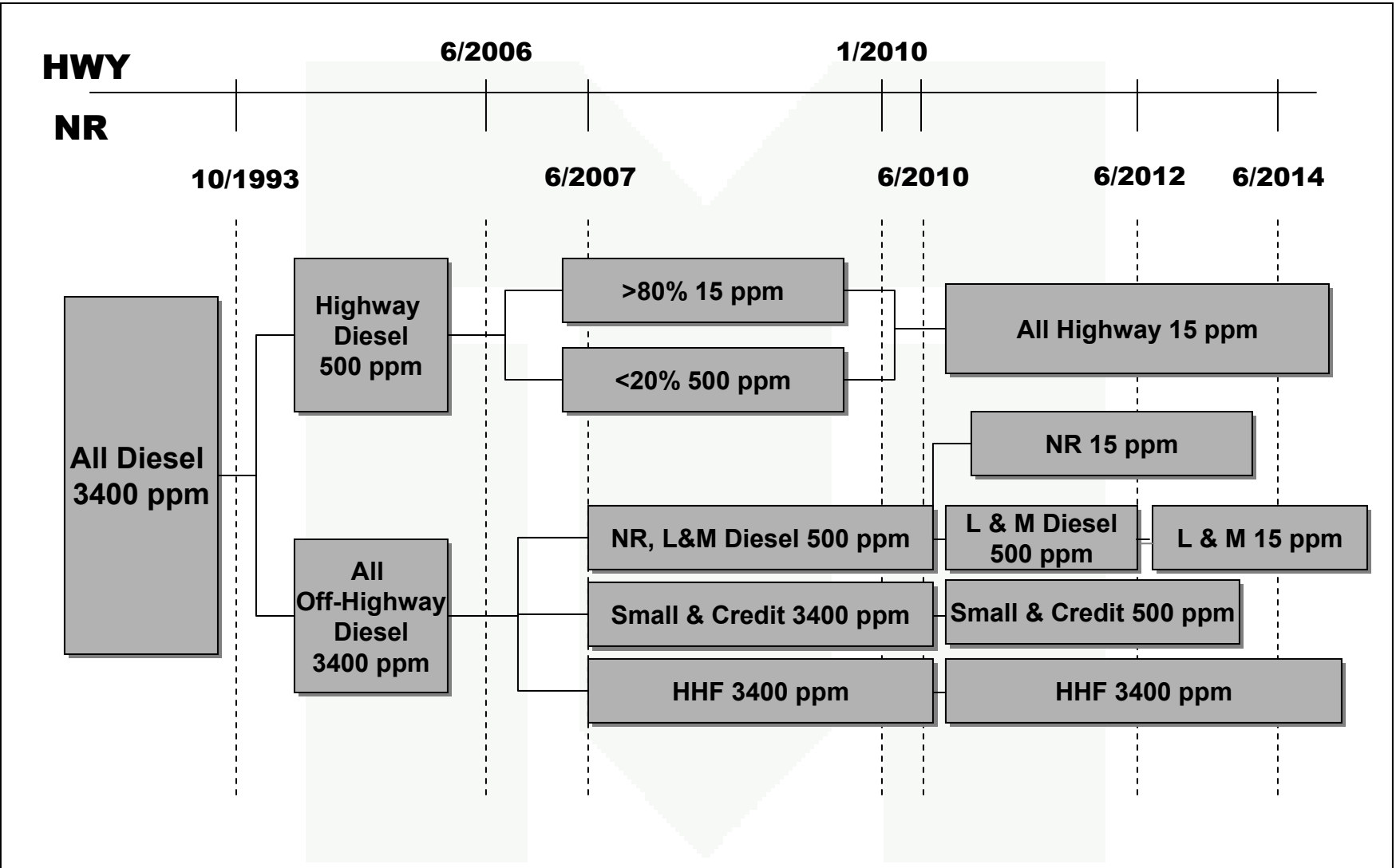


# Ultra Low Sulfur Diesel Discussion



**The Fuel Supply Chain.**

Managing Assets, Distribution and Supply Chain Services





## **ULSD and the Fuel Supply Chain**

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*Terminal and Above*



**The Fuel Supply Chain.**

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## Responsibility in the Distribution

Each entity in the supply chain has a responsibility for product integrity as the product moved through the distribution chain

Refining	Distribution	Terminaling	Transportation	Jobbers & Retail	Consumer
7 – 10 ppm	7 – 10 ppm	10 – 13 ppm	10 – 13 ppm	14 – 15 ppm	15 ppm

In order to provide 15 ppm diesel fuel to the ultimate consumer, the industry must account for some level of contamination at each step of the supply chain



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## Refiners and Importers

Refiners and Importers must produce or import highway diesel fuel meeting the 15 ppm sulfur standard beginning **June 1, 2006**. All highway diesel fuel produced or imported must meet this standard *by June 1, 2010*.

- Highway diesel fuel found at a refinery or import facility with a sulfur content exceeding 15 ppm will be considered to be in violation of the sulfur standard. Determining compliance at the refinery level is not subject to a test tolerance. In downstream sales, EPA will allow an enforcement tolerance of 2 ppm.
- Although the 15 ppm diesel sulfur rule takes effect June 1, 2006, the final rule creates a temporary compliance option called the “production rule.” Under this approach, a refinery or importer may produce up to 20 percent of its total highway diesel fuel at the current 500 ppm sulfur maximum standard until January 1, 2010. Compliance will be determined separately for each refinery.

## At the Terminal Level

On-highway diesel fuel must meet the standard beginning **September 1, 2006**. All highway diesel fuel in the distribution system (excluding retail outlets and wholesale purchasers-consumers) must meet this standard by **October 1, 2010**.

- 500 ppm diesel can still be sold if, for example, it was received by a refinery under the 80/20 “production rule” or if the fuel was downgraded (i.e. terminals can provide 20% of its available supply outside the 15 ppm specification).
- The following maximums may vary depending on the circumstances of the pipeline system, so please check with the relevant pipeline to verify their requirements: Colonial – 8 ppm; Marathon – source- and delivery-point dependent; Buckeye – 8 ppm direct from the refinery and 10 ppm from connecting carrier; Olympic – 8 ppm; Explorer – 8 ppm directly received into Explorer and 7 ppm for Lake Charles and Port Neches origins



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## **ULSD and the Fuel Supply Chain**

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*Below the Terminal*



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## Retail Stations and Wholesale Purchasers-Consumers

These entities must meet the standard by **October 15, 2006**. All highway diesel fuel must meet this standard at retail and wholesale purchaser-consumer facilities by **December 1, 2010**.

- The downstream market may use both 500 ppm and 15 ppm or both until December 2010 provided that the 15 ppm is segregated from the 500 ppm. However, the site must appropriately designate all tanks by **June 1, 2006**.
- If a site is maintaining multiple tanks, the site can deliver 15 ppm fuel to the designated 500 ppm tank without issue prior to December 2010. If a site has a single tank, only 20% of the annual 15 ppm delivered can be put in the 500 ppm tank. The site cannot deliver any 500 ppm into a tank designated as 15 ppm. The site must correctly placard any tank receiving 15 ppm as 15 ppm by **October 15, 2006**.

## Product Transfer Document and Record Keeping

A Product Transfer Document must accompany any transfer of title or custody of diesel and accurately designate the product. Product Transfer Documents (BOL) must be retained for 5 years (either on site or easily accessible to the EPA) and are to include:

- *Name address and facility number of transferor / transferee*
- *Volume*
- *Location and Date*
- *Sulfur Content and Fuel Designation*
- *Dyed or Non-Dyed*

We would advise that the site keep detailed records on transitioning the tanks from 500 ppm to 15 ppm.

If there is any product downgrading (either 15ppm to 500ppm or 500ppm to 15ppm), it is the end-user's responsibility to keep records on when the downgrading occurred.



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## **Fleet Demand at Retail and Wholesale Purchasers- Consumers**

Retailers and consumers selling / consuming diesel fuel must specifically designate the tank as either 15 ppm or 500ppm by attaching the following notice in block letters no less than 24 point type in a color contrasting with the background:

### **ULTRA-LOW SULFUR HIGHWAY DIESEL FUEL (15 ppm Sulfur Maximum)**

Required for use in all model year 2007 and later highway diesel vehicles and engines

Recommended for use in all diesel vehicles and engines

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### **LOW SULFUR HIGHWAY DIESEL FUEL (500 ppm Sulfur Maximum)**

#### **WARNING**

Federal Law prohibits use in model year 2007 and later highway vehicles and engines

Its use may damage these vehicles and engines

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### **NON-HIGHWAY DIESEL FUEL (May Exceed 500 ppm Sulfur)**

Federal law *prohibits* use in highway vehicles or engines

Its use may damage these vehicles and engines



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## The Question of Multiple Tanks

If, for example a site has no 2007 engines, has demand for both 500ppm and 15ppm, and the market will support the consistent delivery of both products to the site. Is there any flexibility with regard to which tank a load of 15ppm is delivered?

- Assuming that there are no 2007 engines on site (which would require 15ppm to operate), the load of 15ppm **could** only be delivered to the tank designated as 500ppm up to 20% of the annual site volume.
- It is important to note that a load of 500ppm **could not** be delivered into the tank designated as 15ppm. Doing so would put the site out of compliance and require the 15ppm tank to be turned / cleaned until all fuel pumped meets the ULSD standard.
- Should a load of 500ppm be delivered to a 15ppm tank, the **site must change the tank designation to 500ppm** until product pumped from the tank meets the ULSD standard. Once the product meets the ULSD standard, the placard can be changed back to 15ppm.



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## Fleet Owners and Final Consumers

All highway diesel fuel must meet this standard by **December 1, 2010**. All 2007 and later engine year diesel-fueled vehicles must run on ULSD.

- While Fleet owners may use both fuel types, to avoid costly engine maintenance (\$8,000 emissions control components) bulk tanks would have to be either completely converted to ULSD, or designate and maintain multiple tanks
- Should tanks be designated as 15 ppm, the owner is subject to the same requirements as the retailer – i.e. they must be able to meet the presumptive liability standard -

*The site is assumed to be in violation of the ULSD standard unless it can show the following:*

- The site did not cause the contamination
- Product transfer documents (BOL) account for fuel found in violation demonstrate that the product was in compliance when it was received by the site

## An Example for Fleet Owners

The EPA samples diesel from a site tank that has a 15 ppm designation and finds the sulfur content to be 28 ppm.

### **The site is assumed liable unless it can demonstrate:**

1. The site did not cause the violation; and
2. The product transfer document received by the carrier (BOL) is designated to be 15 ppm

If the site is able to show the above, the EPA will most likely investigate the carrier, distributor, terminal, and / or refinery. This same presumptive liability defense is available to each of these upstream entities.



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## **ULSD and the Fuel Supply Chain**

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*Product Handling*



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## Product Handling: Refinery Issues

What to expect at the refinery level . . .

- Multiple sulfur levels increases risks and capital costs
- Market uncertainty pushes production to ULSD
- Limited tankage reduces ability to react to changing or developing market conditions



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## Product Handling: New Pipeline Practices and Procedures

Modification to assets and procedures will be dependent on the complexity of the operation

- Product sequences will be altered
- Managing interfaces will be adjusted
- Manifolds will be redesigned
- Additional transmix tanks will be constructed
- Valves will be replaced

These changes will result in cost increases to the end consumer.



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## Product Handling: Terminal Issues

At the terminal level . . .

- More protection required for provers, meters, sumps and manifolds
- Fewer outlets for slightly off-spec products
- Greater risks require greatly expanded testing programs
- Record keeping increases in importance
- The terminal's data are viewed as a check valve for downstream NOV's
- Rack tanks currently in high sulfur service will not need special cleaning prior to receipt of ULSD
- The data indicate that even with conservative cut points, only 5% to 7% of the ULSD batch will have to be downgraded
- Significant sulfur contamination potential exists at the tank truck level



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## Product Handling: Risk Minimization Strategies

To effectively mitigate risk . . .

- Simplify operations
- Upgrade current assets and make capital investments
- Revise operating plans
- Establish or expand testing programs



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## **ULSD and the Fuel Supply Chain**

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*The Role of Biodiesel*



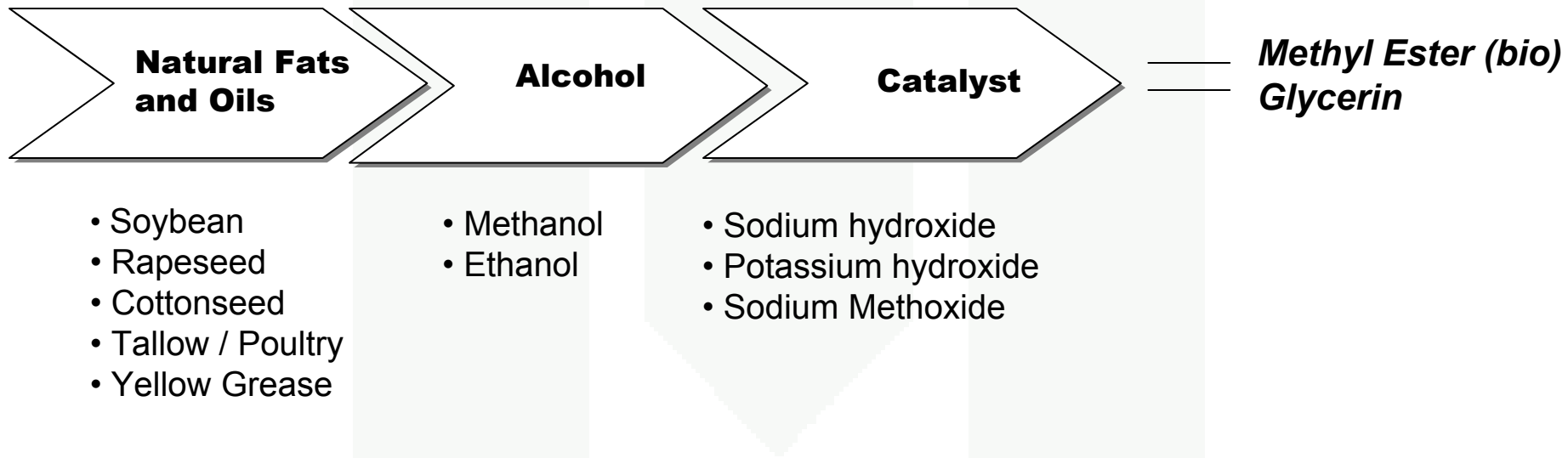
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## Biodiesel: What is it?

A clean burning, oxygenated diesel fuel made from vegetable oils or animal fats that is blended with, or burned as diesel fuel.

## Biodiesel: How is it made?

By reacting alcohol with natural fats, oils or greases through a conventional chemical process known as *transesterification*.



## Benefits of Biodiesel at the Terminal

The role of biodiesel . . .

- Lubricity additive for ULSD
  - ~ .05% to 2% to meet High Frequency Reciprocating test standard for lubricity (generally accepted 2%)
- Conductivity improvement
  - ~ ULSD has poor electrical conductivity creating a safety concern. Tests have shown conductivity additives to be marginally effective. Biodiesel greatly improves ULSD conductivity
- Offspec ULSD
  - ~ Biodiesel contains virtually no sulfur and can be blended with offspec ULSD to bring it back into spec
- Renewable Fuel Standard
  - ~ Biodiesel can help the majors fulfill their 7.5 billion gal Renewable Fuels Standard requirement



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## Additives vs. Biodiesel

Beyond product performance . . .

### **Conventional Additives**

- Attractive handling characteristics
- Lower storage requirements
- Use of existing handling systems
- Optimization management
- Ratable economics

### **Biodiesel**

- Feedstock dependent handling temperatures
- Larger capacity storage, heat requirements
- Overall infrastructure requirements
- Who will optimize dosing
- Economic volatility
- Supply considerations to treat national diesel fuel



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## Conductivity Overview

Quick description . . .

- In pre-2006 diesel there was a broad spectrum of conductivity, 1 to about 50 pS/m. Generally this prevented catastrophic situations. Conductivity of ULSD is expected to be very low, <1 pS/m, with the absence of additives (picosiemens per meter).
- The conductivity of a fuel is a measure of the ability of a fuel to dissipate static electric charge. The colder the temperatures the more likely the concern.
- ASTM 2624, Standard Test Methods for Electrical Conductivity of Aviation and Distillate Fuels.
- NBB has authorized the release of funds to explore the potential impact that biodiesel would have as a conductivity improver.



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## Ensuring Product Quality

Given the variety of feedstock sources, business processes, and methods of delivery it is important that the industry create and maintain quality standards. BQ 9000 status certifies that all biodiesel produced or delivered by the BQ 9000 entity meets the ASTM D 6751 standard.

Objectives	Accreditation	Audits	Ballots
<ul style="list-style-type: none"> <li>• To promote commercial success of biodiesel</li> <li>• Assure biodiesel is produced and maintained at the industry standard – ASTM D 6751</li> <li>• To avoid redundant testing throughout the production and distribution system</li> </ul>	<ul style="list-style-type: none"> <li>• Two accreditations are possible:               <ul style="list-style-type: none"> <li>– BQ-9000 Accredited Producer</li> <li>– BQ-9000 Certified Marketer</li> </ul> </li> <li>• BQ-9000 accredits companies</li> <li>• BQ-9000 <b>does not</b> accredit fuel               <ul style="list-style-type: none"> <li>– No such thing as BQ 9000 biodiesel</li> <li>– BQ-9000 does ensure ASTM D 6751</li> </ul> </li> <li>• There is no logo for accredited producer</li> <li>• There is a logo for a certified marketer</li> </ul>	<p><u>Accredited Producers</u></p> <ol style="list-style-type: none"> <li>1. Huish Detergents</li> <li>2. World Energy</li> <li>3. AGP</li> <li>4. Soymor</li> </ol> <p><u>Certified Marketers</u></p> <ol style="list-style-type: none"> <li>1. TransMontaigne</li> <li>2. Western Petroleum</li> <li>3. Peter Cremer</li> <li>4. World Energy</li> </ol>	<ul style="list-style-type: none"> <li>• Improvements to D 6751</li> <li>• Incorporation of up to 5% biodiesel into the petrodiesel ASTM standard D 975</li> <li>• New stand alone specification for a finished B 20 blend</li> </ul>



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## Conclusion

### Concluding Statement

- ULSD is expected to be widely available in all markets, though short lived disruptions may be experienced during the conversion period.
- Refiners added costs, excluding capital recovery, for ULSD supply are expected to be \$1.0 - \$1.5 cpg plus any added tariff for ULSD
- Refiners capital costs will range from \$2 - \$4 cpg of ULSD produced
- Increased capital costs will be absorbed by terminals and pipelines. These costs will ultimately be passed through to the end consumer



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## For More Information:

- A complete copy of the ULSD rule can be found at [www.epa.gov/otaq/diesel.htm#hd2007](http://www.epa.gov/otaq/diesel.htm#hd2007)
- Information on the diesel workshops and the Diesel Fuel Questions and Answers document can be found at [www.epa.gov/cleandiesel](http://www.epa.gov/cleandiesel)



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## **ULSD and the Fuel Supply Chain**

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*Engine Fact Sheet and Mobile Refueling*



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## ULSD Engine Fact Sheet

### What is on the horizon for 2007 engines?

The design and performance of 2007 engines is based on the use and availability of Ultra Low-Sulfur Diesel (ULSD) fuel. Changes to all major manufacturers' engines include the addition of a diesel particulate filter (DPF) that will be used to trap particulate matter and burn this matter into ash. This ash is to be cleaned from the DPF, as mandated by the EPA, at no less than 150,000 miles but many manufacturers are expecting the life-cycle of their filters to be twice that if used in conjunction with ULSD fuel.

### What happens if you use old fuel in vehicles with 2007 engines?

Occasional or emergency use of high-sulfur fuel in the new engines should not be a problem. It is recommended that you fill up using the least amount necessary to get you to a location that provides ULSD. If used repeatedly, the old fuel could potentially poison the catalysts and DPF causing them to be ineffective and requiring maintenance in advance of planned cleanings. If clogging of the DPF occurs before the 150,000-mile EPA mandate, it is expected that you will have to file a lengthy justification with the EPA noting the reasons for premature cleaning.

### Will the ULSD work in current (pre-2007) engines?

Yes. Engines now in service will experience a 2% to 4% decrease in fuel efficiency. Early testing has shown an increase in fuel filter problems related to the solvency of ULSD in addition to engine seal elasticity issues.

### Will ULSD fuel provide enough lubrication to prevent mechanical problems in current and new engines? What about seal elasticity?

ULSD's effect on seal elasticity has been engine manufacturers' biggest concern. Due to inconsistent lubrication of ULSD fuel by suppliers, increased instances of seal deterioration have occurred among all engines. New state and federal requirements will standardize the lubricating qualities of ULSD but to make sure of fuel quality, truck owners can request from their suppliers a certificate of analysis of the fuel that proves that lubricity was measured and meets the American Society for Testing Standards (ASTM) threshold.

### Will fuel maintenance (necessary in current vehicles using high-sulfur fuel to prevent fuel gelling, water in fuel, lubricity/friction) be the same when ULS fuel is used?

Yes, maintenance of fuel will remain important to prevent these common problems.



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## **Small Tank and Mobile Refueling Fact Sheet**

### **Customers Requiring Mobile Refueling**

The industry is showing that dedicated equipment and/or compartments for mobile refuelers will be the norm. Mobile refuelers are treated as retailers and are liable for the introduction of noncompliant fuel into a vehicle either by condoning misfueling or causing it by improper pump labeling and other practices.

### **Mobile Refueling Recommendations**

Customers that introduce 2007 engines to their fleets should move to ULSD as their sole source of product in order to eliminate confusion for mobile refuelers.

Customers should affix warning labels in the windshield and on the fuel cap that instruct mobile refuelers as to which fuel is required for the vehicle.

### **Customers Requiring Mobile LTL Services**

All storage tanks greater than 550 gallons are considered to be for Wholesale Purchaser-Consumer use and must be labeled in accordance with all applicable EPA ULSD rules and regulations (previously referenced). Mobile refuelers are required to deliver an accurate product transfer document to the customer. It is the responsibility of the customer to make sure that PTD is received and filed for compliance.



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