Low Emissions Synthetic Fuels

(Lansol SP 50)

By

Gregory T Orrell

Lancer - UGF Group

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Who are we and what do we do?

- Founded in 1978.
- System and fuel application patent.
- Specializing in complex, niche petrochemical markets.
- Our main goal is to work with Environmental, Material and Safety Engineers to achieve compliance.
- Cost effective, mine specific, applications.
- Helping our customers understand Petrochemicals.

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The Problem
"Why we are here"

- Diesel fuel is derived from crude oil.
- Very complex hydrocarbon $C_9 - C_{22}$.
- Variations in crude oil.
- What we have in diesel fuel.
- What we don't want in diesel fuel.

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Engine Effects
Diesel vs Lansol SP 50

Diesel

- Hydrocarbon Mixture
- Density
- Viscosity
- Cetane Number
- H/C Ratio
- Heat of Combustion
- Lubricity
- Aromatics

Lansol SP 50

- Highly Paraffinic
- Density
- Viscosity
- Cetane Number
- H/C Ratio
- Heat of Combustion
- Lubricity
- Aromatics

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Diesel Fuel vs. Synthetic Fuel

Property	Conventional Diesel	Synthetic Diesel
BTU/lb	18330	18900
Cetane	40-45	70-80
Aromatics, %	20-35	0
CFPP, °C	0 to -20	<-30
Sulfur, ppm	Up to 500	0
Ash, %	Up to 0.01	<0.001
Viscosity, cSt	~2.5 to 3.5	2.05
Flash Point, °F	130 to 150	150

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Colonial Pipeline vs. Lansol SP 50

Property	**Colonial Pipeline No. 2D**	**Lansol SP 50**
API Gravity, min	**30**	**48**
Flash Point, °C	**130**	**150**
Viscosity, cP min	**1.9**	**2.05**
Sulfur, ppm max	**470**	**10**
Aromatics, vol. % max	**31**	**.001**
CFPP, °C max	**-10**	**-35**
Ash, wt% max	**.01**	**.001**
Ramsbottom carbon, % max.	**.35**	**.01**

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Emissions Results
Average Over the ISO 8178 Test Cycle

Emission Fuel	Diesel Fuel	SP 50 Grade 200
CO_2 , ppm	**6**	**5.5**
CO, %	**120**	**97**
NO, ppm	**465**	**391**
NO2, ppm	**47**	**36**
PM, gr/hr	**13.99**	**10.17**
WPM, gr/hr	**2.0985**	**1.5255**

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Test Results
Average % of Reduction

Emissions	% Reduction from No. 2D
CO	11
CO_2	8
NO	15
NO_2	22
PM	30
WPM	30

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MSHA Isuzu ISO 8178 Weighted Average Modal Emissions

Emissions/Fuel	No. 2D	SP 50	Benefit, %
NO, gr/hr	129.2	109.8	15.0
NO2, gr/hr	18.9	15.3	19.2
CO2, gr/hr	26460.6	24417.4	7.7
CO, gr/hr	30.6	27.4	10.6
Modal Particulate Emission gr/hr	9.1	6.3	31.1

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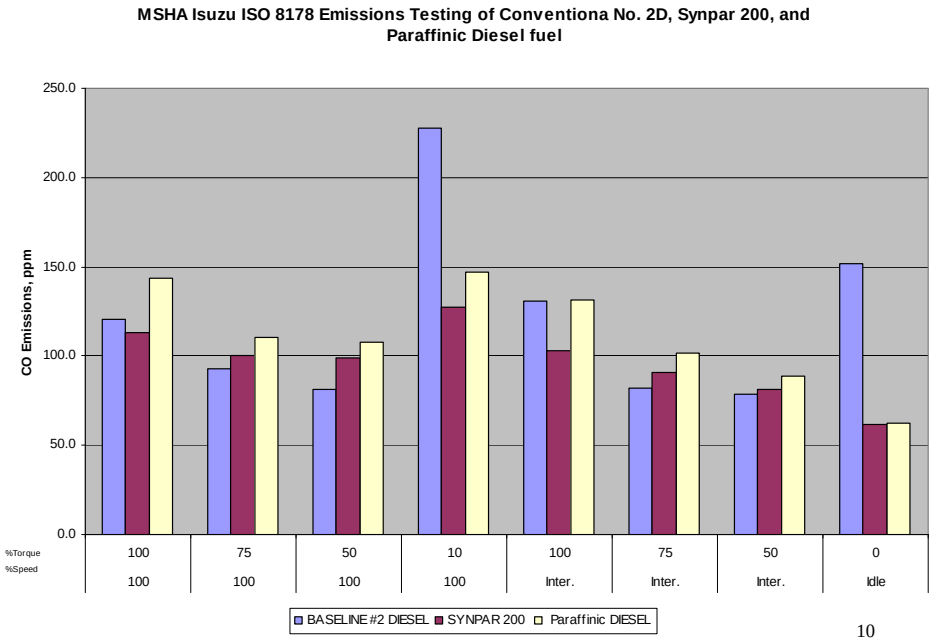

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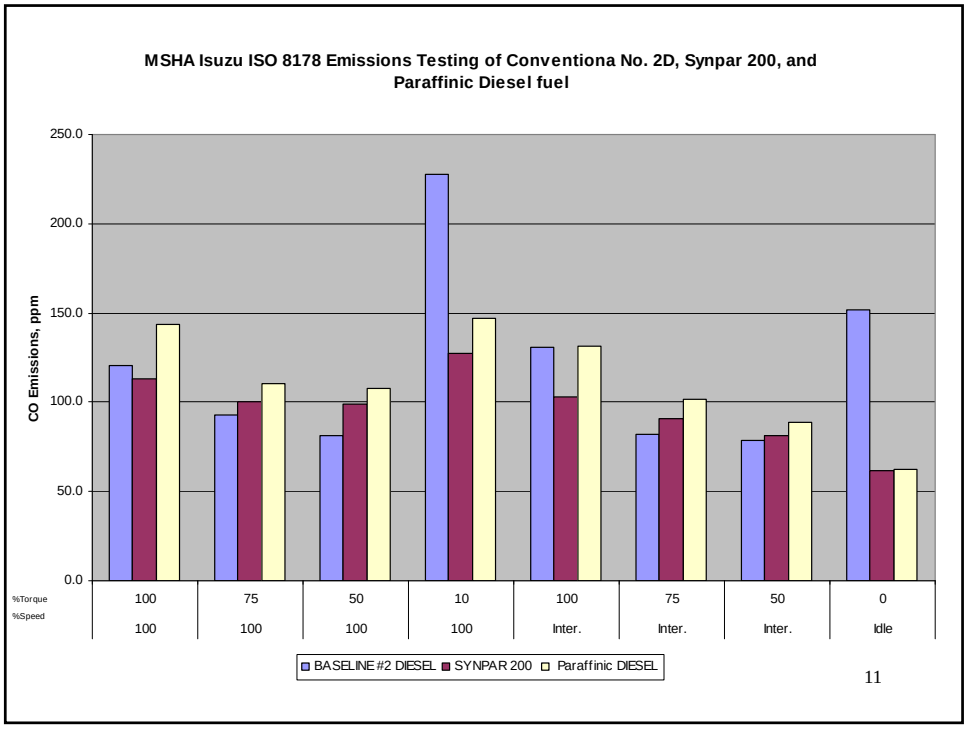
MSHA Isuzu ISO 8178 Emissions Testing of Conventiona No. 2D, Synpar 200, and Paraffinic Diesel fuel
CO Emissions, ppm
250.0
200.0
150.0
100.0
50.0
0.0
%Torque
%Speed
100 100
75 100
50 100
10 100
100 Inter.
75 Inter.
50 Inter.
0 Idle
BASELINE #2 DIESEL
SYNPAR 200
Paraffinic DIESEL
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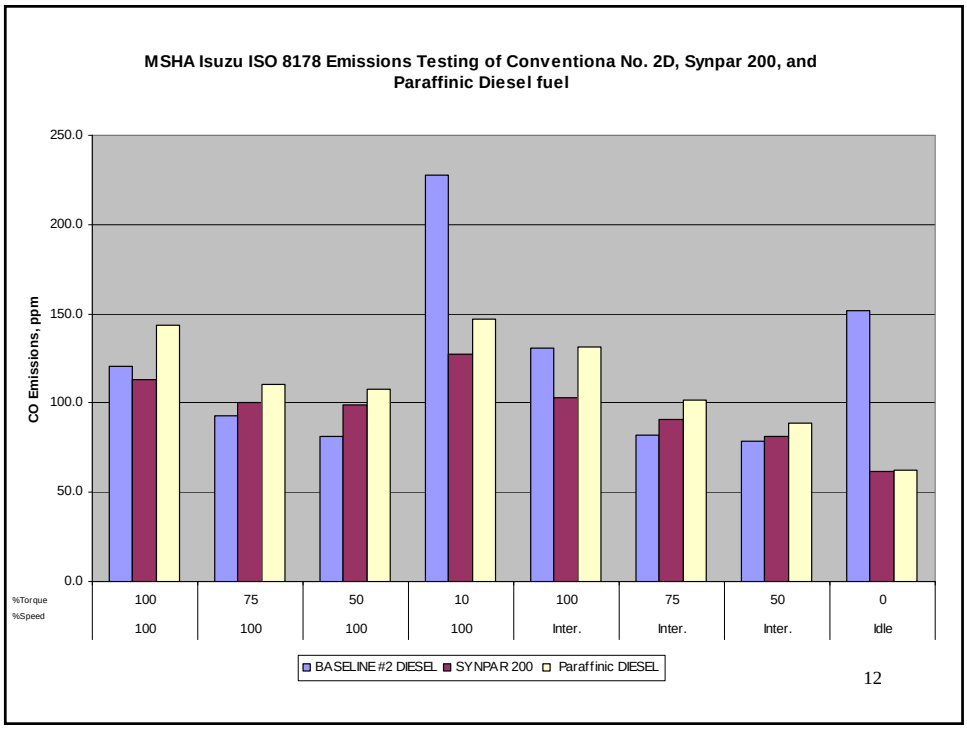
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50 Inter.
0 Idle
BASELINE #2 DIESEL
SYNPAR 200
Paraffinic DIESEL
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Test Results
Reduction in Elemental Carbon

- Mode 1…….23.61%
- Mode 2…….39.96%
- Mode 5…….38.33%
- Mode 6…….32.17%
- Average reduction in Elemental Carbon 33.52%

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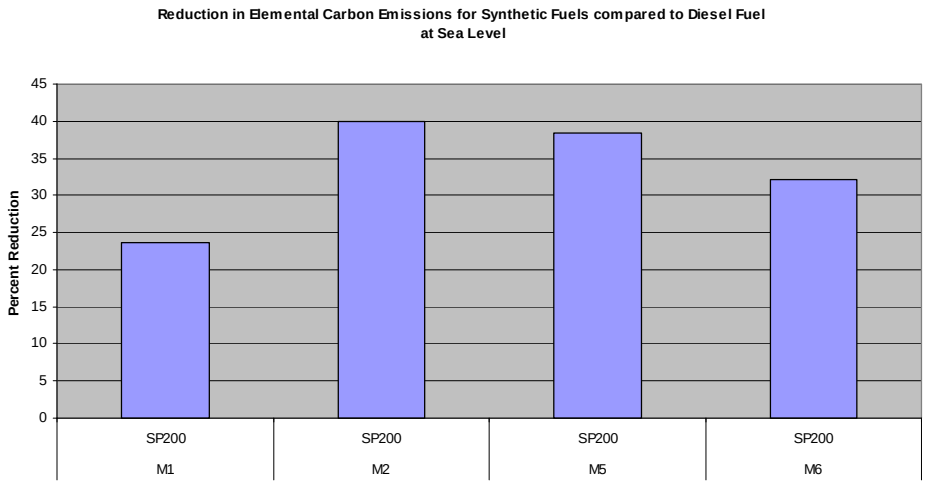

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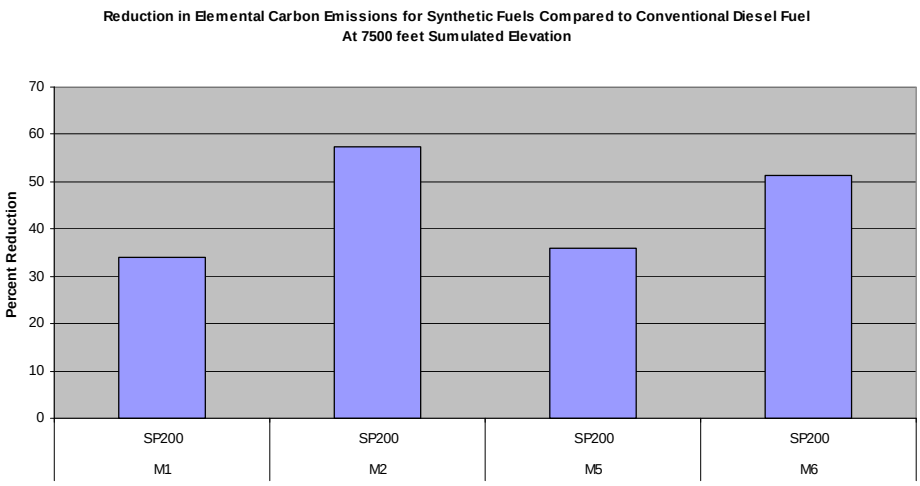

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Durability Demonstration of Synthetic Diesel Fuels

- National Renewable Energy Laboratory
  - Testing of Shell GTL diesel fuel in delivery vehicles
- Shell Global Solutions
  - Shell Testing of GTL Blends with ULSD
  - http://www.osti.gov/fcvt/deer2005/Cherrilloposter.pdf
  - http://www.worldfuels.com/sample.php?GTLN
- Daimler-Chrysler Sun diesel
  - http://www.daimlerchrysler.com/Projects/c2c/channel/documents/682135_hightechreport_01_2005_sundiesel_e.pdf

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Additive Package
Premium Multifunctional Product

Features	Benefits
Lubricity fuel improver……..	Extend life of pump and injectors
CFPP performance……..	More reliability of operative
	Reduce Kerosene blending
Moisture control……..	Extends filter life
	Reduce downtime and maintenance cost
Stabilizer/Corrosion inhibitor……..	Extends filter life
	Reduce corrosion in fuel system
Detergent…….	Enhance complete combustors
	Increase power
	Improve engine performance

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Why Use Lansol SP50

- Reduce emissions.
- Patent Application.
- Engine emissions determine what maintenance is needed.
- Equipment is more reliable.
- Cost savings
  - Ventilation rate
  - In some cases, no after market filters
- Cleaner environment.

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Questions

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Acknowledgements

- MSHA- For providing the fuel testing and results on the Lansol SP 50
- NIOSH- For providing the testing of the sample collected by MSHA of the EC/OC
- Lubrizol – For providing the Additive Package

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