Ultra Low Sulfur Diesel Fuel For Use In Locomotive Marine

The objective of this program was to explore a combination of advanced injection control and urea-selective catalytic reduction (SCR) to reduce the emissions of oxides of nitrogen (NOx) and particulate matter (PM) from a Tier 2 off-highway diesel engine to Tier 3 emission targets while maintaining fuel efficiency. The engine used in this investigation was a 2004 4.5L John Deere PowerTechTM; this engine was not equipped with exhaust gas recirculation (EGR). Under the original CRADA, the principal objective was to assess whether Tier 3 PM emission targets could be met solely by increasing the rail pressure. Although high rail pressure will lower the total PM emissions, it has a contrary effect to raise NOx emissions. To address this effect, a urea-SCR system was used to determine whether the enhanced NOx levels, associated with high rail pressure, could be reduced to Tier 3 levels. A key attraction for this approach is that it eliminates the need for a Diesel particulate filter (DPF) to remove PM emissions. The original CRADA effort was also performed using No. 2 Diesel fuel having a maximum sulfur level of 500 ppm. After a few years, the CRADA scope was expanded to include exploration of advanced injection strategies to improve catalyst regeneration and to explore the influence of urea-SCR on PM formation. During this period the emission targets also shifted to meeting more stringent Tier 4 emissions for NOx and PM, and the fuel type was changed to ultra-low sulfur Diesel (ULSD) having a maximum sulfur concentration of 15 ppm. New discoveries were made regarding PM formation at high rail pressures and the influences of oxidation catalysts and urea-SCR catalysts. These results are expected to provide a pathway for lower PM and NOx emissions for both off- and on-highway applications. Industrial in-kind support was available throughout the project period. Review of the research results were carried out on a regular basis (annual reports and meetings) followed by suggestions for improvement in ongoing work and direction for future work. A significant portion of the industrial support was in the form of experimentation, data analysis, data exchange, and technical consultation.

Please note that the content of this book primarily consists of articles available from Wikipedia or other free sources online. Pages: 78. Chapters: Asphalt, Kerosene, Diesel fuel, Lubricant, Paraffin, Bitumen, Gasoline, Petrochemical, Common ethanol fuel mixtures, E85, Ultra-low-sulfur diesel, Fuel oil, Cutting fluid, Naphtha, Fuel tax, Petroleum jelly, Mineral oil, Castrol, Heating oil, Petroleum naphtha, Kerogen, 2007 UK petrol contamination, Oxygenate, Elf Aquitaine, Shell V-Power, Microcrystalline wax, Petroleum product, Motul, Top Tier Detergent Gasoline, Naphthenic acid, Bardahl, Gasoline additive, Instrumentation in petrochemical industries, Drip gas, Resinol, Mazut, Shell Rotella T, Tractor vaporising oil, Petroleum ether, Cannel coal, Retene, Techron, Louis Pierre Ancillon de la Sablonniere, Opal, Cosmoline, Products based on refined oil, Cadalene, Product Transfer Security, Petroleum resin, Dilbit, Lead Replacement Petrol, Naphthenic oil, Techroline, Texas Low Emission Diesel standards, White gas, Petrox, Tactrol, Ampelite, Keroselene.

While sulfur in diesel fuels helps reduce friction and prevents wear and galling in fuel pump and injector systems, it also creates environmental pollution in the form of hazardous particulates and SO2 emissions. The environmental concern is the driving force behind industry's efforts to come up with new alternative approaches to this problem. One such approach is to replace sulfur in diesel fuels with other chemicals that would maintain the antifriction and antiwear properties provided by sulfur in diesel fuels while at the same time reducing particulate emissions. A second alternative might be to surface-treat fuel injection parts (i.e., nitriding, carburizing, or coating the surfaces) to reduce or eliminate failures associated with the use of low-sulfur diesel fuels. This research explores the potential usefulness of a near-frictionless carbon (NFC) film developed at Argonne National Laboratory in alleviating the aforementioned problems. The lubricity of various diesel fuels (i.e., high-sulfur, 500 ppm; low sulfur, 140 ppm; ultra-clean, 3 ppm; and synthetic diesel or Fischer-Tropsch, zero sulfur) were tested by using both uncoated and NFC-coated 52100 steel specimens in a ball-on-three-disks and a high-frequency reciprocating wear-test rig. The test program was expanded to include some gasoline fuels as well (i.e., regular gasoline and indolene) to further substantiate the usefulness of the NFC coatings in low-sulfur gasoline environments. The results showed that the NFC coating was extremely effective in reducing wear and providing lubricity in low-sulfur or sulfur-free diesel and gasoline fuels. Specifically, depending on the wear test rig, test pair, and test media, the NFC films were able to reduce wear rates of balls and flats by factors of 8 to 83. These remarkable reductions in wear rates raise the prospect for using the ultra slick carbon coatings to alleviate problems that will be caused by the use of low sulfur diesel and gasoline fuels. Surfaces of the wear scars and tracks were characterized by optical and scanning electron microscopy, and by Raman spectroscopy.

An off-road direct injection diesel engine equipped with a continuous-regeneration diesel particulate filter (DPF) was subject to two sets of experiments in which two fuels, ultra low sulfur diesel (ULSD) and 20 vol. % biodiesel blend (B20) were compared. In the first set of experiments lubricant oil consumption was measured by sulfur tracing. Results revealed a suggestive trend but not statistical confirmation of greater lubricant oil consumption with B20 fuel blend. In the second set of experiments nanoparticle formation downstream of the DPF was assessed. It was found that number concentration of nanoparticles released from the catalyzed DPF depends on fuel type and on engine operating condition and hence the onset of filter regeneration. For low soot loading times B20 fueling produces lower number concentrations, whereas longer soot loading times produce lower number concentrations with ULSD fueling.

Technical Amendments to the Highway and Nonroad Diesel Regulations (US Environmental Protection Agency Regulation) (EPA) (2018 Edition) The Law Library presents the complete text of the Technical Amendments to the Highway and Nonroad Diesel Regulations (US Environmental Protection Agency Regulation) (EPA) (2018 Edition). Updated as of May 29, 2018 EPA is taking direct final action to correct, amend, and revise certain provisions of the Highway Diesel Rule, and the Nonroad Diesel Rule. This action corrects additional errors and omissions from the previous rules, and it makes minor changes to the regulations to assist entities with regulatory compliance. This action also makes technical amendments that resulted from discussions with various diesel stakeholders. These technical amendments will: provide a temporary increase in the sulfur testing tolerance, revise the designate and track provisions to account for non-petroleum diesel fuels (i.e., biodiesel) and fuel that meets the California Air Resources Board's diesel fuel standards, and amend the alternative defense provisions to account for conductivity additives and red dye. This action is intended to help facilitate compliance with the diesel fuel regulations and ensure a smooth transition to ultra low sulfur diesel fuel. This book contains: - The complete text of the Technical Amendments to the Highway and Nonroad Diesel Regulations (US Environmental Protection Agency Regulation) (EPA) (2018 Edition) - A table of contents with the page number of each section

A monochromatic wavelength dispersive X-ray fluorescence (MWDXRF) technique has been successfully developed for measuring low-level sulfur in fuel. In this technique, two doubly curved crystal (DCC) optics were used to provide monochromatic excitation and fixed channel wavelength dispersive analysis. Using highly efficient DCC optics, compact bench top MWDXRF analyzers for sulfur analysis have been successfully produced. A new ASTM standard test method for low-level sulfur determination in diesel and gasoline, D7039-04, has been developed based on this technique. Data for ultra-low-sulfur fuel were collected and analyzed using this new method. In this paper, the results of repeatability, reproducibility, and bias are presented and discussed. The repeatability for 10-ppm sulfur fuel was shown to be around 1 ppm. The pooled limit of quantification (PLOQ) for ultra-low-sulfur diesel was found to be less than 1.5 ppm in this study. The reproducibility of 15-ppm sulfur diesel fuel was determined to be better than 3 ppm (95 % confident level). The limit of detection for a single analyzer was found to be 0.36 ppm. The effect of matrix composition was investigated. The correction due to matrix for low-level sulfur diesel and gasoline is generally not significant.

The main objective of this experimental thesis is to study the exhaust emissions of in-use garbage trucks for different idling modes fuelled with alternate fuels. The emission concentrations of carbon monoxide, sulfur dioxide, oxides of nitrogen (NO, NO2, and NOX), and carbon dioxide were examined with respect to engine parameters such as fuel temperature, coolant temperature and percent fuel. A Testo350 XL portable emission monitoring instrument was used to collect second by second data for the pollutants. Performance of engine parameters was also monitored simultaneously using on-board diagnostic (OBD) software. The tail pipe emissions from Ultra-Low Sulfur Diesel (ULSD) are compared with emissions from biodiesel blends. Hotter engines produced lower emissions compared to colder engines for all fuel blends and vehicle makes. Significant reductions in emission concentrations were observed due to the inspection and maintenance programs. The performance of biodiesel blends in reducing emission concentrations of pollutants across different vehicle makes was found to be inconsistent. A comprehensive study on various vehicle, fuel and operating parameters that effect the exhaust emission concentrations was conducted to find an alternative to ULSD.

Currently, the U.S. Army can not purchase commercial off the shelf (COTS) on-road diesel engines for tactical wheeled vehicles due to a variety of reasons related to Environmental Protection Agency (EPA) emission regulations. Such reasons include Jet Propellant-8 (JP-8) incompatibility issues with exhaust after treatment devices and cooled exhaust gas recirculation (EGR) systems, unstable combustion regimes at part-load operation while operating on widely varying cetane number fuels such as JP-8, thermal management load increases that impact vehicle mobility and survivability, and high pressure fuel system reliability issues associated with using low lubricity fuels such as JP-8. This submission will briefly discuss these practical engine system issues and then present recent applied research that has focused on quantifying ignition and combustion differences between representative JP-8 and DF-2 samples in direct and indirect injected diesel engines through single and multicylinder experimentation, constant volume bomb experiments, spray and liquid length evaporation modeling, and shock tube experiments. The ultimate goal of this effort is to aid military engine suppliers in either converting current COTS engines to operate on JP-8 or in developing the next generation of military engines that must operate on JP-8. Such research is strictly applicable to the Army and other service agencies since military engine suppliers are currently focused on meeting future EPA emission standards which must operate on commercial ultra low sulfur diesel fuel.

The United States Environmental Protection Agency (EPA) will have regulations in effect no later than 2010 requiring sulfur content to be no greater than 15 parts per million (ppm) for on-road, off-road, and marine diesel fuel applications. Hydrotreatment will remove sulfur, but it also removes other polar compounds that impart fuel lubricity. The rapid and accurate discrimination of ultra-low sulfur diesel (ULSD) fuels is then important for both regulation compliance and lubricity assessment. While near-infrared (NIR) spectroscopy has not yet been able to accurately predict the sulfur content of fuels, partial least-squares (PLS) models can be constructed to predict ULSD identity indirectly through the other chemical changes caused by hydrotreatment that do, in fact, affect NIR instrument responses, albeit only subtly (see the Supporting Information). Therefore, it is possible to develop relatively low-cost portable NIR field instrumentation for the rapid identification of fuels that have undergone hydrotreatment, which, by virtue of the inevitably low resulting sulfur content, are ULSD fuels. Data were collected from a set of 391 worldwide diesel fuel samples, consisting of 251 Naval distillate (NATO F-76), 129 marine gas oil (MGO), and 11 ULSD fuels from various North American sources. The non-ULSD fuels had measured sulfur contents ranging from 200 to over 9000 ppm, and the ULSD fuels contained 10 ppm or less sulfur. NIR absorbance spectra were collected from 1000-1600 nm with a fiber optic reflectance probe coupled to a custom Bruker Optics NIR spectrometer, which employed a thermoelectrically cooled 512 element GaAs detector array.

The primary objective of this research has been to investigate how the oxidation characteristics of diesel particulate matter (PM) are affected by blending soy-based biodiesel fuel with conventional ultra low sulfur diesel (ULSD) fuel. PM produced in a light duty engine from different biodiesel-conventional fuel blends was subjected to a range of physical and chemical measurements in order to better understand the mechanisms by which fuel-related changes to oxidation reactivity are brought about. These observations were then incorporated into a kinetic model to predict PM oxidation. Nanostructure of the fixed carbon was investigated by HR-TEM and showed that particulates from biodiesel had a more open structure than particulates generated from conventional diesel fuel, which was confirmed by BET surface area measurements. Surface area evolution with extent of oxidation reaction was measured for PM from ULSD and biodiesel. Biodiesel particulate has a significantly larger surface area for the first 40% of conversion, at which point the samples become quite similar. Oxidation characteristics of nascent PM and the fixed carbon portion were measured by temperature programmed oxidation (TPO) and it was noted that increased biodiesel blending lowered the light-off temperature as well as the temperature where the peak rate of oxidation occurred. A shift in the oxidation profiles of all fuels was seen when the mobile carbon fraction was removed, leaving only the fixed carbon, however the trend in temperature advantage of the biofuel blending remained. The mobile carbon fraction was measured by temperature programmed desorption found to generally increase with increasing biodiesel blend level. The relative change in the light-off temperatures for the nascent and fixed carbon samples was found to be related to the fraction of mobile carbon. Effective Arrhenius parameters for fixed carbon oxidation were directly measured with isothermal, differential oxidation experiments. Normalizing the reaction rate to the total carbon surface area available for reaction allowed for the definition of a single reaction rate with constant activation energy (112.5 ± 5.8 kJ/mol) for the oxidation of PM, independent of its fuel source. A kinetic model incorporating the surface area dependence of fixed carbon oxidation rate and the impact of the mobile carbon fraction was constructed and validated against experimental data.

Discusses the full useful life exhaust emission performance of a NOx (nitrogen oxides) adsorber and diesel particle filter equipped light-duty and medium-duty engine using ultra low sulfur diesel fuel.

This book presents the papers from the latest conference in this successful series on fuel injection systems for internal combustion engines. It is vital for the automotive industry to continue to meet the demands of the modern environmental agenda. In order to excel, manufacturers must research and develop fuel systems that guarantee the best engine performance, ensuring minimal emissions and maximum profit. The papers from this unique conference focus on the latest technology for state-of-the-art system design, characterisation, measurement, and modelling, addressing all technological aspects of diesel and gasoline fuel injection systems. Topics range from fundamental fuel spray theory, component design, to effects on engine performance, fuel economy and emissions. Presents the papers from the IMechE conference on fuel injection systems for internal combustion engines Papers focus on the latest technology for state-of-the-art system design, characterisation, measurement and modelling; addressing all technological aspects of diesel and gasoline fuel injection systems Topics range from fundamental fuel spray theory and component design to effects on engine performance, fuel economy and emissions

This report summarizes an open literature survey that was conducted to determine the level of risk associated with using Ultra Low Sulfur Diesel (ULSD) Fuels in Naval operations. The findings show the level of risk for hydroperoxide and soluble gum formation in these fuels is not well understood. Thus, specific test methods have been identified for determining if these fuels will meet the Navy's long-term storage requirements. In addition, approved antioxidants formulations for jet fuel (MIL-DTL-5624R) have been recommended as a potential solution in mitigating peroxide and gum formation in ULSD.

Hydrotreating catalysis with transition metal sulphides is one of the most important areas of industrial heterogeneous catalysis. The present book deals with the chemical and catalytic aspects of transition metal sulphides, focusing on their use in hydrotreating catalysis. The book¿s 12 chapters present reviews of solid-state, coordination and organometallic chemistry, surface science and spectroscopic studies, quantum chemical calculations, catalytic studies with model and real catalysts, as well as refinery processes. A presentation of state-of-the-art background to pertinent work in the field. Can be used as an introduction to the chemical and catalytic properties of transition metal sulphides as well as an advanced level reference.

The goal of this thesis is to examine dual-fueling concepts using two different types of primary fuel, methane and propane; as well as two different pilot fuels, ultra-low sulfur diesel (ULSD) and biodiesel (B100). Experiments were performed using a 1.9 liter, turbocharged, 4 cylinder diesel engine at 1800 rev/min with ULSD and B100 being injected as a pilot fuel directly into the combustion chamber, at different brake mean effective pressures (BMEP), and percent energy substitutions of propane and methane. Brake thermal efficiency (BTE) and emissions (NOx, THC, CO, CO2, O2 and smoke) were also measured and analyzed. Maximum PES was limited by misfire at 2.5 bar, 5.0 bar, 7.5 bar, BMEP for all cases and knock at 10 bar BMEP for both B100-propane and ULSD-propane. In general dual fueling was shown to be beneficial for lowering NOx, CO2, and smoke emissions along with, in some cases, showing improvements in BTE.

As part of a multimedia relative risk assessment of biodiesel, small scale infiltration experiments, called "Ant Farm Experiments" were done to simulate and qualitatively evaluate the impacts of biodiesel fate and mobility in the subsurface compared directly to Ultra Low Sulfur Diesel (ULSD). ULSD is the current standard fuel in the state of California. It has been accepted for use statewide and nationally so it was used as a reference fuel for the relative comparison to determine if there were significant differences in the environmental fate of several organically derived biodiesels. For the purpose of the study, the two most feasible and readily available biodiesel feedstocks were used: Animal Fat and Soybean Oil. Experiments were run with a pure fuel (B100) and a blended fuel (B20) for both Animal Fat Biodiesel and Soy Biodiesel in a relative setting to qualitatively compare the differences in infiltration and lens formation. The relative infiltration experiments were compared through several metrics. The first metric is the relative amount of spreading of the plumes at the water table. The second metric is the relative thickness of the lens at the water table. The third and fourth metrics are relative residuals (colorimetric, i.e. darker color implies higher residuals) in the vadose zone during and at the end of the experiment, respectively. The experiments found that neither Soy B100 nor Soy B20 have noticeable differences compared to ULSD. The Animal Fat B20 does not appear to have any noticeable differences compared to ULSD either. However, the Animal Fat B100 appears to be much less mobile than the ULSD due to its higher viscosity at temperatures below 20 degrees Celsius. There was a noticeable difference in the amount of residual fuel along the vadose zone downward migration path that occurred in the Animal Fat B100 compared to the ULSD. In addition, the ULSD lens was much more developed than the Animal Fat B100 lens. Further study was done using the Hydrocarbon Spill Screening Model (HSSM) to determine if there were any significant differences between the Soy B100 and the ULSD. The simulation was done for a 29000 gallon spill on three different soils: sand, silt, and clay. The results of the modeling simulations showed that there was very low mobility for the silt and the clay. Neither fuel was able to get to the water table four meters below the ground surface within a reasonable amount of time (2500 simulated days). The simulation with sand showed that the ULSD and the Soy B100 were very similar in the spreading and also in the lens thickness. While HSSM is a quasi-three-dimensional model (one-dimensional vertical infiltration and radial lens spreading) and the experiments were only two-dimensional, the similarities show that the Soy B100 and the ULSD are not noticeably different in their subsurface fate. HSSM model simulations with Animal Fat Biodiesel were not compared to the Animal Fat experiments since HSSM was only run at twenty degrees Celsius. At twenty degrees Celsius, the fuel properties of Animal Fat B100 are approximately the same as Soy B100. As a result, the biodiesel fuels tested in this research did not demonstrate any higher relative risk than that of ULSD with regards to the mobility and lens formation at the water table.

Biodiesel has been a promising clean alternative fuel to fossil fuels, which reduces the emissions that are released by fossil fuels and possibly reduces the energy crisis caused by the exhaustion of petroleum resources in the near future. Biodiesel is replacing diesel as an alternative fuel for internal combustion engines. Previous research studies have shown that biodiesel greatly reduces carbon monoxide (CO), hydrocarbon (HC) and particulate matter (PM) emissions compared to diesel fuels. At present, B20 (20% biodiesel in the total fuel mix) is being used commonly due to its material compatibility to changing weather conditions, emission benefits and costs. In this study biodiesel blends B5, B10 and B50 were combusted to investigate how the engine conditions influence the emission concentrations of H2, CO, CH4, CO2, N2 and morphological data of particulate matter. Different emission samples were collected for a certain range of temperatures and pressures. The samples were analyzed using Gas Chromatography and the particulate matter was analyzed using Scanning Electron Microscope images. The samples of different biodiesel blends were then compared with the emissions from B20 and Ultra Low Sulfur Diesel at the same temperature and pressure ranges. From the results under varied tested conditions it has been inferred that, for low H2 emissions, B5 combustion under low temperatures and high pressures is preferred. For low CO emissions, B20 combustion under high temperatures and pressures is preferred. For low N2 emissions, B5 combustion under low temperatures and high pressures is preferred. For low CH4 emissions, B5 combustion under low temperatures and high pressures is preferred. For low CO2 emissions, ULSD combustion under low temperatures and low pressures is preferred. H2 emissions have decreased as the biodiesel blend increased. CO was observed to increase with the blend. The emissions were comparatively lower under low temperatures. N2 showed an increasing trend with the blend. Low temperatures and high pressure reduced the emissions. Not much variation was observed for CH4 for the blends under the tested conditions. The CO2 emission from the results was observed to be on an increasing trend except for B20. Under higher pressures and temperatures CO2 emissions were lower for all the blends except for B20. ULSD showed lower emissions under low temperatures and varying pressures compared to biodiesel. B5 showed lower emissions under lower temperatures and higher pressures. B10 showed the least emissions under lower temperatures and lower pressures. B20 showed lower emissions under high pressures and varying temperatures. B50 showed the least emissions under lower temperatures and higher pressures except for CO_2 which showed lower emissions under higher temperatures and pressures.

Regulation of Fuels and Fuel Additives - Modifications to the Transmix Provisions Under the Diesel Sulfur Program (US Environmental Protection Agency Regulation) (EPA) (2018 Edition) The Law Library presents the complete text of the Regulation of Fuels and Fuel Additives - Modifications to the Transmix Provisions Under the Diesel Sulfur Program (US Environmental Protection Agency Regulation) (EPA) (2018 Edition). Updated as of May 29, 2018 EPA is amending the requirements under EPA's diesel sulfur program related to the sulfur content of locomotive and marine (LM) diesel fuel produced by transmix processors and pipeline facilities. These amendments will reinstate the ability of locomotive and marine diesel fuel produced from transmix by transmix processors and pipeline operators to meet a maximum 500 parts per million (ppm) sulfur standard outside of the Northeast Mid-Atlantic Area and Alaska and expand this ability to within the Northeast Mid-Atlantic Area provided that: the fuel is used in older technology locomotive and marine engines that do not require 15 ppm sulfur diesel fuel, and the fuel is kept segregated from other fuel. These amendments will provide significant regulatory relief for transmix processors and pipeline operators to allow the petroleum distribution system to function efficiently while continuing to transition the market to virtually all ultra-low sulfur diesel fuel (ULSD, i.e. 15 ppm sulfur diesel fuel) and the environmental benefits it provides. This book contains: - The complete text of the Regulation of Fuels and Fuel Additives - Modifications to the Transmix Provisions Under the Diesel Sulfur Program (US Environmental Protection Agency Regulation) (EPA) (2018 Edition) - A table of contents with the page number of each section

This edited work covers diesel fuel chemistry in a systematic fashion from initial fuel production to the tail pipe exhaust. The chapters are written by leading experts in the research areas of analytical characterization of diesel fuel, fuel production and refining, catalysis in fuel processing, pollution minimization and control, and diesel fuel additives.

Regulation of Fuels and Fuel Additives - Alternative Affirmative Defense Requirements for Ultra-low Sulfur Diesel and Gasoline Benzene (US Environmental Protection Agency Regulation) (EPA) (2018 Edition) The Law Library presents the complete text of the Regulation of Fuels and Fuel Additives - Alternative Affirmative Defense Requirements for Ultra-low Sulfur Diesel and Gasoline Benzene (US Environmental Protection Agency Regulation) (EPA) (2018 Edition). Updated as of May 29, 2018 EPA is issuing a direct final rule to amend the diesel sulfur regulations to allow refiners, importers, distributors, and retailers of highway diesel fuel the option to use an alternative affirmative defense if the Agency finds highway diesel fuel samples above the specified sulfur standard at retail facilities. This alternative defense consists of a comprehensive program of quality assurance sampling and testing that would cover all participating companies that produce and/or distribute highway diesel fuel if certain other conditions are met. The sampling and testing program would be carried out by an independent surveyor. The program would be conducted pursuant to a survey plan approved by EPA that is designed to achieve the same objectives as the current regulatory quality assurance requirement. This rule also amends the gasoline benzene regulations to allow disqualified small refiners the same opportunity to generate gasoline benzene credits as that afforded to non-small refiners. This book contains: - The complete text of the Regulation of Fuels and Fuel Additives - Alternative Affirmative Defense Requirements for Ultra-low Sulfur Diesel and Gasoline Benzene (US Environmental Protection Agency Regulation) (EPA) (2018 Edition) - A table of contents with the page number of each section

Diesel fuel with an ultra-low sulfur content will soon displace the high sulfur fuel that has been used for a long time. The purpose of this research was to evaluate how ultra-low sulfur diesel (Texas Low Emission Diesel, TxLED) fuel effects on engine performance and emissions. Hence, TxLED was compared to use of conventional 2D on-road diesel in a one cylinder diesel engine. Small diesel engines such as this are used for a variety of applications by the Texas Department of Transportation. According to the results of these experiments, TxLED provide about 12 % reduction in fuel consumption and emissions benefits of about 30-33 % for NOx, about 21-23 % for PM, about 13~25 % for HC, and about 47~66 % for CO depending upon the test cycle. Also at most test points, the maximum torque with TxLED is higher than with 2D. As a result, it is concluded that use of TxLED in small utility diesel engines provides a benefit in emissions, fuel consumption, and performance

In support of the U.S. Dept. of Energy (DOE) Fuels Technologies Program Multiyear Program Plan Goal of identifying fuels that can displace 5% of petroleum diesel by 2010, the Nat. Renewable Energy Lab. (NREL), in collaboration with the Nat. Biodiesel Board (NBB) and with subcontractor Southwest Research Institute, performed a study of biodiesel oxidation stability. The objective of this work was to develop a database to support specific proposals for a stability test and specification for biodiesel and biodiesel blends. B100 samples from 19 biodiesel producers were obtained during Dec. 2005 and Jan. 2006 and tested for stability. Eight of these samples were then selected for additional study, including long-term storage tests and blending at 5% and 20% with a number of ultra-low sulfur diesel (ULSD) fuels. These blends were also tested for stability. The study employed accelerated tests as well as tests intended to simulate three real-world aging scenarios: (1) storage and handling, (2) vehicle fuel tank, and (3) high-temperature engine fuel system. Results were analyzed to determine whether ensuring B100 stability was adequate to ensure the stability of B5 and B20 blends. Several tests were also performed with two commercial antioxidant additives to determine whether these additives might improve stability. This report documents completion of the NREL Fiscal Year 2007 Annual Operating Plan Milestone 10.1. Illus.

The Oak Ridge National Laboratory Refinery Yield Model has been used to study the refining cost, investment, and operating impacts of specifications for reformulated diesel fuel (RFD) produced in refineries of the U.S. Midwest in summer of year 2010. The study evaluates different diesel fuel reformulation investment pathways. The study also determines whether there are refinery economic benefits for producing an emissions reduction RFD (with flexibility for individual property values) compared to a vehicle performance RFD (with inflexible recipe values for individual properties). Results show that refining costs are lower with early notice of requirements for RFD. While advanced desulfurization technologies (with low hydrogen consumption and little effect on cetane quality and aromatics content) reduce the cost of ultra low sulfur diesel fuel, these technologies contribute to the increased costs of a delayed notice investment pathway compared to an early notice investment pathway for diesel fuel reformulation. With challenging RFD specifications, there is little refining benefit from producing emissions reduction RFD compared to vehicle performance RFD. As specifications become tighter, processing becomes more difficult, blendstock choices become more limited, and refinery benefits vanish for emissions reduction relative to vehicle performance specifications. Conversely, the emissions reduction specifications show increasing refinery benefits over vehicle performance specifications as specifications are relaxed, and alternative processing routes and blendstocks become available. In sensitivity cases, the refinery model is also used to examine the impact of RFD specifications on the economics of using Canadian synthetic crude oil. There is a sizeable increase in synthetic crude demand as ultra low sulfur diesel fuel displaces low sulfur diesel fuel, but this demand increase would be reversed by requirements for diesel fuel reformulation.