

Texas environmental improvements Environmental Research through research and science Consortium

RESOLUTION 2.23

Whereas the Texas Environmental Research Consortium (TERC) is responsible for implementing the New Technology Research and Development (NTRD) Program under contract with the Texas Commission on Environmental Quality (TCEQ); and

Whereas the Houston Advanced Research Center has issued a Request for Grant Assistance to solicit technology projects in accordance with previous authorizations by TERC's Board of Directors; and

Whereas well conceived and cost-effective technology projects have been received that would contribute to TERC's achievement of the legislative goals of the NTRD Program; and

Whereas these projects have been evaluated and recommended for funding by TERC's Environmental Technology Advisory Council; and

Whereas the TCEQ has approved the funding of these; and

Whereas TERC's Executive Director and the Houston Advanced Research Center concur with the TCEQ's assessment;

Now, Therefore, Be It Resolved that the TERC Board Executive Committee hereby provides final approval for TERC funding of the Technology projects outlined below:

• EMD	645E overhaul kit	\$409,443
• EMD	645EB & 645FB overhaul kit	\$456,200
• EMD	710 Overhaul kit Phase I	\$749,750
• International	25-40% NOx reduction kit	\$357,720

Adopted and Approved this 29th day of August, 2007.

Kelly Frels, Chairman

Company: EMD
Address: 9301 W. 55th St., LaGrange, IL 60525
Project Title: 645E overhaul kit
Grant Award: \$409,443

Abstract

EMD (ELECTRO MOTIVE DIESEL) proposes engine emission reduction kits for EMD diesel engines running in marine vessels that operate in the Houston-Galveston area. This kit will provide 30% or more reduction in NOx emission and over 20-30% reduction in PM (Particulate Matter), HC (Hydrocarbon), and CO (Carbon monoxide) emission from engine baseline configuration. These kits will reduce emissions to lower than EPA Marine Tier 1 standards.

EMD estimates there are approximately 100 16 cylinder 645E engines running in the Houston-Galveston area, which equates to 4500 tons of NOx/ year. EMD's emission reductions kit that will be developed with NRTD funding will reduce that to 2781 tons of NOx/ year.

EMD is proposing to develop an emission kit for the these 645E engines that will include power assemblies, camshafts, oil separator, and an Electronic Unit Injection (EUI) system for use in EMD's 645E mechanical unit injected (MUI) engines. This system will provide the needed injection control throughout the engine power range to limit emissions and maximize fuel economy. The EUI system also gives greater flexibility for future emission reductions as injection and emission reduction technology advances.

Company: EMD
Address: 9301 W. 55th St., LaGrange, IL 60525
Project Title: 645EB & FB overhaul kit
Grant Award: \$456,200

Abstract

EMD (ELECTRO MOTIVE DIESEL) proposes NOx reduction overhaul kits for EMD engines running in locomotives, marine vessels, and power generation that will provide a 25% reduction in NOx emission and 20-30% reduction in PM (Particulate Matter) emission from current EPA Tier 0 locomotive line haul standards. These kits will be applicable to EMD 645EB and FB turbocharged engines. For rail applications, this kit will also include our "Auto Engine Start Stop" system that will further reduce engine emissions and fuel consumption through idle reduction.

EMD is proposing to develop e Electronic Unit Injection (EUI) system for use in EMD's 645 mechanical unit injected (MUI) engines. This system will provide the needed injection control throughout the engine power range to limit emissions and maximize fuel economy. The EUI system also gives greater flexibility for future emission reductions as injection and emission reduction technology advances. This system requires application of EMD's locomotive control system (EM2000), along with EMD's EMDEC (electronic injection system) to meet and even exceed the required NOx targets.

Company: EMD
Address: 9301 W. 55th St., LaGrange, IL 60525

Project Title: 645EB & FB overhaul kit
Grant Award: \$749,750

Abstract

EMD (ELECTRO MOTIVE DIESEL) proposes a repower kit for older switch locomotives that will provide 75% reduction in NOx emission and over 60% reduction in PM (Particulate Matter) emission from current EPA Tier 0 switch standards. In addition the repower kit also provides fuel savings of about 10% that would reduce the green house gas emission. This kit will also include the “Auto Start Stop System” that will further reduce engine out emissions and fuel consumption.

The older switch locomotives operating in Texas typically operate below 225C approximately 80% of their duty cycle. Currently there are in excess of 200 older switch locomotives operating in Houston/Galveston area and these units alone provides and opportunity to reduce in excess of 3000 tonnes NOx /year.

EMD will provide a fully integrated with proven technology and reliability. These kits will have components that are common with the current high horsepower fleet. This provides an opportunity for the railroads to carry fewer parts and a familiar technology for the railroad maintenance personnel.

This technology will be available for demonstration in mid 2008 and for commercial application starting 2009.

Company: International Truck and Engine Company (ITEC)
Address: 4201 Winfield Rd. , Warrenville, IL. 60555
Project Title: 25-40% NOx reduction kit
Grant Award: \$357,720

ITEC intends to conduct engine calibration modifications and vehicle compatibility activities at Southwest Research Institute (SWRI) that will identify an optimal, acceptable, functional, and legal emissions level for International ® DT-466E diesel engines from model year 2000 to 2003 that will also achieve a NOx reduction of 25% percent minimum (with potential of achieving up to 40 % percent reductions) from their original in use levels. We further intend to submit the test results to the USA, EPA for verification as an on-highway, diesel retrofit upgrade. Once verification is obtained, our authorized distributors in Texas and all across the nation will be allowed to provide this retro fit upgrade with warranty provided by ITEC. All vehicles that receive this upgrade, will receive a new engine certificate identifying the upgrade.

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RESOLUTION 2.24

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Whereas the TCEQ has approved the funding of these; and

Whereas TERC's Executive Director and the Houston Advanced Research Center concur with the TCEQ's assessment;

Now, Therefore, Be It Resolved that the TERC Board Executive Committee hereby provides final approval for TERC funding of the Technology projects outlined below:

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|----------------------------|-------------------------------|-----------|
| • National Biodiesel Board | Biodiesel/TxLED fuel blend | \$122,775 |
| • Viscon | Additive for biodiesel blends | \$250,000 |

Adopted and Approved this 29th day of August, 2007.

Kelly Frels, Chairman

Company: National Biodiesel Board
Address: P.O. Box 104898, Jefferson City, MO 65110-4898
Project Title: Evaluation of biodiesel blends with TxLED
Grant Award: \$122,775

Abstract

The National Biodiesel Board (NBB) proposes to conduct emissions certification testing, to qualify for an Alternative Diesel Formulation, by comparing a TCEQ (48/10) reference fuel against a blend of biodiesel (B100) and the same TCEQ reference fuel. The biodiesel used will meet ASTM D 6751 specifications and the reference fuel will be a Texas specified low emissiondiesel reference fuel. Successful completion of these tests to demonstrate neutral or better NOx emissions when compared with a reference TxLED fuel, will qualify as an alternative diesel formulation any ASTM D6751 biodiesel blended (up to the tested volumetric blend) with any TxLED compliant fuel. The test plan will adhere to the appropriate test procedures listed in the requirements specified in Title 30, Texas Administrative Code, Chapter 114, Subchapter H, Division 2, §114.315 (c) for the approval of an alternative diesel formulation for TxLED.

Company: Viscon California LLC
Address: 3121 Standard Street
Project Title: TxLED alternative formulation using biodiesel with Viscon
Grant Award: \$250,000

Abstract

It is Viscon CA's proposal to enable wide-spread utilization of biodiesel and to further enhance the TxLED program.

- The primary project objective is to provide the State of Texas, TCEQ with evidence necessary to evaluate the effects of a 20% and 99% biodiesel blend, when treated with Viscon, as a viable TxLED fuel formulation to achieve total NOx compliance.
- Viscon CA will use the awarded funds to confirm previous testing using Viscon.
- Testing will be conducted in the independent laboratory of Olson–Ecologic, Engine Testing Laboratories, LLC. (O-E) is located in Fullerton California. O-E is an ISO 9001:2000 registered facility, has conducted several previous projects for TCEQ and is recognized by both EPA and the California Air Resources Board (CARB).
- Emissions testing will be conducted following the guidelines set forth in the Request for Grant Applications, Solicitation No. RFGA-09.
- Via wide-spread use of Viscon in the state of Texas it is intended to:
 - Provide a technology to refiners which otherwise would be non-compliant;
 - Reduce fossil fuels usage and reliance on foreign sources; and
 - Increase the use of renewable fuels.

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RESOLUTION 2.25

Whereas the Texas Environmental Research Consortium (TERC) is responsible for implementing the New Technology Research and Development (NTRD) Program under contract with the Texas Commission on Environmental Quality (TCEQ); and

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Whereas the TCEQ has approved the funding of these; and

Whereas TERC's Executive Director and the Houston Advanced Research Center concur with the TCEQ's assessment;

Now, Therefore, Be It Resolved that the TERC Board Executive Committee hereby provides final approval for TERC funding of the Technology projects outlined below:

Texas A&M University	Root Cause Analysis of	\$600,000
– Texas Engineering	Changes in NOx	
Experiment Station	Emissions due to	
	Biodiesel Combustion	

Adopted and Approved this 29th day of August, 2007.

Kelly Frels, Chairman

Company: Texas A&M University – Texas Engineering Experiment Station
Address: 3123 TAMU, College Station, Texas, 77843-3123
Project Title: Root Cause Analysis of Changes in NOx Emissions due to Biodiesel Combustion in Diesel Engines
Grant Award: \$600,000

Abstract

This proposed research seeks to identify the root causes of characteristically increased nitric oxides (NOx) emissions with biodiesel fuel relative to petroleum diesel fuel in diesel engines, with the following specific objectives:

1. Identify the root causes of differences in NOx and other emissions from biodiesel fueled engines and petroleum diesel fueled engines.
2. Determine how energy resources in Texas can be used to produce qualifying fuels.

The completion of the above objectives will occur via an integrated approach of experimental and model-based activities that focus on in-cylinder nitric oxide (NO) formation, fuel manufacturing modification, feedstock determination, additive and water addition, and novel combustion implementation. The proposed work is based on a unique collaboration that joins combustion and engine expertise with fuel and agricultural expertise. Experimental techniques will use diesel engine test facilities to identify fundamental mechanisms surrounding NO formation processes such as thermal formation (influenced by combustion timing, combustion phasing, and radiation heat transfer) and fuel-bound nitrogen.

TEXAS environmental improvement
ENVIRONMENTAL
RESEARCH through research and science
CONSORTIUM

RESOLUTION 2.26

Whereas the Texas Environmental Research Consortium (TERC) is committed to pursuing a research agenda that analyzes the significant data collected during the Texas Air Quality Study II; and

Whereas preliminary analyses indicate the continuing need to improve the analysis of data from the TexAQS II field study; and

Whereas TERC's Science Advisory Committee and the staff of the Texas Commission on Environmental Quality have recommended the completion of air quality research project H87 to enhance understanding of the field study data.

Now, Therefore, Be It Resolved that the Executive Committee of the Texas Environmental Research Consortium hereby authorizes the Houston Advanced Research Center to increase the budget of research project H87 by \$40,000 for the purpose of increasing data analysis and data sharing with other research teams.

Adopted and Approved this 14th day of June 2007.

Kelly Frels, Chairman

Justification of Budget Increase for Project H87

The main objective of this new task is to facilitate transfer of air quality modeling data hosted at the University of Houston (UH) to the TexAQS-II research community and other state and federal governmental entities. UH has been operating the East Texas Air Quality (ETAQ) forecasting system for TexAQS-II for the period of June 2005-October 2006. The real-time forecasting was used for planning of daily field program operations, and to provide information on the suitability of particular cases for future modeling activities. As part of TERC Project H87, UH is currently working to retrospectively simulate the intensive TexAQS-II period (mid August – early October, 2006), using observational data collected during the field study to improve model performance. Both the air quality forecasting and the retrospective modeling efforts have produced a significant amount of model input and output data of about a few terabytes in size, which are stored in about 120 off-line hard drives. The modeling data base established at UH is used to assist various research groups involved in TexAQS-II. There have been a number of requests to provide such modeling data to field study participants, but the effort is being hampered by the lack of additional resources to transfer the large amount of modeling data to other institutions. This addendum provides resources to enable UH to satisfy requests for model data without prejudicing its ability to complete the original Scope of Work for H87.

The forecasting and retrospective air quality simulation data to be transferred includes meteorological model output, model-ready emissions input, and CMAQ simulation results. The data to be delivered must first be quality assured. The archived model data currently in the off-line drives will then be uploaded to a large scratch disk storage system. (This is a very labor intensive activity involving manual loading of a few drives at the same time, reassigning data ports, and rebooting the data server computer.) Once data is uploaded, the data must then be converted to the target data format, and files for transfer must then be generated. For small data files, UH will prepare a password secured ftp site for data download. For large data files, UH will export the files to hard disk drives to send through express mail.

Deliverables for this addendum will include monthly report summarizing the data QA and file transfer activities, and a final report compiling the data transfer record, including QA activity results.