



# US Army TARDEC Fuels and Lubricants Research Facility



## Technology Demonstration of Qualified Vehicle Modifier (QVM) Compressed Natural Gas and Gasoline-Fueled Ford F-150 Series Bifuel Prep Vehicles at Ft. Bliss, TX

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**Problems and Objectives:** A technology demonstration of Ford F-150 series bifueled (compressed natural gas [CNG] or gasoline) Qualified Vehicle Modifier (QVM) vehicles was conducted at Ft. Bliss, Texas. This Department of Energy (DOE) sponsored effort was in support of Section 400-AA of the Alternative Motor Act (AMFA) of 1988, the Clean Air Act (CAA) Amendments of 1990, and the Energy Policy Act of 1992. The objectives of the program were to 1) demonstrate the acceptability of alternative-fueled vehicles in a Department of Defense (DOD) U.S. Army activity in support of installation operations, 2) to quantify vehicle performance and fuel economy, and 3) to assess exhaust emissions using CNG and gasoline fuel in selected vehicles.

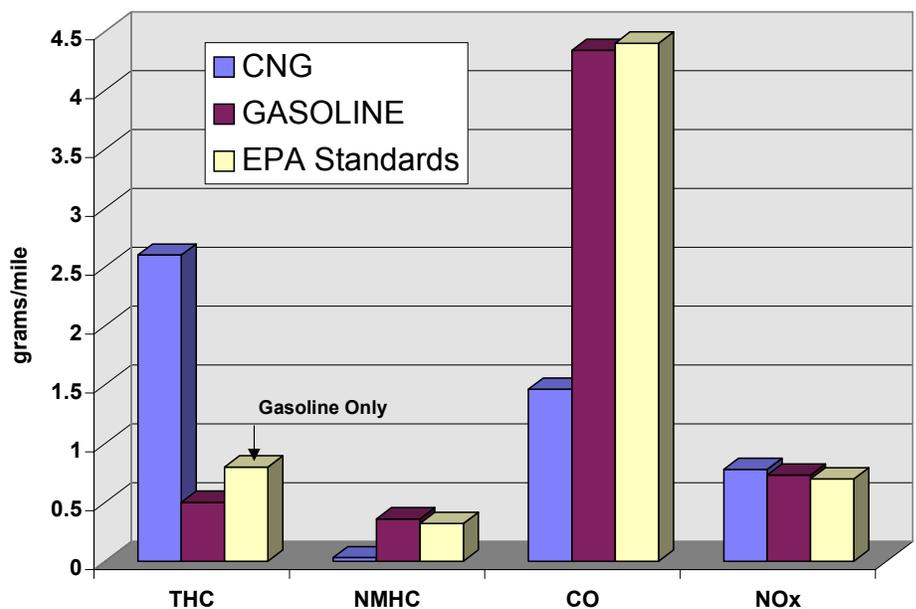
**Importance of Project:** With emphasis on finding methods to reduce the amount of pollutants in the air, CNG fuel definitely offers a viable alternative. This technology demonstration provided real-world utilization and performance data on QVM CNG and gasoline bifueled vehicles. Also, the previous fleet of dedicated CNG vehicles presented a problem because random vehicle assignments were not possible due to restricted range. With the introduction of bifueled vehicles, range was no longer a factor, and vehicles could be assigned anywhere in the operating area.

**Technical Approach:** The fleet of General Services Administration (GSA)-owned, Army-leased bifueled vehicles was placed under the direction of the Ft. Bliss Transportation Division. The vehicles were randomly assigned to the different service sections to be used in daily mission requirements. Twenty-five vehicles were randomly selected by the transportation officer to provide the data required. Designated drivers of the bifuel vehicles attended classes that covered topics such as program background and objectives, CNG description and fueling procedures, and data collection procedures.

**Accomplishments:** More than 300,000 miles of combined CNG and gasoline usage were accumulated during the program. There were no major problems reported, and the drivers, as well as section super-

visors, favorably received the vehicles. The most prevalent complaints while operating with CNG fuel were the limited range, the distance to the CNG fueling facility located outside the installation, and the prolonged starting time. Mechanically, the vehicles performed satisfactorily, and of the 25 vehicles monitored, only two required maintenance. Federal Test Procedures (FTP) exhaust emissions testing was performed at Southwest Research Institute (SwRI) on three selected vehicles at 4,000-, 10,000- and 20,000-mile intervals. The selected vehicles when operated on CNG showed dramatic reductions in non-methane organic gas (NMOG), non-methane hydrocarbons (NMHC), and carbon monoxide (CO). There was a small increase in oxides of nitrogen (NOx) emissions while using CNG. Fuel economy was equivalent with CNG and gasoline when compared to FTP results.

**Military Impact:** U.S. military installations continue to provide an excellent avenue to introduce alternative fuels. Therefore, the data accumulated during this demonstration program can be used in the decision-making process of assigning GSA bifueled vehicles to military installations. Also, the demonstration clearly shows the need for alternative fueling infrastructure in the immediate vicinity of the fleet.



Comparison of Averaged FTP Unburned Hydrocarbon Emissions Results