Volume Four • Issue Three *January 1996*

AFDC UPDATE

News of the Alternative Fuels Data Center

AFDC: One-Stop Shopping for Emissions Data

Do alternative fuel vehicles (AFVs) improve air quality? How does the use of alternative fuels affect smog formation? You may find answers to these and other questions through the U.S. Department of Energy's (DOE) Alternative Fuels Data Center (AFDC)—the nation's most comprehensive repository of performance data and general information on AFVs.

To date, more than 600 vehicles—including light-duty cars, trucks, vans, transit buses, and heavy-duty trucks—have been tested on various alternative and conventional fuels with the goal of identifying the potential for alternative fuels to displace petroleum and improve our nation's air quality.

Although comparing regulated emissions between fuels may seem straightforward, evaluating emissions is complicated by differences in vehicle technology, driving cycles, deterioration, ozone-forming potential, effects on human health, and more. DOE's emissions testing program is contributing to the understanding of many of these issues. In short, AFVs— when engineered and maintained properly—have shown the potential to contribute significant reductions in overall ozone precursors, according to Kenneth Kelly, the project engineer responsible for the emissions testing program at the National Renewable Energy Laboratory (NREL).

Light-Duty Vehicle Test Results

DOE's AFV testing program began with the Alternative Motor Fuels Act of 1988, a Congressional mandate to evaluate AFV performance. The first light-duty vehicle demonstration included 1991 M85 (85% methanol, 15% gasoline) Ford Tauruses and Chevrolet Luminas, and has expanded to include data on newer models running on E85 (85% ethanol, 15% gasoline), compressed natural gas (CNG), propane, and reformulated gasoline (RFG).

The light-duty AFV emissions testing program, now in the middle of its second round of evaluations, has tested more than 400 vehicles pulled from the General Services Administration's alternative fuel fleet. NREL personnel have made painstaking efforts to design and implement a test program that will yield valuable, high-quality information and ensure the reliability of the data in the AFDC. In order to determine relative emissions deterioration, vehicles are tested at least once a year at target mileage intervals of 4,000, 10,000, and every increment of 10,000 miles thereafter. To eliminate the question of fuel quality, the vehicles are tested on fuels that are specifically blended for the program.

Emissions from 15% of the vehicles tested undergo detailed hydrocarbon speciation, which

IN THIS ISSUE

Reminder:

AFDC users using modem access can call toll free at **(800) 588-2336**. To better serve users experiencing technical difficulties accessing the AFDC or having other operational problems, the new technical support number is **(303) 275-4545**.

How to Reach Us

- The AFDC World Wide Web address is **http://www.afdc.doe.gov**
- The *AFDC Update* newsletter is available on the WWW at **http://www.afdc.doe.gov/news** It is available on-line 2 or 3 weeks before the newsletter is mailed.
- To speak to a human being, call the National Alternative Fuels Hotline at ***(800) 423-1DOE.***

includes quantifying up to 172 different hydrocarbons in the exhaust and evaporative emissions, noted Wendy Clark of Automotive Testing Laboratories, one of three private laboratories performing the tests around the country. (Environmental Research and Development of Washington, D.C. and Mantech Environmental Technology of Denver, Colorado, are the other two.) This information feeds into the Atmospheric Photochemistry Project, another effort by NREL to model the effects of vehicle emissions on air quality (the next issue of *AFDC Update* will contain more information on this project).

Although emissions are often vehicle specific, AFDC's substantial emissions database already reveals some trends (see Table 1). CNG vehicles produced by the auto manufacturers have shown reduced emissions (non-methane hydrocarbons [NMHC], carbon monoxide [CO], and oxides of nitrogen [NO_X]) across the board, according to Kelly. The alcohol vehicles have shown the potential to reduce some components, including CO and hydrocarbons (HC).

Warren Gretz, NREL / PIX 01826

A technician from Mantech Environmental Technology of Denver, Colorado, analyzes aldehyde emissions with a liquid chromatograph.

Many fleet managers around the country have converted, or are considering converting, gasoline vehicles to operate on alternative fuels. For that reason, NREL researchers are also testing the emissions performance of several CNG and propane conversion systems. The first results from this study will be available in early 1996.

NREL Finds Low NGV Emissions

The first round of emissions tests on CNG vehicles from original equipment manufacturers included approximately 40 dedicated Dodge B250 passenger vans and 40 standard gasoline versions tested on RFG. Average results from these tests are summarized in Figure 1. Exhaust emissions levels of CO, NMHC, and NO_X were all substantially lower for the CNG vehicles than for their

Table 1
Light-Duty Vehicles Documented in the AFDC

Vehicle Models	Fuel	Number of Vehicles	Early Exhaust Emissions Results Compared to RFG
Dodge B250 van	CNG	66	30%-70% reduction in NO_X, CO, and NMHC. 80% reductions in ozone-forming potential.
Dodge Spirit	M85	76	Modest reductions in NMHC. 40% reduction in ozone-forming potential. Similar CO and NO_X levels.
Ford Econoline van	M85	18	Modest reductions in NMHC and CO. 50% reduction in ozone- forming potential. Similar NO_X levels.
Chevrolet Lumina	E85	25	Approximately 20% reductions in NMHC, CO, and NO_X. 25% reduction in ozone-forming potential.
Dodge Caravan	CNG	25	First round of testing under way
Ford Taurus	E85	25	First round of testing under way
Dodge Intrepid	M85	25	First round of testing under way
Control vehicles	RFG	243	
Total		***503***	

gasoline counterparts. The CNG vehicles also exhibited 80% reductions in ozone-forming potential. In addition, air toxins such as benzene and 1,3-butadiene were decreased by approximately 90%.

In general, aldehyde emissions were lower, but one vehicle emitted higher levels of formaldehyde. Researchers indicated this could be due to a catalytic converter malfunction; they will continue to monitor these emissions as the vehicles age.

Although system designs of gaseous vehicles are expected to prevent the release of evaporative emissions, the laboratories were instructed to perform leak measurements similar to the evaporative test performed on gasoline vehicles. The methane fuel leakage, measured as total HC levels, was found to be similar to or below HC levels that evaporate from gasoline vehicles.

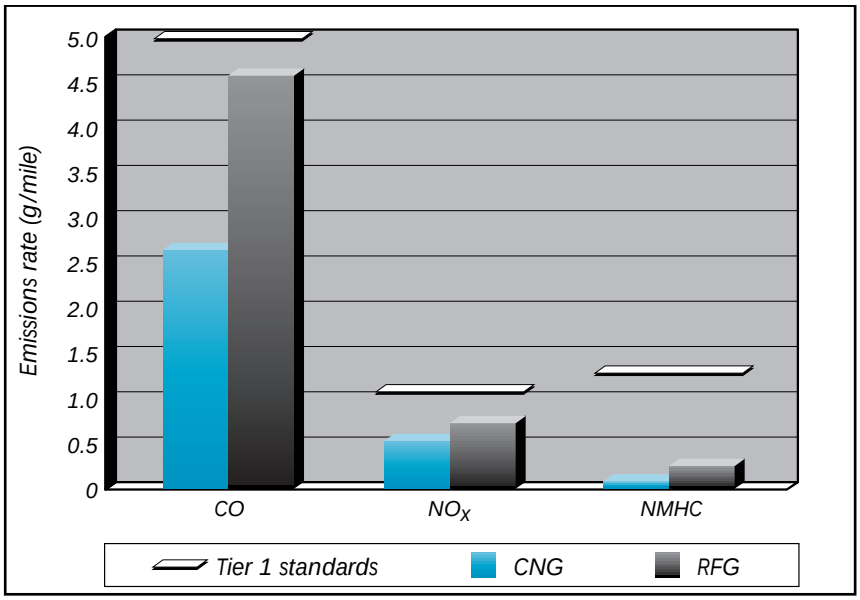
Alcohol Vehicle Emissions Lower Overall than Those from RFG-Fueled Vehicles

Flexible fuel vehicles (FFVs) such as the Dodge Spirit, Ford Econoline van, and Chevrolet Lumina can operate on gasoline or a mixture of alcohol and gasoline. During the first round of testing, these vehicles were tested on: (1) RFG; (2) a 50/50 mixture of alcohol and RFG; and (3) an 85/15 mixture of alcohol and RFG. The ability of these vehicles to run on various fuel blends allows for direct emissions comparisons between fuels.

Both the methanol (M85) and ethanol (E85) FFVs tested in NREL's program had lower emissions overall compared to the same vehicles using RFG. NREL researchers concluded that alcohol fuels tend to produce fewer NMHC emissions, a precursor to ozone formation, and a human health concern. They also concluded that the HC profiles for ethanol and methanol have between 25%-50% lower ozone-forming potential than RFG. In addition, alcohol fuels showed considerable reductions in benzene, an air toxin. The U.S. Environmental Protection Agency (EPA) has estimated that alcohol fuels reduce benzene by about 50%. However, emissions of formaldehyde (with methanol) and acetaldehyde (with ethanol) were increased; both are air toxins and contribute to ozone formation.

The results for individual emissions constituents were somewhat varied from vehicle to vehicle. This may be partially due to the design constraint of being capable of operating on a variable mixture of fuels. Although the results from the first round of testing are promising, several questions regarding emissions deterioration, fuel effect on emissions during hard accelerations outside of the standard driving cycle, and cold starting still need to be addressed. Studies designed to answer these questions are under way and results will be reported as soon as they become available.

Figure 1. Average emissions results from Dodge B-250 vans



Warren Gretz, NREL / PIX 03488

This light-duty vehicle undergoes an FTP emissions test on a chassis dynamometer at Mantech.

Federal Express—in the Express Lane to CleanFleets

The Federal Express Company, a world leader in parcel delivery, quickly became a leader in the AFV industry by participating in one of the most comprehensive studies on all aspects of AFV operations. The 2-year demonstration in southern California known as "CleanFleet" began using 84 alternative fuel delivery vans operating on propane, M85, CNG, RFG, gasoline and electricity. There were also 27 control vehicles.

Although the study represented a wide range of technology developments, "all of the alternative fuels reduced emissions compared to unleaded gasoline," said George Sverdrup, Battelle Columbus Laboratory's program manager for the demonstration (see the Spring 1995 issue of *AFDC Update*). "The ozone-forming potential of the exhaust from the natural gas vehicles was on average 90% cleaner than the exhaust from standard gasoline," he said. "Propane as well showed significant reduction in the ozone-forming potential in the exhaust." Because electric vehicles are classified as zero-emission vehicles, they were not brought into the emissions testing component of the program.

Battelle's "Vehicle Emissions Final Report" from CleanFleet was released last June; the full report can be obtained from the AFDC: the direct address is http://www.afdc.doe.gov/web_view/fedx_report/fedx3.html

Cooperative Program Helping to Reduce Heavy-Duty Vehicle Emissions

DOE's heavy-duty chassis dynamometer emissions testing represents a cooperative effort designed to monitor and evaluate emissions from heavy-duty vehicles. Participants include DOE, several heavy-duty engine manufacturers, West Virginia University (WVU), NREL, and fleet operators across the country. To date, more than 200 transit buses and 50 heavy-duty trucks (including refuse haulers, snowplows, and tractors) with engines built by Cummins, Detroit Diesel Corporation (DDC), and Caterpillar have been tested on CNG, biodiesel, diesel, E100 (100% ethanol), and E95 (95% ethanol, 5% gasoline). Many of the same engine models (Cummins' L-10 CNG and DDC's alcohol 6V92) were tested in both transit bus and line-haul truck applications.

Heavy-duty engine manufacturers have been cooperating with the program in several ways. Most importantly, they have been developing alternative fuel technologies and bringing products to the marketplace. Many of the AFVs tested have been prototype or field-test units that were not fully optimized for emissions. Even so, most of the AFVs tested to date have shown a strong potential for reducing particulate matter (PM) emissions without a corresponding increase in NO_X (see Figure 2). This proven reduction in PM levels is good news for alternative fuels. Because PM is suspected of being a carcinogen and can cause respiratory irritation in humans, EPA's emissions standards for new heavy-duty engines have become increasingly stringent (see Table 2). Test results on other emissions components (HC, CO, and in some cases NO_X) have been more varied.

Figure 2. Summary of heavy-duty vehicle particulate emissions results

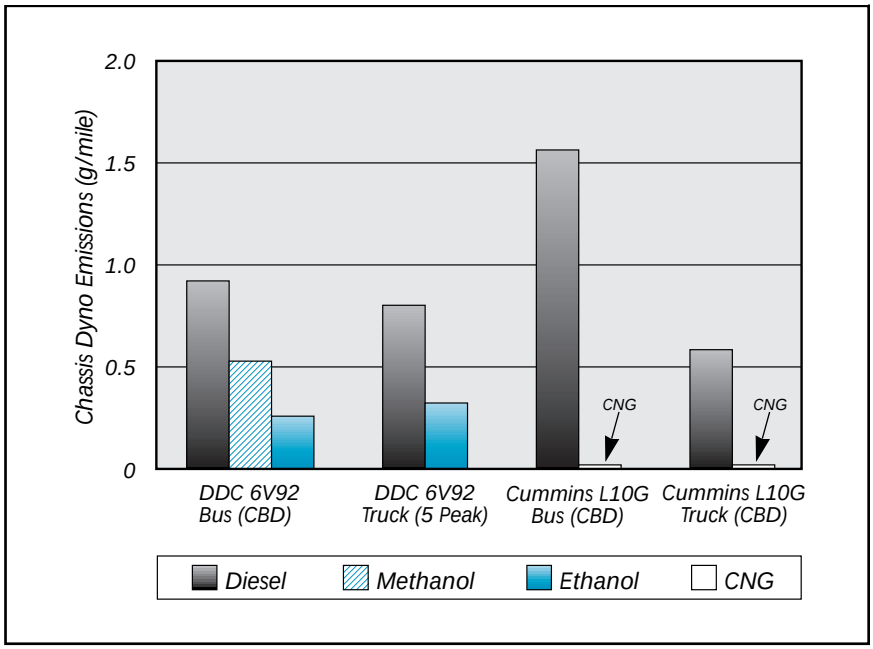


Table 2
Federal Heavy-Duty Engine Emissions Standards*

Heavy-Duty Trucks	HC	CO	NO_X	PM
1991–93	1.3	15.5	5.0	0.25
1994–97	1.3	15.5	5.0	0.10
1998	1.3	15.5	4.0	0.10
Urban Buses				
1991–92	1.3	15.5	5.0	0.25
1996–97	1.3	15.5	5.0	0.05
1998	1.3	15.5	4.0	0.05

*Grams per brake-horsepower hour

NREL, with funding from DOE, recently brought together WVU and representatives from two major engine manufacturers to test vehicles at transit sites in Tacoma, Washington, and Peoria, Illinois. NREL had identified these vehicles for further study because of higher than expected emissions from the alternative fuels. Significant emissions reductions were achieved through further testing by WVU and diagnosis and repair by the manufacturers. Repairs ranged from adjusting the air/fuel ratio to replacing faulty parts such as the air/fuel mixing valve, fuel injectors, and catalytic converters. The exercise has furthered the understanding of heavy-duty vehicle emissions and led Kelly to conclude that alternative fuels play an important role in reducing emissions, but engine technology and proper maintenance are also critical factors.

Several engine manufacturers are releasing new alternative fuel models or enhanced versions of the older engines. Testing and evaluation of these latest offerings will be a top priority for the program in 1996.

In addition to emissions analysis, NREL is also developing advanced engine technologies that will further reduce emissions and provide greater air quality benefits. You can read more about this in the next issue of *AFDC Update.*

For access to emissions data or NREL summary reports, please call the National Alternative Fuels Hotline or visit the AFDC's Emissions Home Page: the direct address is http://www.afdc.doe.gov/web_view/emishome.html

Those involved with the emissions data collection projects have presented their findings at several meetings. For more information, call the National Alternative Fuels Hotline at ***(800) 423-1DOE***.

What's New at the AFDC's Internet Site

The National Renewable Energy Laboratory (NREL) has added several new features to the Alternative Fuels Data Center's (AFDC) Internet site that bring more alternative fuels information to your fingertips.

The new Alternative Fuel Emissions Home Page includes many options, with pictures, maps, and detailed program descriptions available for downloading. Under the emissions home page are four subtopics: **Light-Duty Vehicle Emissions**, which includes data on a representative sample of light-duty alternative fuel vehicles (AFVs) and gasoline control vehicles purchased by the General Services Administration; **Transit Bus Emissions**, which contains a detailed program description and map of vehicle locations; **Heavy-Duty Vehicle Emissions**, which also contains representative data and a map; and **Federal Express CleanFleet Emissions**, also available under the emissions section.

The following reports have also been added to the AFDC for on-line access (click on "what's new in the AFDC"):

- *The Fourth Annual Report to Congress*, released July 1995
- *Inspection of CNG Cylinders on School Buses*
- *Alternative-Fueled Truck Demonstration CNG Caterpillar G3406LE*, located under *Heavy-Duty Vehicle Reports and Summaries.*
- *BioFacts-Global Warming and Biofuels Emissions.*

Other sections have been updated with new information:

- *Original Equipment Manufacturers (OEM) Alternative Fuel Vehicle Offerings* now contains information about the 1996 model year OEM AFVs.
- New CNG sites information, located under *Refueling Sites.*

AFDC users may find that *Adobe Acrobat* is required for downloading some of the pictures and maps in the AFDC. This software is required for the user to read these items in their original high-quality formats. To download *Adobe Acrobat*, click on "features used in the AFDC Web" on the AFDC's Home Page.

The AFDC's Internet address is http://www.afdc.doe.gov

Inspection Guidelines for CNG School Buses Released

When visiting compressed natural gas (CNG) school bus fleets for inspections as part of the National Renewable Energy Laboratory's ongoing demonstration program, representatives of Acurex Environmental Corporation found damage to four cylinders at three of the ten sites. As a result of their experience, the field inspectors have identified several ways to reduce the risk of tank damage and potential ruptures.

According to Acurex's report, *Inspection of Compressed Natural Gas Cylinders on School Buses*, the tank damage included a bolt embedded in the composite wrap surface, discoloration of the composite wrap surface, possible burn marks, a metal nut embedded in the composite wrap surface, and a deep scratch in the composite wrap surface.

Some of the problems could have been eliminated during cylinder installation. Inspectors found extraneous hardware around the mountings, excessively taut or inadequately supported fuel lines, and poor location of cylinder labels. Road hazards also contributed to the damage, according to the report. The Gas Research Institute has recommended stone shields with adequate draining.

A gap in education about proper cylinder maintenance was noted, specifically when it came to proper service intervals and visual inspections. "Site personnel need to have the proper training, which combines available information with the ability to interpret it, to adequately service and maintain CNG cylinders and fuel systems," according to the report.

The full report from Acurex is available through the hotline at ***(800) 423-1DOE*** *or over the Internet: the direct address is http://www.afdc.doe.gov/demoproj/bus/busrpts/alltp7629.html*

Detroit Offers More AFVs in 1996

In an effort to provide products for the anticipated fleet requirements of the Energy Policy Act of 1992 and other state and local programs, the major domestic automobile manufacturers have expanded their alternative fuel vehicle (AFV) offerings. At the same time, the U.S. automobile industry is engaged in research, development, and production programs covering a range of alternative fuels.

The AFV outlook for 1996 and 1997 includes new light-duty trucks and passenger vehicles, according to a survey conducted for the U.S. Department of Energy.

For the 1996 model year, a number of compressed natural gas (CNG) vehicles will be available from Ford Motor Company and Chrysler Corporation. Several gaseous-fueled vehicles will also be produced through various partnerships between automakers and firms that convert specially prepared vehicles under an authorized arrangement. Although alcohol fuel and propane vehicles will be available, model selections are more limited for both light- and heavy-duty applications.

Ford and Chrysler are continuing their demonstrations of electric minivans. Ford has announced that an electric version of its Ranger pickup may soon be available through an approved converter as well as from its own production line. General Motors Corporation (GM) continues to test its electric Impact and may make an announcement on its availability later this year.

GM has already announced it will reenter the AFV market in the 1997 model year, when it will sell its electric EV1 coupe at selected Saturn dealerships in Arizona and California. In the 1998 model year, all of its S-Series and Sonoma four-cylinder pickup trucks produced will be capable of running on as much as 85% blends of ethanol.

Vehicles available in 1996 are summarized in Tables 3 and 4.

Table 3
Ford Alternative Fuel Vehicle Program, Model Year 1996

	Taurus	F-Series	Econoline	Crown Victoria	F700
Fuel	M85 or E85 with gasoline combinations	CNG/gasoline bi-fuel with automatic switching	CNG/gasoline bi-fuel with automatic switching	CNG dedicated	LPG
Vehicle type	Full-size sedan	Light-duty truck	Light-duty truck	Full-size sedan	Heavy-duty
Emission Classification	California TLEV*	Federal and California gasoline levels	Federal and California gasoline levels	Ultra-low-emission vehicle	California-certified
Power train	3.0-liter	4.9-liter Inline 6, gaseous fuel prep engine with internal upgrades for durability	4.9-liter Inline 6, gaseous fuel prep engine with internal upgrades for durability	4.6-liter V-8	7.0-liter, 218-hp
Drivetrain	Front-wheel drive	Rear-wheel drive (RWD)	RWD	RWD	RWD
Fuel Capacity	18 Gasoline gallon equivalent (GGE)	4 different tank configurations	2 different tank configurations	10 GGE	Depends on tank config.
Special Maintenance	Special engine oil	Periodic visual inspection of tank	Periodic visual inspection of tank	Periodic fuel-cylinder inspection	None
Additional Costs	$1,165**	$5,700–$6,400** (different tank configurations)	$7,500–$9,300** (different tank configurations)	$6,165**	Contact dealer
Availability	1st Qtr. '96	Currently available	Currently available	Currently available	Currently available
Estimated Range	E85= 230 miles city, 310 miles highway M85=185 miles city, 265 miles highway	85–140 miles city, 120–140 miles highway	95–180 miles city, 130–240 miles highway	140 miles city, 215 miles highway	Not available (aftermarket tanks)

*Transitional low-emission vehicle.

**Does not include AFV special discounts of $1,165 for the Taurus, $1,220 for the F-Series trucks, $2,440 for the E-Series vans, and $3,255 for the Crown Victoria.

Estimated range is based on the following:

① Estimated EPA adjusted on-road city and highway fuel economy

② Useable fuel capacity
- E and F series: 87% of total tank capacity
- Crown Victoria and Taurus: 95% full down to 25 miles range remaining

③ Worst-case configuration city fuel economy and best-case configuration highway fuel economy.

Table 4
Chrysler Alternative Fuel Vehicle Program, Model Year 1996

	Dodge Ram Van/Wagon	Dodge Ram Pickup	Dodge Dakota Pickup	Dodge Caravan Plymouth Voyager
Fuel	CNG	CNG	CNG	CNG
Vehicle type	Light-duty truck	Light-duty truck	Light-duty truck	Light-duty truck
Emission Classification	California ultra-low-emission vehicle (ULEV)Federal inherently low emission vehicle (ILEV)	California ULEV Federal ILEV	California ULEV Federal ILEV	California ULEV Federal ILEV
Power train	5.2-liter V-8	5.2-liter V-8	5.2-liter V-8	3.3-liter V-6
Drivetrain	Rear-wheel drive (RWD)	RWD	RWD	Front-wheel drive
Fuel Capacity	11.1–14.5 Gasoline gallon equivalent (GGE) @ 3,000 pounds per sq. inch (psi)	16.9 GGE @3,000 psi	14.2 GGE @ 3,000 psi	10.1 GGE @3,000 psi
Special Maintenance	Periodic fuel-cylinder inspection	Periodic fuel-cylinder inspection	Periodic fuel-cylinder inspection	Periodic fuel-cylinder inspection
Additional Costs	$3,838-$5,063*	$5,563	$5,563	Not available
Estimated Range	100–125 miles city, 150–200 miles highway	125–175 miles city, 175–225 miles highway	125–175 miles city, 175–225 miles highway	125–175 miles city, 175–225 miles highway

*Ram Van and Ram Wagon are priced $750 below last year's models

Please call the hotline at **(800) 423-1DOE** for information on vehicle availability.

Source: Chrysler Corporation

The full paper from which the preceding article was written can be found on the WWW: the direct address is http://www.afdc.nrel.gov/vehicles/96OEMsum/ldv_96_oem.html

New Natural Gas Engine Provides a Clean Ride to School

School bus fleet managers now have the choice of a new compressed natural gas (CNG) school bus engine that can provide performance as well as emissions benefits. Working in an alliance with Deere Power Systems Group, Blue Bird Corporation, and the CNG Cylinder Company, engineers at Southwest Research Institute (SwRI) recently developed a fully electronically controlled bus engine that runs on natural gas. The new engine design is one aspect of a research and development contract funded by the U.S. Department of Energy and the National Renewable Energy Laboratory to develop an ultra-safe, low-emission school bus.

"School buses in particular are ideal candidates for natural gas use because routes are generally well defined and the fuel requirements and refueling intervals are well known," said John Kubesh, senior research engineer for SwRI's Engine and Vehicle Research Division. "Natural gas engines can be operated at very lean conditions, which translates into low emissions and high efficiency," he added.

One school district has already tested the new John Deere Power Tech 6081 8.1-liter engine in the Blue Bird school bus chassis. "This is the first 250-horsepower CNG engine anyone can go to and save money over diesel," said Kenneth McCoy, chief executive officer of southern California's Antelope Valley School District. Antelope Valley has put more than 10,000 miles on the bus. "It has as much or more power than anything else in my fleet," McCoy said.

Blue Bird engineers are also impressed. "It's an amazing engine," said Richard Earl. Its adaptive air/fuel ratio ensures that it is always operating optimally. "The fuel mileage and performance is unique," Earl said.

Table 5 shows the results of emissions tests on the new engine.

Table 5
John Deere 6081 Natural Gas Engine Emissions Results*

	Nitrogen Oxides	Particulate Matter	Nonmethane Organic Hydrocarbons	Carbon Monoxide
Without catalyst	1.77	0.015	0.24	1.66
California Air Resources Board (CARB) 1996 Standards	5.0	0.100	1.20	15.5

*as submitted to CARB October 1995

Propane Vehicle Event to Challenge Students

Engineering students in the United States and Canada will have an opportunity to develop and design advanced propane vehicles for a new competition announced last month by the U.S. Department of Energy (DOE).

The 1996 Propane Vehicle Challenge, to be held May 30–June 4, 1996, in Windsor and Toronto, Ontario, Canada, will encourage students to convert 1996 Chrysler minivans from gasoline-fueled to propane-fueled. Winners will develop an ultra-low-emission vehicle that has a minimum range of 400 kilometers (250 miles) and performance equal to or better than an equivalent gasoline-fueled vehicle.

The challenge is sponsored by DOE, Natural Resources Canada, and Chrysler Canada Ltd. The National Propane Gas Association and the Propane Gas Association of Canada are also supporting the competition. It is being organized by Argonne National Laboratory.

To sponsor or participate in the Propane Vehicle Challenge, contact Shelley Launey, Manager of Vehicle Competitions (EE-30), U.S. Department of Energy, 1000 Independence Ave., SW, Washington, DC 20585; phone: (202) 586-1573; fax: (202) 586-9815; e-mail: shelley.launey@hq.doe.gov.

NREL Looking for AFV Fleets to Provide More Data

In an effort to provide up-to-date information for fleet managers considering alternative fuels, the National Renewable Energy Laboratory's (NREL) Alternative Fuels Data Center is seeking more private light-duty alternative fuel vehicle (AFV) fleets to contribute data.

To qualify, the fleet must:

- Operate 20 or more identical model vehicles (ideally 3 gasoline control vehicles and 5 to 15 AFVs, or have plans to begin AFV operation in the next 12 to 18 months)
- Include alternative fuels such as ethanol, methanol, compressed natural gas, propane, and biodiesel
- Accumulate at least 70,000 miles annually on each vehicle in the program
- Maintain accurate maintenance records: NREL is seeking detailed operating, maintenance, emissions, and driveability information.

The AFVs may be either original equipment or conversions, but new or low-mileage vehicles (fewer than 5,000 miles) are preferable.

The data effort will be completed in about 1 year. To minimize the impact of the effort on the fleet's operation, NREL will work with the fleet manager to place someone on site to handle the data collection. The fleet will be acknowledged in the database and any resulting reports.

Interested fleet managers can mail or fax a list of qualifications to NREL, 1617 Cole Blvd., Golden, CO 80401; fax (303) 275-4415 (attention Peg Whalen). The expression of interest and list of qualifications should include the fleet size and location; vehicle types (model and year); typical annual mileage accumulation; number of AFVs or planned AFVs; type of fuel; any experience with vehicle operation data collection efforts; and a contact name, phone number, fax, and mailing address.

Alternative Fuels News

- Representatives of natural gas vehicle cylinder manufacturer EDO Canada Ltd. are checking some of its cylinders for a manufacturing irregularity. Owners of **LiteRider cylinders** with a water seal O-ring in the valve/end boss assembly purchased prior to May 4, 1995, and with part numbers ending in 260, 269, 301, 304, 319, 348, 355, 360, 372, 400, and 414 will be contacted by EDO to schedule an inspection. The company is encouraging affected vehicle owners to store their vehicles outside, away from ignition sources, and to perform the standard leak check outlined in the cylinder manual. Customers with specific questions can contact the EDO LiteRider cylinder customer service line at (800) 361-TANK.

- A **new publication** entitled *Resource Guide: Infrastructure for Alternative Fuel Vehicles* (publication number P500-95-004) is now available from the California Energy Commission (CEC). To request a copy, contact the CEC Publications Office, 1516 Ninth Street, MS-13, Sacramento, CA 95814. The *Resource Guide* can also be found on the Internet, at http://www.energy.ca.gov/energy/homepage.html. Also available from the CEC is *The ABCs of AFVs*, (publication number P180-95-001).

Upcoming Events

For a complete listing of upcoming events, call the National Alternative Fuels Hotline at **(800) 423-1DOE** or check "Conferences and Events" on the AFDC Home Page at **http://www.afdc.doe.gov.** To have your event listed, fax information to Greg Haigwood, (703) 528-1953 or e-mail: **hotline@afdc.nrel.gov.**

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Fax — THE FOLLOWING NEW REPORTS ARE AVAILABLE THROUGH THE NATIONAL ALTERNATIVE FUELS HOTLINE:

❑ **# 2864** A September 1995 fleet economics report of the Federal Express CleanFleet study.

❑ **# 2834** *Development of an Ultra-Safe, Ultra-Low Emissions Natural Gas-Fueled School Bus; Phase I: Systems Design Final Report*, by J. Kubesh, Southwest Research Institute.

❑ **# 2825** *Hardware Assembly and Prototype Testing for the Development of a Dedicated Liquefied Propane Gas Ultra Low Emission Vehicle*, by IMPCO Technologies.

❑ **# 2180** *Advanced Hydrogen/Methanol Utilization Technology Demonstration; Phase II: Hydrogen Cold Start of a Methanol Vehicle*, by Hydrogen Consultants, Inc.

❑ **# 2203** *Evaluation of Aftermarket CNG Conversion Kits in Light-Duty Vehicle Applications*, by C.F. Blazek, P. Freeman Rowley, J.W. Grimes, Institute of Gas Technology.

❑ **# 2427** *Alternative Fuel Tips for Operators and Owners*. The "TIPS" in this booklet produced by the U.S. Department of Energy's Office of Transportation Technologies stands for Technical Information on Performance and Safety.

❑ **# 2870** *Case Studies of Cost-Effective Natural Gas Fueling Stations*, released by the Gas Research Institute.

To request any of the above documents, check the appropriate box(es) and fax this form to (703) 528-1953 or call the National Alternatives Fuels Hotline at (800) 423-1DOE.

Name _____

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AFDC UPDATE

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