

## Welcome...

This first issue of the *APBF-DEC Quarterly Update* provides background information about the program, its purpose, design, and startup activities. Future issues will keep you posted on the program's progress, decisions, and results.

### **APBF-DEC's Purpose, Mission**

The program's purpose is to identify the optimal combinations of fuels, lubricants, diesel engines, and emission control systems to meet projected emission standards through 2010. APBF-DEC's mission is to: (1) meet projected emission standards in the 2000 to 2010 period while maintaining improved engine efficiency and durability; (2) maintain customer satisfaction with vehicle performance; (3) provide the basis for economical transport of people and goods; (4) meet additional potential constraints (e.g., emissions of unregulated substances such as ultrafine particulate matter); and (5) explore the potential to achieve even lower emissions of criteria and unregulated pollutants beyond 2010.

### **Organization, Study Design**

The APBF-DEC program began in February 2000 and is supported by government agencies, trade associations, and private industry. The program is directed by a Steering Committee that includes representatives of those groups. Three systems work groups and three supporting work groups were appointed to analyze and document the effects of fuel and lubricant properties on emissions for a variety of automotive and heavy vehicle engines and emission control systems. The systems work groups are:

- Fuels, engines, selective catalytic reduction (SCR)/diesel particle filter (DPF) technologies
- Fuels, engines, NO<sub>x</sub> adsorber/DPF technologies, and
- Lubricant effects on emissions and emission control devices.

The supporting work groups are:

- Unregulated emissions
- Fuel and lubricants provision and
- Experimental design.

Results from studies of two of the three emission control technologies—DPF and NO<sub>x</sub> adsorber—under the earlier Diesel Emission Control-Sulfur Effects (DECSE) program will be used in the APBF-DEC studies. The lubricants work group will examine the effects of sulfur and other

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<sup>♦</sup> APBF-DEC is an industry/government program to identify and evaluate (1) the optimal combinations of fuels, lubricants, diesel engines, and emission control systems to meet projected emission standards for the 2000 to 2010 time period and (2) properties of fuels and vehicle systems that could lead to even lower emissions beyond 2010. It is an outgrowth of the Diesel Emission Control—Sulfur Effects (DECSE) program, whose objective is to determine the impact of fuel sulfur levels on emission control systems that could lower emissions of NO<sub>x</sub> and PM from diesel-powered vehicles in the years 2002 to 2004. DECSE is scheduled to conclude this fall. Results of DECSE to date are available on the World Wide Web at: <http://www.ott.doe.gov/decse>. The final DECSE report will be available on the web site in January 2001. The data are expected to provide technical information on emission control technology options and the effects of fuel properties (including additives) on the performance of emission control systems. Information about the APBF-DEC program will be posted at [http://www.ott.gov/apbf\\_dec](http://www.ott.gov/apbf_dec). For further information, contact Helen Latham at Battelle, phone 614-424-4062, fax 614-424-5601, e-mail [lathamh@battelle.org](mailto:lathamh@battelle.org).

constituents in the lubricants on the performance of emission control systems and on engine-out emissions, which will become increasingly important as sulfur emissions from the fuel are reduced.

### **Timeline, Funding, In-kind Support**

The four-year program is expected to have a 50/50 government/industry cost share and be funded at about \$35 million, including \$25 million in funding and \$10 million in in-kind contributions. Major funding is currently being provided by the U.S. Department of Energy (DOE), the Engine Manufacturers Association (EMA), the American Petroleum Institute (API), the Manufacturers of Emission Controls Association (MECA), and the American Chemistry Council. Industry is providing significant in-kind resources. The program is managed by staff members at two DOE laboratories, the National Renewable Energy Laboratory (NREL) in Golden, CO, and the Oak Ridge National Laboratory (ORNL) in Oak Ridge, TN. Testing is expected to begin in early 2001.

### **Planning Phase**

During the first year, the program has concentrated on organizing and planning functions. This has included determining groups interested in participating, securing adequate funding and in-kind support, appointing Steering Committee members, determining the makeup of the work groups, and establishing meeting schedules, methods, and operating principles.

### **Startup Activities**

Since last spring, the APBF-DEC Steering Committee has been meeting in formal sessions and teleconferences. Following are the committee's key accomplishments to date:

- Determined the number of work groups needed, defined their scopes, and identified members of each group
- Developed operating principles
- Finalized funding needs, sources
- Agreed on the general requirements for hardware, engines, and test facilities
- Considered opportunities to "piggyback" on existing, similar DOE and industry programs to reduce costs
- Agreed that initial testing will focus on the effects of sulfur and subsequent testing will examine other fuel properties (e.g., oxygen-containing compounds)
- Coordinated establishment of specifications for the baseline diesel fuel to be used in this and other test programs and
- Gave the work groups the go-ahead:
  - The three systems work groups will determine the most appropriate combination of technologies for their systems, develop test plans (for both the light- and heavy-duty programs), select test sites, issue requests for proposals (RFPs), obtain subcontractors, and monitor work.
  - The lubricants work group will establish an experimental design and lubricant matrix (i.e., additives and base oils); decide on fuel, hardware, and analytical equipment; issue an RFP, select a contractor, and monitor work.
  - The unregulated emissions work group will develop methods for compounds most likely to be formed and specify methods to measure emissions and toxicity and effects on the emission control devices. This work group will support the efforts of the three systems work groups.

### **Progress of Systems Work Groups**

- **Fuels, engines, selective catalytic reduction (SCR)/diesel particle filter (DPF).** Finalized the statement of work and drafted the RFP. Expect to issue the RFP before the end of the calendar year. Will demonstrate low emission performance with the SCR and DPF technologies and evaluate sensitivities to fuel variables. Plan to use one heavy-duty engine and one light-duty engine, three different SCR catalysts paired with DPFs. Expect to begin testing in the Spring of 2001.

- **Fuels, engines, NO<sub>x</sub> adsorber/DPF technologies.** Finalized the statement of work and test plan, issued the RFP for a contractor to perform the tests. Posted NO<sub>x</sub> adsorber Summary Report on DECSE web site. Will determine the low diesel emissions performance of two heavy-duty and two light-duty engines, controls, fuel, eight NO<sub>x</sub> adsorbers, four DPFs, and thermal management technologies. Expect to begin testing in the Spring of 2001.
- **Lubricants.** Expect to issue the RFP this month for a subcontractor to perform the tests. Defined a three-phase plan to test the impact of engine lubricants on engine-out emissions and the performance of emission control systems. Plan to use a multi-cylinder diesel engine equipped with exhaust gas recirculation hardware and using 3-ppm diesel fuel. Will test four different oil basestocks and approximately 12 additive packages containing various levels of ash, sulfur, phosphorous, selected metals, and other key components. Will measure particulate matter, including sulfate and nitrate fractions, metal content, toxics, and size distribution; NO<sub>x</sub>; SO<sub>2</sub>; and HC. Will develop a lubricants matrix and a method to evaluate and confirm oil consumption.

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