

## DOE completes one million test miles on oil bypass filters in Idaho National Laboratory buses and light-duty vehicles

The U.S. Department of Energy, through its Advanced Vehicle Testing Activity, has accumulated one million oil-bypass-filter-test miles on 11 Idaho National Laboratory (INL) buses and six light-duty Chevrolet Tahoes. Oil bypass filters are used to extend engine oil life by cleaning solid contaminants as small as one micron out of the engine oil, as well as removing harmful liquid and gaseous contaminants from engine oil.

Bypass filters from puraDYN Inc. and Refined Global Solutions Inc. are being used to evaluate the feasibility of reducing engine oil use and minimizing waste oil generation at INL as well as throughout the DOE complex. INL personnel that manage DOE's Advanced Vehicle Testing Activity, along with the staff from INL Fleet Operations, are conducting the oil-bypass-filter technology evaluation. Fourteen oil-bypass-filter systems from puraDYN are being used on eight INL buses and six INL Tahoes, while oil-bypass-filter systems from Refined Global Solutions are being used on three INL buses.

The standard internal combustion engine oil filter is a *full flow* filter that filters the entire flow of the engine's oil pump (about 2,100 gallons per hour in the INL diesel buses) down to the 40 to 60 micron particle size. A *bypass* oil filter is a secondary, aftermarket oil filter system installed for super cleaning (down to one micron) a partial flow (about eight gallons per hour) of the

engine oil. During the 1 million test miles, the oil bypass filters have been used to avoid 80 percent of the oil changes in the test buses, avoiding the use and waste generation of 1,680 quarts (420 gallons) of bus engine oil. The Tahoes have demonstrated a 75 percent reduction in engine oil changes, avoiding the use and waste generation of more than 130 quarts (33 gallons) of engine oil.

Based on the results of the INL testing, analysis has shown that annual engine oil savings of up to 32,000 gallons could be achieved if oil bypass filters were used in the entire DOE fleet nationwide and up to 1.7 million gallons could be saved annually if oil bypass filters were used by all federal fleets. For most bus fleets, the economic payback occurs about 100,000 miles.

In addition to supporting DOE's goal of ensuring energy security for the United States, this demonstration provides the environmental benefit of reducing the generation of waste oil products.

To validate the extended oil-drain intervals, an oil-analysis regime evaluates the fitness of the oil for continued service by monitoring the presence of 30 variables, including: necessary oil additives, undesirable contaminants, engine- and component-wear metals, and oxidation and nitration levels. The testing also includes counting the number and size of particulates suspended in the oil of the test buses and Tahoes to validate the effectiveness of the filters. In addition, heightened wear-metal levels can be used to identify potential engine and component failures.

Nine quarterly reports documenting the Oil Bypass Filter Evaluation results can be found at [HYPERLINK "http://avt.inl.gov/obp.html"](http://avt.inl.gov/obp.html) <http://avt.inl.gov/obp.html>. The evaluation test plans can also be found at this address.

These elements of the Advanced Vehicle Testing Activity are managed for the DOE Office of Energy

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**For more information**

*For more information on the Advanced Vehicle Testing Activity and its testing methods and activities, visit the Advanced Vehicle Testing Activity Web page*  
**HYPERLINK** “  
<http://avt.inl.gov/>”  
<http://avt.inl.gov>,

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Efficiency and Renewable Energy from the Idaho National Laboratory in Idaho Falls, Idaho.

DOE, through its Advanced Vehicle Testing Activity, conducts Accelerated Reliability and Fleet testing on hybrid, neighborhood and urban electric vehicles, as well as hydrogen-powered internal combustion vehicles. (The Advanced Vehicle Testing Activity is a DOE activity within the FreedomCAR and Vehicle Technology Program.) The

Advanced Vehicle Testing Activity performs unbiased baseline performance testing to provide benchmark data for technology modeling and research and development programs, as well as to help fleet managers and other vehicle purchasers make informed purchase and operations decisions.

Note: Reference to any specific manufacturer or products is not an endorsement by the federal government nor the INL.

INL is a U.S. Department of Energy national laboratory operated by Battelle Energy Alliance

