

US EPA ARCHIVE DOCUMENT

THE ENVIRONMENTAL TECHNOLOGY VERIFICATION  
PROGRAM



## ETV Joint Verification Statement

<b>TECHNOLOGY TYPE:</b>	<b>MOBILE DIESEL ENGINE AIR POLLUTION CONTROL</b>
<b>APPLICATION:</b>	<b>CONTROL OF EMISSIONS FROM MOBILE DIESEL ENGINES IN HIGHWAY USE WITH A PARTICULATE FILTER</b>
<b>TECHNOLOGY NAME:</b>	<b>LUBRIZOL ENGINE CONTROL SYSTEMS PURIFILTER PARTICULATE FILTER</b>
<b>COMPANY:</b>	<b>LUBRIZOL ENGINE CONTROL SYSTEMS</b>
<b>ADDRESS:</b>	<b>165 PONY DRIVE NEWMARKET, ONTARIO CANADA L3Y 7V1 PHONE: (905) 853-5500</b>

The U.S. Environmental Protection Agency (EPA) has created the Environmental Technology Verification (ETV) Program to facilitate the deployment of innovative or improved environmental technologies through performance verification and dissemination of information. The goal of the ETV Program is to further environmental protection by accelerating the acceptance and use of improved and cost-effective technologies. ETV seeks to achieve this goal by providing high-quality, peer-reviewed data on technology performance to those involved in the design, distribution, financing, permitting, purchase, and use of environmental technologies.

ETV works in partnership with recognized standards and testing organizations; stakeholder groups, which consist of buyers, vendor organizations, permittees, and other interested parties; and with the full participation of individual technology developers. The program evaluates the performance of innovative technologies by developing test plans that are responsive to the needs of stakeholders, conducting field or laboratory tests (as appropriate), collecting and analyzing data, and preparing peer-reviewed reports. All evaluations are conducted in accordance with rigorous quality assurance protocols to ensure that data of known and adequate quality are generated and that the results are defensible.

The Air Pollution Control Technology Verification Center (APCTVC), one of six centers under the ETV Program, is operated by Research Triangle Institute (RTI), in cooperation with EPA's National Risk Management Research Laboratory. The APCTVC has evaluated the performance of an emissions control system consisting of a precious and base metal, passively regenerated particulate filter for mobile diesel engines.

## ETV TEST DESCRIPTION

All tests were performed in accordance with the general test plan *Test/QA Plan for the Verification Testing of Diesel Exhaust Catalysts, Particulate Filters, and Engine Modification Technologies for Highway and Nonroad Use Diesel Engines* and the *Test-Specific Addendum to ETV Mobile Source Test/QA Plan for Lubrizol Engine Control Systems precious metal passively regenerating particulate filter*. These documents are written in accordance with the applicable generic verification protocol and include requirements for quality management, quality assurance, procedures for product selection, auditing of the test laboratories, and test reporting format.

The mobile diesel engine air pollution control technology was tested on two different engines at Southwest Research Institute. The performance verified was the percentage emission reduction achieved by the technology for particulate matter (PM), nitrogen oxides (NO<sub>x</sub>), hydrocarbons (HC), and carbon monoxide (CO) relative to the performance of the same baseline engine without the technology in place. Operating conditions were documented and ancillary performance measurements were also made. A summary description of the ETV test is provided in Table 1.

**Table 1. Summary Description of the ETV Test**

Test type	Highway Transient Federal Test Procedure (FTP), heavy-duty cycle
First engine family	XNVXHO7.3ANE
First engine make–model year	Navistar International Corporation–1999
First engine service class	On-highway, heavy-duty diesel engine
First engine rated power	183 kW (244 bhp) @ 2,600 rpm
First engine displacement	7.3 L
Second engine family	1DDXHO8.5FJY
Second engine make–model year	Detroit Diesel Corporation (DDC)–2001
Second engine service class	On-highway, heavy-duty diesel engine
Second engine rated power	206 kW (275 bhp) @ 2,100 rpm
Second engine displacement	8.5 L
Technology	Lubrizol Engine Control Systems Purifilter particulate filter
Technology description	A precious and base metal, passively regenerated particulate filter used with ultralow-sulfur diesel (ULSD) fuel
Test cycle or mode description	One cold-start and three hot-start tests according to FTP test
Test fuel description	EPA standard low-sulfur and ultralow-sulfur No. 2 diesel fuels per 40 CFR Part 86.1313
Critical measurements	PM, NO <sub>x</sub> , HC, and CO
Ancillary measurements	CO <sub>2</sub> , exhaust back-pressure, exhaust temperature, and fuel consumption

## VERIFIED TECHNOLOGY DESCRIPTION

This verification statement is applicable to Lubrizol Engine Control Systems Purifilter (Model SC17L) precious and base metal, passively regenerated particulate filter. It is applicable to mobile diesel engines fueled by commercial ULSD fuel (meeting the EPA specifications for 2007 at less than 15 ppm maximum sulfur content).

This verification statement describes the performance of the tested technology on the diesel engine and fuels identified in Table 1.

## VERIFICATION OF PERFORMANCE

The Lubrizol Engine Control Systems Purifilter achieved the reduction in tailpipe emissions shown in Table 2 at the stated conditions.

**Table 2. Verified Emissions Reductions for System Consisting of Lubrizol Engine Control Systems Purifilter**

Test Engine	Device type	Fuel		Mean Emissions Reduction (%)				95% Confidence Limits on the Emissions Reduction (%)			
		Baseline	Controlled	PM <sup>c</sup>	NOx	HC	CO	PM <sup>c</sup>	NOx	HC	CO
Navistar	Aged	LSD	ULSD	95	a	88	71	91-99	a	79-97	70-73
DDC	Degreened	LSD	ULSD	86	a	b	87	83-90	a	b	83-92
DDC	Aged	LSD	ULSD	91	a	b	79	88-95	a	b	74-84

<sup>a</sup> The emissions reduction could not be distinguished from zero with 95% confidence.

<sup>b</sup> The emissions reduction could not be quantified or distinguished from 100% with 95% confidence.

<sup>c</sup> The verified PM emissions reduction combines reductions related to the control technology and the change in fuel sulfur level.

For the purposes of determining the status of the technology in regard to EPA's voluntary diesel retrofit program, the prospective user is encouraged to contact EPA's Office of Transportation and Air Quality (OTAQ) or visit the retrofit program web site at <http://www.epa.gov/otaq/retrofit/>.

The APCTVC QA Officer has reviewed the test results and quality control data and has concluded that the data quality objectives given in the generic verification protocol and test/QA plan have been attained. EPA and APCTVC quality assurance staff have conducted technical assessments at the test laboratory and of the data handling. These confirm that the ETV tests were conducted in accordance with the EPA-approved test/QA plan.

This verification statement verifies the emissions characteristics of the *Lubrizol Engine Control Systems Purifilter* for the stated application. Extrapolation outside that range should be done with caution and an understanding of the scientific principles that control the performance of the technologies. This verification focused on emissions. Potential technology users may obtain other types of performance information from the manufacturer.

In accordance with the generic verification protocol, this verification statement is valid, commencing on the date below, indefinitely for application of *Lubrizol Engine Control Systems Purifilter* within the range of applicability of the statement.

Original signed by L. W. Reiter                      6/7/04

Lawrence W. Reiter Ph. D  
Acting Director  
National Risk Management Research  
Laboratory  
Office of Research and Development  
United States Environmental Protection  
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Date

Original signed by A. R. Trenholm                      6/9/04

Andrew R. Trenholm  
Director  
Air Pollution Control Technology  
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Date