THE ENVIRONMENTAL TECHNOLOGY VERIFICATION PROGRAM

U.S. Environmental Protection Agency

ETV Joint Verification Statement

TECHNOLOGY TYPE:	**MOBILE DIESEL ENGINE AIR POLLUTION CONTROL**
APPLICATION:	**CONTROL OF EMISSIONS FROM MOBILE DIESEL ENGINES IN HIGHWAY USE BY DIESEL OXIDATION CATALYST (DOC) AND CLOSED CRANKCASE VENTILATION (CCV) SYSTEM**
TECHNOLOGY NAME:	**201350N DOC PLUS COALESCER BREATHER CV5061200 AND CRANKCASE DEPRESSION REGULATOR (CDR) VALVE 395587500**
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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, permitters, 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 (QA) 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 (APCT Center), one of six centers under the ETV Program, is operated by RTI International (RTI), in cooperation with EPA's National Risk

Management Research Laboratory. The APCT Center has evaluated the performance of an emissions control system consisting of a precious metal diesel oxidation catalyst and diesel particulate filter for highway diesel engines.

ETV TEST DESCRIPTION

All tests were performed in accordance with the *Test/QA Plan for the Verification Testing of Diesel Exhaust Catalysts, PM 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 Cummins Emission Solutions & Cummins Filtration for the 201350N DOC + Coalescer Breather CV5061200.* These documents are written in accordance with the applicable generic verification protocol and include requirements for quality management, QA, procedures for product selection, auditing of the test laboratories, and test reporting format.

The mobile diesel engine air pollution control technology was tested January 10-12, 2007, at Southwest Research Institute. The performance verified was the percentage emission reduction achieved by the technology for particulate matter (PM), nitrogen oxides (NO_x), 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)
Engine family	YCEXH0661MAH
Engine make–model year	Cummins – 2000 ISM 350 ESP
Service class	Highway, heavy heavy-duty diesel engine
Engine rated power	350 hp at 2100 rpm
Engine displacement	10.8 L, inline six-cylinder
Technology	201350N DOC plus coalescer breather CV5061200 and crankcase depression regulator (CDR) valve 395587500
Technology description	Diesel oxidation catalyst (DOC) and closed crankcase ventilation (CCV)
Test cycle or mode description	One cold-start and multiple hot-start tests according to FTP test for baseline engine, degreened and aged systems.
Test fuel description	Ultra-low-sulfur diesel (ULSD) fuel with 15 ppm sulfur maximum
Critical measurements	PM, NO_x, HC, and CO
Ancillary measurements	CO_2, NO, NO_2 (by calculation), soluble organic fraction (SOF) of PM, exhaust backpressure, exhaust temperature, and fuel consumption

VERIFIED TECHNOLOGY DESCRIPTION

The Cummins Emission Solutions & Cummins Filtration's 201350N precious metal diesel oxidation catalyst (DOC) and closed crankcase ventilation (CCV) system, consists of the DOC plus the coalescer breather CV5061200 and crankcase depression regulator (CDR) valve 395587500. This verification statement describes the performance of the tested technology on the diesel engine and fuels identified in Table 1, and applies only to the use of the 201350N DOC plus coalescer breather

CV5061200 and CDR valve 395587500 on highway engines fueled only by ULSD (15 ppm or less) fuel.

VERIFICATION OF PERFORMANCE

The 201350N DOC plus coalescer breather CV5061200and CDR valve 395587500 achieved the reduction in tailpipe emissions shown in Table 2 compared to baseline operation without the DOC+CCV system.

Table 2. Verified Emissions Reductions

Device type	Fuel	Mean Emissions Reduction (%)				95% Confidence Limits on the Emissions Reduction (%)			
		PM	NO_x	HC	CO	PM	NO_x	HC	CO
Degreened	ULSD	31	2.8	80	71	27 to 34	2.0 to 3.7	75 to 86	70 to 73
Aged	ULSD	30	0.68	68	60	26 to 34	– [a]	62 to 73	59 to 61

[a] The emission reduction cannot be distinguished from zero with 95% confidence.

The APCT Center 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 APCT Center QA staff have conducted technical assessments of the test laboratory and of the data handling. These assessments 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 201350N DOC plus coalescer breather CV5061200 and CDR valve 395587500 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 technology. This verification focuses 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 the 201350N DOC plus coalescer breather CV5061200 and CDR valve 395587500 within the range of applicability of the statement.

Original signed by S. Gutierrez *7/16/07*

Sally Gutierrez Date
Director
National Risk Management Research Laboratory
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Original signed by A. R. Trenholm *7/3/07*

Andrew R. Trenholm Date
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