

**THE ENVIRONMENTAL TECHNOLOGY VERIFICATION
PROGRAM**



ETV Joint Verification Statement

TECHNOLOGY TYPE: DUST SUPPRESSANT

APPLICATION: CONTROL OF DUST ON UNPAVED ROADS

TECHNOLOGY NAME: EnviroKleen

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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, 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 (QA) protocols to ensure that data of known and adequate quality are generated and that the results are defensible.

The Air Pollution Control Technology (APCT) Verification Center, a center 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 a dust suppressant product for control of dust on an unpaved road.

ETV TEST DESCRIPTION

A field test program was designed by RTI and Midwest Research Institute (MRI) to evaluate the performance of dust suppressant products. Five dust suppressants manufactured or distributed by three firms were tested in this program. The field test for Midwest Industrial Supply's EnviroKleen was conducted at two sites: Fort Leonard Wood, Missouri (FLW), and Maricopa County, Arizona (MC). Test/QA plans for the field testing at FLW and MC were developed and approved by EPA in July 2003. These test/QA plans describe the procedures and methods used for the tests. The July 2003 versions of the test/QA plans were based on October 2002 versions and subsequent test/QA plan addenda (dated February 2003). The goal of each test was to measure the performance of the products relative to uncontrolled sections of road over a 1-year period. Field testing was planned quarterly over a 1-year period; however, some logistical difficulties related to winter weather and then maintenance activities on the roads of interest arose, and the test/QA plans were revised (Rev 3) to address those issues. At FLW, testing occurred per the test/QA plan for three roughly 6-month periods. At MC, testing was conducted for only two quarterly test periods, per the test/QA plan. At FLW, two of those test periods are summarized below and are considered most representative of product performance; the third testing period at FLW occurred after unexpected road maintenance, and those data may be seen in the verification report. At MC, one of the two test periods is summarized below and is considered representative of product performance; data from the second testing period at MC that occurred after unexpected road maintenance may be seen in the verification report. The verification report also contains 90 percent confidence limits for the data collected during all of the test periods at each site. Emissions measurements were made for total particulate (TP), particulate matter less than or equal to 10 micrometers (μm) in aerodynamic diameter (PM_{10}), and for particulate matter less than or equal to 2.5 μm in aerodynamic diameter ($\text{PM}_{2.5}$).

One of the host facilities for the field test program, FLW, is a U.S. Army base. The test site used unpaved Roads P and PA in training area (TA) 236. Roads P and PA are the main access routes to TA 236 and are traveled by truck convoys, as well as traffic into and out of TA 236. EnviroKleen was applied to test section B located on Road PA; test section F, located on Road P, was left untreated as the experimental control. Section 3.1 of the verification report provides a figure showing the test locations. Testing at FLW was conducted during October 2002, May 2003, and October 2003.

The other host facility for the field test program, MC, is located on Broadway Road (a county road) near the towns of Buckeye and Wintersburg, Arizona. The sections used for dust suppressant testing were on portions of the road constructed of shale. The road typically experiences approximately 150 vehicle passes per day, with the majority of passes by light-duty cars and trucks. Much of the traffic appears to be associated with local residents commuting to their workplaces and thus occurs during the early morning and late afternoon hours. Test sections were located on Broadway Road east of 355th Avenue. EnviroKleen was evaluated on the section immediately east of 355th Avenue. The uncontrolled measurements were conducted on a separate section of Broadway Road. Section 3.1 of the verification report provides a figure showing the test locations. Testing at MC was conducted during May 2003 and August 2003.

Table 1 presents test conditions for key parameters that may affect the performance of dust suppressants on unpaved roads.

Table 1. Test Conditions

Parameter	FLW, October 2003	FLW, May 2003	MC, May 2003
Initial application rate, l/m ²	1.4	1.4	0.83
Follow-up application rate, l/m ²	0.43	0.32	0.27
Time between application and testing, days	120	77	70
Precipitation during test week, cm	0.2	3.7	0
Precipitation during week before testing, cm	1.8	3.2	0
Precipitation between application and testing, total, cm	39	24	1.3
Soil moisture during test weeks, %—uncontrolled road	0.62–1.5	0.01–1.8	0.22
Soil moisture during test weeks, %—controlled road	0.48–0.58	1.3	0.14
Soil silt during test weeks, %—uncontrolled road	1.7–5.4	1.5–4.3	4.7
Soil silt during test weeks, %—controlled road	1.1–4.3	1.3	1.0

The EnviroKleen product was analyzed using an array of chemical and toxicity tests. The results of these tests are included in the appendices to the verification report. A summary of the toxicity data is presented in Table 2.

Table 2. Toxicity Test Results

Species	Acute LC ₅₀ for survival	Chronic LC ₅₀ for survival	Chronic EC ₅₀
<i>Ceriodaphnia dubia</i>	>1,000 mg/L (48-hr)	>1,000 mg/L (7-d)	>1,000 mg/L (7-d), reproduction
Fathead minnow	>1,000 mg/L (96-hr)	>1,000 mg/L (7-d)	>1,000 mg/L (7-d), growth
<i>Americamysis bahia</i>	>1,000 mg/L (96-hr)	>1,000 mg/L (7-d)	>1,000 mg/L (7-d), growth, fecundity

d = day

EC₅₀ = effective concentration which affects 50% of sample population

hr = hour

LC₅₀ = lethal concentration which kills 50% of sample population

LOEC = lowest observed effective concentration

mg/L = milligrams per liter

NOEC = no observed effect concentration

VERIFIED TECHNOLOGY DESCRIPTION

This verification statement is applicable to *Midwest Industrial Supply's EnviroKleen*, which is a hydrotreated, hydrocracked, hydroisomerized, high-viscosity synthetic isoalkane. The material safety data sheet (MSDS) for EnviroKleen is retained in the RTI project files and is available at <http://www.midwestind.com/problemsolver/productmaterials/EKMSDS.pdf> [accessed July 2005].

VERIFICATION OF PERFORMANCE

The overall reduction in particulate matter emissions achieved by the EnviroKleen dust suppressant compared to uncontrolled sections of road is shown in Table 3.

Table 3. Summary of Test Results

Test location	Average control efficiency, %			Noted events
	TP	PM ₁₀	PM _{2.5}	
FLW, October 2003	81	>87	20	Rain events the day before test. ^a
FLW, May 2003	>99	>98	>90	Rain events the morning of test. ^b
MC, May 2003	78	91	87	None.

^a All test sections were wet from rain the previous day. The uncontrolled section was heavily potholed and another section was used for the test. MRI used traffic to dry the road before testing.

^b Rainfall in the morning meant that the uncontrolled section of the road was wet and another section was used for the test.

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 at the test organization 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 effectiveness of *Midwest Industrial Supply's EnviroKleen* to control dust on unpaved roads as described above. 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 *Midwest Industrial Supply's EnviroKleen* to control dust on unpaved roads.

Signed by Sally Gutierrez

9/25/2005

Signed by Andrew Trenholm

9/16/2005

Sally Gutierrez, Director
National Risk Management Research
Laboratory
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