



California Environmental Protection Agency



EQUIPMENT AND PROCESS PRECERTIFICATION PROGRAM

**EVALUATION OF THE AIR QUALITY PERFORMANCE CLAIMS
FOR PENNZOIL-QUAKER STATE COMPANY
PENNZSUPPRESS® D
Dust Suppressant**

AUGUST 2000

Equipment:
Applicant:

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ABSTRACT

The purpose of this report is to document the California Air Resources Board's (ARB's) evaluation and verification of the air quality-related claims made by the Pennzoil-Quaker State Company concerning its PennzSuppress D[®], a dust suppressant.

In an effort to make progress towards attaining healthy air quality in California, regulations restrict PM₁₀ emissions from a broad spectrum of activities. PM₁₀ emissions are formed as products of combustion or indirectly as fugitive dust. The reduction of PM₁₀ emissions from all sources is part of California's clean air strategy to achieve and maintain healthy air quality in California.

As part of its Equipment and Process Precertification (Equipment Precertification) Program application package, the Pennzoil-Quaker State Company requested that the ARB evaluate its proposed performance claim with respect to the fact that PennzSuppress D[®] reduces PM₁₀ emissions from unpaved roads.

Upon successful completion of the requirements associated with the ARB's Equipment Precertification Program, a report is issued with two companion documents—an Executive Order and a certificate. These documents serve as official records that the ARB has independently verified the applicant's performance claims. Executive Orders earned under the ARB's Equipment Precertification Program are valid for three years from the date issued, presuming the holder complies with: 1) the terms and conditions identified in this report and 2) the general requirements discussed in the Equipment Precertification Program Guidelines and Criteria.

After review of the documents discussed throughout this report, the ARB recommends that a Precertification certificate be issued for the Pennzoil-Quaker State Company PennzSuppress D[®] dust suppressant.

**CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
AIR RESOURCES BOARD**

**EQUIPMENT AND PROCESS
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DUST SUPPRESSANT**

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I. INTRODUCTION

This report discusses the PennzSuppress® D dust suppressant manufactured by the Pennzoil-Quaker State Company, the performance claim to be verified by the Air Resources Board (ARB), the emissions testing results, and the findings and recommendations of the ARB staff concerning this technology.

This report is organized into several sections. The next section, General Information, provides background information on the ARB's Equipment and Process Precertification (Precertification) Program. The subsequent sections, Summary of Scope, Statement of Claims, and Description of Technology, discuss the breadth of our evaluation, the performance claim for PennzSuppress® D, and a detailed description of PennzSuppress® D.

The following two sections, Technical Evaluation and Evaluation of Claims, present detailed information on our technical review and assessment of PennzSuppress® D. The sections entitled: Quality Management and Environmental and Economic Benefits provide supporting information on the Pennzoil-Quaker State Company's procedures to produce a dust suppressant that meets the company's claim and a brief assessment of the potential environmental and economic impacts of the technology.

Finally, the remaining sections: Recommendations and Precertification Conditions discuss the ARB staff's determination of the performance of PennzSuppress® D relative to the company's claim. These sections also

provide some guidance with respect to the specific conditions that must be met for the certificate to remain valid for three years.

Appendix A contains a listing of the information that we relied upon to conduct our evaluation. Appendices B through G contain some of the detailed information that supports the evaluation in this report.

II. GENERAL INFORMATION

Under the regulations established for the program, equipment or processes eligible for Precertification must: 1) have an air quality benefit; 2) be commonly-used or have the potential to be commonly-used in the near future (market ready); and 3) not pose a significant potential hazard to public health and safety and the environment. Furthermore, to be eligible, applicants for the program must demonstrate that they have sufficient control over the manufacture of the equipment or process to ensure that they can consistently and reliably produce equipment which performs at least as well as that considered in this evaluation.

A. Equipment Precertification Program Background

The Equipment Precertification Program is a voluntary statewide program for manufacturers of commonly-used equipment or processes. A precondition for entry into the program is that the equipment has an air quality benefit. On June 14, 1996, the ARB adopted section 91400 of the California Code of Regulations which incorporates the Criteria for Equipment and Process Precertification (Criteria). The regulation and Criteria were approved by the California Office of Administrative Law on October 31, 1996 and became effective

on November 30, 1996.

Under the Equipment Precertification Program, manufacturers request that the ARB conduct an independent third-party verification of performance claims which focus on the air quality benefits of its equipment or process. If the claims are verified, the manufacturer is free to refer to the results of the ARB staff's evaluation in its marketing literature. Upon successful completion of the verification process, the ARB staff notify air pollution control and air quality management districts (Districts) in California of its determination. As a result of the ARB's notification, Districts have an advance opportunity to become familiar with the performance of the equipment or process.

On October 20, 1997, the ARB received a request from Pennzoil-Quaker State Company that the ARB staff determine if PennzSuppress® D was eligible for the Equipment Precertification program. After receiving confirmation from ARB staff that PennzSuppress® D was eligible for the program, Pennzoil-Quaker State Company submitted a Precertification application package. As part of our review of the application package, we evaluated formulation information, the results of emissions testing programs, and other information concerning the performance of PennzSuppress® D to determine whether the claim was verifiable.

B. Relationship to Air Quality

1. PM₁₀ Emissions

PM₁₀ emissions can adversely affect the respiratory system and can cause decreased visibility. In an effort to make progress toward attaining healthful air

quality in California, regulations restrict PM₁₀ emissions from a broad spectrum of activities. PM₁₀ emissions are formed as products of combustion or as fugitive dust. Fugitive dust is any solid particulate matter that becomes airborne, other than that emitted from an exhaust stack, directly or indirectly as a result of human activity. The primary chemical constituents of fugitive dust are oxides of silicon, aluminum, and iron, and some calcium compounds. Some examples of fugitive dust sources are agricultural operations, construction activities, dry lakebeds, and unpaved roads.

Unpaved roads are any unsealed or unpaved roads, equipment paths, or travel ways that are not covered by one of the following: concrete, asphaltic concrete, recycled asphalt, asphalt, or other materials with equivalent performance. Fugitive dust emissions from unpaved roads are caused primarily by movement of vehicles, equipment, and spillage from haul loads. Emissions from unpaved roads can also be caused when mud from a wet unstabilized road surface sticks to vehicle tires or undercarriages, is tracked onto paved roads, and upon drying generates fugitive dust when subjected to vehicle traffic.

As a vehicle traverses an unpaved road, the force of its wheels on the road surface pulverizes the surface material. Particles are lifted and dropped from the rolling wheels by the wind-shearing action generated from the passing vehicle. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed. The wind shear lifts particles that are smaller than 425 microns (sand size and smaller) from the road surface to generate dust.

Soil type does not appear to have a measurable influence on the effectiveness of chemical dust suppressants. In fact, the 1987 United States Environmental Protection Agency (U.S. EPA) report used to develop emissions factors for unpaved roads indicated that it did not appear possible to develop a meaningful expression that related the control performance of chemical suppressants to the amount of silt (a parameter used to classify soils) present on the road surface.

2. Control of PM₁₀ Emissions from Unpaved Roads

The measures available to suppress PM₁₀ emissions from unpaved roads include reduction of vehicular trips, speed control, surface modification, and surface treatment. The reduction of vehicular trips is accomplished by restricting access (such as bussing of employees) or redirecting vehicle traffic. Speed control involves limiting vehicle speeds to no greater than 15 miles per hour through the use of employee training, the posting of signs, installation of speed bumps, and other speed control measures. Surface modification is the covering of unpaved roads with materials such as asphalt, concrete, recycled road base, or gravel. Surface treatment includes frequent watering, application of hygroscopic materials (such as chloride salts and wood pulp by-products), and application of chemical stabilizers.

Eleven air quality management plans have been prepared by Districts for areas within their jurisdiction that did not attain the National Ambient Air Quality Standard for PM₁₀. Many of these plans have included the development of rules governing a number of sources of fugitive

dust, including unpaved roads. For example, South Coast Air Quality Management District (SCAQMD) Rule 403 requires the implementation of best available fugitive dust control measures for unpaved roads during active operations within the South Coast Air Basin. Rule 403 also requires large operations to implement specific control actions or, alternatively, submit a fugitive dust emission control plan for all sources, including unpaved roads. Dust suppressants are referred to in many District rules as “dust palliatives”. For the purposes of this evaluation, the two terms were considered to be interchangeable.

Districts in California do not require that an air quality permit be obtained prior to the application of a dust suppressant. However, most Districts require that chemical stabilizers used as dust suppressants be non-toxic. In order to be effective, a non-toxic chemical stabilizer must be of sufficient concentration and application frequency to maintain a stabilized surface. A stabilized unpaved road surface is defined by the SCAQMD as one in which any fugitive dust plume emanating from vehicular traffic does not exceed 20 percent opacity.

Most Districts disallow the use of chemical stabilizers that are prohibited from use by the Regional Water Quality Boards, the ARB, the U.S. Environmental Protection Agency (U.S. EPA), or any applicable law, rule, or regulation. The Districts also stipulate that a chemical stabilizer should meet any specifications, criteria, or tests required by any federal, state, or local water agency.

The reduction of PM₁₀ emissions from unpaved roads is part of California's

clean air strategy to achieve and maintain healthful air quality in California. Because the use of PennzSuppress® D reduces fugitive dust emissions from unpaved roads, the ARB evaluated PennzSuppress® D as air pollution control equipment.

C. Health and Environmental Impacts

As part of our evaluation, ARB staff consulted with other governmental agencies to conduct a cursory review of the potential health and environmental impacts associated with PennzSuppress® D.

Based on our review of the Material Safety Data Sheet (MSDS) for PennzSuppress® D, we determined that PennzSuppress® D would not likely present health impacts significantly different from those associated with asphalt or concrete road paving materials which are currently in wide use throughout California.

As mentioned earlier in this report, local air Districts in California do not require that an air quality permit be obtained prior to the application of a dust suppressant. However, air Districts do require that a chemical dust suppressant meet any specifications, criteria, or tests required by any federal, state, or local water agency.

A regional water quality control board (board) requires a report of waste discharge if the application of the dust suppressant threatens water quality. Therefore, the appropriate regional board should be contacted to obtain a determination of the acceptability of using PennzSuppress® D as a dust suppressant for the application in

question. The State of California Water Resources Control Board indicated in a memorandum to the ARB dated April 12, 2000, that it did not oppose ARB's performance precertification of PennzSuppress® D.

The concentrated form of PennzSuppress® D was subjected to the U.S. EPA's Toxicity Characteristics Leaching Procedure (TCLP) which is one of the tests used to assess whether a substance should be handled as a hazardous waste. The results of the "inorganics", "volatiles", and "semi-volatiles" TCLP tests did not show any detectable levels of regulated chemicals.

The California Department of Toxic Substance Control (DTSC) and its four regional offices regulate the management of hazardous waste in California. After reviewing the PennzSuppress® D TCLP results, Material Safety Data Sheets, and other product information, the DTSC indicated that it would not expect the product to be regulated as a hazardous waste. The DTSC indicated that it does not have any concerns with ARB's precertification of PennzSuppress® D for air-related claims.

PennzSuppress® D contains hydrocarbons that are primarily C-25 and higher. The results of two laboratory analyses submitted to the ARB by Pennzoil-Quaker State Company showed no detectable levels of reactive volatile organic compounds (VOCs) in PennzSuppress® D. Therefore, it is reasonable to expect that the use of PennzSuppress® D will not significantly contribute to existing levels of VOCs.

Please note that Pennzoil-Quaker State

Company, its distributors, and/or applicators of PennzSuppress® D are required to meet all applicable federal, state, and local laws, rules and regulations with respect to the manufacture, transport, sale, storage, application, and disposal of PennzSuppress® D.

D. Manufacture/Ownership Rights

The recommendations in this report are contingent upon Pennzoil-Quaker State Company having the legal rights to produce and/or market PennzSuppress® D. Pennzoil-Quaker State Company documented its ownership of these rights in a letter to the ARB, dated April 6, 1998.

III. SUMMARY OF SCOPE

Pennzoil-Quaker State Company claims that when unpaved roads are treated with PennzSuppress® D, emissions of fugitive dust are reduced, specifically particulate matter that is less than 10 microns in size. In addition, Pennzoil-Quaker State Company claims that PennzSuppress® D reduced emissions by approximately 85 percent after 7,000 vehicle passes on an engineered unpaved road. Generally, the control of fugitive dust emissions involves using surface modification, surface treatment, speed control, or reduction of vehicular trips.

IV. STATEMENT OF CLAIMS

The following is the claim verified by ARB staff concerning the Pennzoil-Quaker State Company's PennzSuppress® D. The verification of this claim is predicated on the presumption that PennzSuppress® D is manufactured, transported, sold, stored, applied, and disposed of in accordance with manufacturer's instructions.

When topically applied as a dust suppressant in accordance with the manufacturer's instructions, including a target concentration of 0.15 gallons of concentrate per square yard of treated surface, PennzSuppress® D reduced PM₁₀ emissions by approximately 85 percent after 7,000 vehicle (predominantly light-duty) passes on an engineered unpaved road consisting of a well-graded aggregate.

V. DESCRIPTION OF TECHNOLOGY

A. Product Composition

The undiluted form of PennzSuppress® D was evaluated for this report. PennzSuppress® D is a patented product composed primarily of a petroleum resin (2600 VIS RESIN) that contains C-25 and higher hydrocarbons. The Material Safety Data Sheet (MSDS) for PennzSuppress® D states that it is composed of 30 to 60 percent of petroleum resins, 20 to 40 percent water, 15 to 35 percent emulsifiers, 1 to 5 percent surfactants, and 5 to 15 percent vacuum residuum. The petroleum resin is produced from the vacuum tower bottoms of the refining process for highly paraffinic Pennsylvania Grade (Penn Grade) crude oil.

B. Mechanism of Action

PennzSuppress® D relies upon its high carbon-index resin to agglomerate a road's soil particles, and increase the cohesion among the aggregate particles. The agglomeration potential and the increase in cohesion hold the aggregate, including the dust particles, in place. The agglomeration of finer dust particles into larger masses increases the particle size and weight of dust-prone particles, thereby reducing the amount of dust

generated by the passing of a vehicle. As weathering occurs on a road treated with PennzSuppress® D, the resin in the road becomes harder and starts to take on the appearance of asphalt.

Because C-20 and higher compounds are not soluble in water, PennzSuppress® D does not dissolve and wash away when exposed to rain. Because of its low solubility in water, PennzSuppress® D is not influenced by moisture in the atmosphere, and thus can be used in both arid and humid environments.

C. Appropriate Uses

PennzSuppress® D is used as a fugitive dust suppressant, as a soil-compacting agent, and to control silt runoff. It is applied primarily to soils on roads, parking lots, parks, fields, offhighway motor vehicle parks, and other similar high dust areas. It can also be use to reduce windblown dust from ore and coal storage piles and to control dust mites in orchards and vineyards. However, this Precertification only evaluates the effectiveness of suppressing fugitive dust emissions from engineered unpaved roads consisting of well-graded aggregate. In this evaluation, the term “engineered unpaved road” means a purpose-built road, as opposed to a path or a trail.

Well-graded aggregate is an engineering term that defines road material with a wide range in grain sizes.

PennzSuppress® D is not recommended on aggregates that have low abrasion resistance (i.e., those that will crush and form new dust under the weight of vehicles.) Also, it is not recommended that the product be applied when the ambient temperature is below 45

degrees Fahrenheit.

PennzSuppress® D is sold in the United States via either select distributors, or directly by PennzSuppress® D representatives. Pennzoil Product Company trains its distributors and representatives about the product and its application. The distributors or representatives assist customers in determining whether PennzSuppress® D would be effective for certain applications, and if so, what application rate would be suitable. Distributors, in some cases, may also provide equipment and operators to apply PennzSuppress® D.

D. Application Procedures

This section summarizes the PennzSuppress® D manufacturer’s instructions contained in the document entitled PennzSuppress® D Recommended Practices for Reducing the Generation of Airborne Particulate Matter from Unpaved Roads. This document is available at www.pennzsuppress.com and in Appendix F of this report.

PennzSuppress® D is delivered to distributors in rail cars, tanker trailers, or in 55 gallon drums. During shipping and storage, PennzSuppress® D should not be allowed to freeze or boil.

PennzSuppress® D should be applied at temperatures above 45 degrees Fahrenheit. Prior to removing PennzSuppress® D from its storage vessel, it should be thoroughly mixed.

Pennzoil-Quaker State Company recommends a target concentration rate of 0.15 gallons of concentrate per square yard of unpaved road surface to achieve optimal dust control. This is the same

concentration rate that was achieved in the emissions testing results that were reviewed as part of this evaluation. The thickness of the PennzSuppress® D coating and the depth of its penetration into soil are controlled by varying the water-to-concentrate ratio, as well as the total volume of the diluted product per area.

PennzSuppress® D is applied using a liquid application truck with a pressurized spray bar (typically operated at 20 to 30 psi) designed to apply the product evenly over the roadbed surface. For some situations, heavy equipment may also be needed to condition the roadbed before and after application. This equipment can include a milling/reclaiming machine, a motor grader with blade attachments, a pneumatic rubber-wheel roller, or a vibratory steel drum roller.

Some soil types are best treated with a one-time heavy application of PennzSuppress® D, while others may require several light applications. For example, for some very dry unpaved road surfaces in arid environments, a series of pre-treatments of water or very dilute applications of PennzSuppress® D may be required to “pre-wet” the soil to allow for enhanced penetration. If these series of pre-wetting applications are not applied, a very dry unpaved road in an arid environment may exhibit “beading up”, and thus, no penetration of the PennzSuppress® D into the soil matrix. In general, the depth of penetration of PennzSuppress® D ranges from in excess of 15 millimeters in moderately permeable aggregates to in excess of 8 millimeters in low permeability aggregates.

Initial preparation of the unpaved road is essential to allow for even and effective treatment with PennzSuppress® D. The road should be free of imperfections such as potholes, wash-boarding, aggregate loss, rutting, etc. Improper drainage should be corrected by constructing a crown/slope on the road, cutting ditches along the length of the road and/or constructing drainage beneath the road surface. Roadways should be crowned to allow rainfall to readily drain into ditches. If the area to be treated is hard and compacted, the surface should be scarified to a depth of one to two inches. All open drains should be covered prior to application.

Typically, PennzSuppress® D is applied in at least two consecutive treatments to achieve the target concentration of no less than 0.15 gallon of concentrate per square yard (0.68 liters per square meter) of unpaved road surface. The second application is required within 7 to 10 days of the first application. Pennzoil-Quaker State Company recommends that the road should be rolled after each application. Because PennzSuppress® D penetrates soil and sets up rapidly, roads may be opened up to traffic immediately after treatment without any concern about product residue adhering to vehicles. In warm summer months, PennzSuppress® D cures in less than an hour. Cure times increase as temperatures decrease.

The frequency of treatments of PennzSuppress® D will depend on the soil conditions and amount of vehicle traffic. The common industry practice is to retreat with a dust suppressant approximately every 4 to 6 weeks, depending on the nature and amount of vehicle traffic. The control efficiency claim

that is verified in this report assumes that PennzSuppress® D is re-applied every 28 days. It is reasonable to assume that after repeated treatments of PennzSuppress® D, the amount of product required to achieve dust suppression will, to a point, likely decrease over time.

VI. TECHNICAL EVALUATION

A. Description of Field Testing

Pennzoil contracted with Midwest Research Institute (MRI) to evaluate the effectiveness of PennzSuppress® D in controlling fugitive dust emissions from unpaved roads. MRI conducted a series of sampling runs on Linda Vista Road in July 1997. Linda Vista is a public unpaved road in Tucson, Arizona.

Traffic during the 28-day sampling period primarily consisted of light duty vehicles traveling between 30 and 35 miles per hour. In addition, deliveries to a nearby dam construction project resulted in approximately 5 passes per day by relatively heavy vehicles (cement mixers.) Segregated treated, untreated, and buffer test sections of the unpaved road were created. The buffer section was used to control track-on of material from untreated sections onto the treated sections.

Figure 1 in Appendix B displays a layout of the test site.

Figure 1 of Appendix C illustrates the testing equipment setup that was used by MRI to quantify particulate emissions from the segregated untreated (uncontrolled) and treated (controlled) portions of the test road. This setup provides simultaneous measurement of particulate concentrations at various points over the effective height of the plume generated by passing vehicles. The sampling

equipment consisted of a high-volume cyclone operated at 40 cubic feet per minute (cfm) placed downwind of the test area at heights of 1.3, 2.7, 4.1, and 6.0 meters. In addition, high-volume cyclones followed by a 3-stage cascade impactor were operated at 20 cfm and placed upwind (to determine background concentrations) and downwind of the test area at heights of 1.3 and 4.1 meters. The aerodynamic particle sizes measured by this equipment included 15, 10.2, 4.2, and 2.1 microns.

The setup included meteorological instrumentation that monitored wind direction. The deployment of the particulate samplers and the meteorological equipment is consistent with that used to develop U.S. EPA's AP-42 emissions factor equations for paved and unpaved roads. In addition, vehicle passes, vehicle speed, and vehicle weights were monitored.

During the test program, several parameters were monitored at the test site that were not used directly in conducting this evaluation. These included precipitation, wind speed, temperature, barometric pressure, and soil silt content.

B. Description of Test Results

Prior to testing, three passes of PennzSuppress® D were applied to the unpaved road. Each pass was applied at a rate of 0.025 gallon per square yard of unpaved road, using a dilution rate of nine parts water to one part of concentrate. Seven days later, the same application rate of PennzSuppress® D was applied to the same portion of the unpaved road that had been treated a week earlier. The total ground inventory of PennzSuppress®

D after these two treatments was 0.15 gallons of concentrate per square yard of road. Vehicle traffic was not allowed on the road until after the second application.

MRI completed a total of six PM₁₀ sampling runs—four treated runs from a portion of the road treated with PennzSuppress® D and two untreated runs from a portion of the road that was not treated with PennzSuppress® D. (MRI invalidated a seventh run because of poor wind conditions.) The duration of the sampling periods ranged from 204 minutes to 280 minutes for the treated runs and 38 to 44 minutes for the untreated runs.

As shown in Table D-1 of Appendix D, treated testing runs were conducted at 11, 12, 26, and 28 days after the second application of PennzSuppress® D. During the four treated runs, traffic counts ranged from 392 to 439 vehicles per day with cumulative vehicle traffic totaling 7,000 vehicle passes over the 28-day period. The two untreated testing runs were conducted on the untreated portion of the road. Vehicle passes for these runs were 51 and 63.

After the completion of the “12th day” test, approximately 100 vehicles (approximately one-fourth of which was 18-wheel trucks) detoured from a nearby interstate highway and caused some damage to the testing site buffer area. MRI hypothesized that this event increased the rate at which fugitive dust control efficiency decreased for PennzSuppress® D.

MRI determined, through laboratory analysis of the sampler filters, the airborne PM₁₀ concentrations for the treated and untreated road surfaces.

Using this information, MRI derived emission factors (expressed in grams per vehicle mile traveled), to calculate the control efficiency of PennzSuppress® D. Using a simpler approach (expressed in micrograms per cubic meter), ARB staff calculated the control efficiency for each of the four runs by comparing dust emission measurements from the roads treated with PennzSuppress® D to the untreated roads. Using this approach and the MRI raw data, the ARB staff obtained results that were consistent with those obtained by MRI.

Although the ARB staff confirmed the control efficiencies calculated by MRI, the ARB evaluation concluded that the average PM₁₀ control efficiency of PennzSuppress® D cannot be estimated with statistical confidence due to the limitations in the test design, particularly in the small number of both treated and untreated runs. In addition, our evaluation suggests that the cumulative number of vehicle passes appears to heavily influence the control efficiency of PennzSuppress® D. A detailed explanation of the ARB staff’s evaluation is provided in Appendix D of this report. Appendix E contains detailed information about the approach used by MRI to calculate the control efficiency.

C. Site Visit

As part of our evaluation, we contacted current users of PennzSuppress® D. These users indicated that they have been pleased with the performance of PennzSuppress® D as a dust suppressant on unpaved roads. One customer included the California Department of Transportation in Southern California where PennzSuppress® D was used to reduce PM₁₀ emissions from on

unpaved road surfaces associated with the construction of a large freeway project. ARB staff also visited a winery and vineyard in Central California where PennzSuppress® D was applied to reduce PM₁₀ emissions and the associated dust mites that affect grape quantity and quality.

VII. EVALUATION OF CLAIMS

This section presents additional information relating to the claim verified by the ARB as part of this evaluation report. Our verification of this claim is based on our evaluation of the information listed in Appendix A. As stated earlier, the ARB's evaluation and recommendations presented in this report are predicated on the expectation that PennzSuppress® D is manufactured, transported, sold, stored, applied and disposed of in accordance with manufacturer's instructions.

The claim language is precise because it directly correlates with the supporting documentation included with the application package. Below the claim are supporting comments, which may be used to interpret the significance of the claim verified in this report. To assist the reader, the claim is displayed in bold text.

When topically applied as a dust suppressant in accordance with the manufacturer's instructions, including a target concentration of 0.15 gallons of concentrate per square yard of treated surface, PennzSuppress® D reduced PM₁₀ emissions by approximately 85 percent after 7,000 vehicle (predominantly light-duty) passes on an engineered unpaved road consisting of a well-graded aggregate.

The MRI results suggest that the cumulative number of vehicle passes appears to heavily influence the control efficiency of PennzSuppress® D. Over the 28-day test period, the control efficiency ranged from approximately 85 to 99 percent. The highest control efficiency of PennzSuppress® D was obtained early in the test schedule, after the fewest vehicles passes had occurred. The minimum instantaneous control efficiency suggested by the results of the test program was obtained 28 days after treatment and after 7,000 vehicle passes.

In recognition of the design limitations of the MRI study, the ARB-verified PennzSuppress® D control efficiency is based on the minimum instantaneous control efficiency that was suggested by the results of the Linda Vista test program. Specifically, the Linda Vista test results suggest that 85 percent control efficiency was obtained after 7000 vehicle passes.

VIII. QUALITY MANAGEMENT

A. Practices and Standards

PennzSuppress® D is manufactured exclusively by Pennzoil-Quaker State Company at their ISO 9002-certified manufacturing facility in Mundy's Corner, Pennsylvania and Alameda, California. Pennzoil-Quaker State Company's quality management practices and standards for PennzSuppress® D are described in detail in the Pennzoil-Quaker State Company Specialty Plant Quality System Manual.

Each ingredient used in the manufacturing of PennzSuppress® D is obtained from a source-specific vendor. Incoming ingredients are shipped with a Certificate

of Analysis (CA) that describes the chemical and physical characteristics of the specific shipment. To ensure consistent quality, each incoming ingredient is analyzed at the manufacturing facility for a variety of parameters, including pH, API Gravity, and viscosity. The results of the analyses are compared to the CA in order to confirm ingredient purity. If an ingredient does not meet Pennzoil-Quaker State Company's specifications, it is shipped back to the vendor. Once an ingredient has been qualified, it is received by the facility and placed in storage for use in the blending of PennzSuppress® D.

During the blending of PennzSuppress® D, each ingredient is added to the blending tank in a specific sequence and quantity. The precise quantity of each ingredient is metered into the blending tank in the proper sequence and mixed for a specified period of time. Each instrument used in weighing and metering ingredients is calibrated in accordance with ISO 9002 standards.

Once a blend has been completed, samples of the finished product are collected from the blending tank and analyzed for percent solids, specific gravity, and API Gravity. Another portion of the sample is diluted with water to the typical application dilution of four parts water to one part concentrate and examined. The diluted sample is held for 24 hours and the thickness of a cuff, which commonly develops as a slightly dense emulsion, is measured. The characteristics of the emulsion are also examined under a microscope and qualitatively compared to standards developed by Pennzoil-Quaker State Company for PennzSuppress® D.

Data sheets from each blend are retained in a workbook at each facility and entered into a computer database for future reference. The data sheet records the specific quantity of each ingredient, blending times, blending duration, temperature, and other quality assurance measurements. The data sheets and quality assurance measurements are reviewed, and once it is determined that the blend meets PennzSuppress® D specifications, it is released for sale.

After evaluating the quality management program provided by Pennzoil-Quaker State Company, the ARB staff has determined that sufficiently comprehensive measures are used in the manufacturing process of PennzSuppress® D to ensure that ingredient quality, manufacturing process consistency, and finished product quality are achieved and maintained.

B. Other Certifications/Approvals

Environmental and transportation agencies for the states of Arkansas, Missouri, Nevada, Pennsylvania, Virginia, Texas, Connecticut, and California have granted approval for use of PennzSuppress® D as a dust suppressant. Product safety and performance information was reviewed to varying degrees by each state. Many of the states also approved PennzSuppress® D for use as a dust suppressant by their own agencies. However, none of the states included the evaluation of a performance claim as part of their review. (Appendix G contains copies of these letters of approval).

C. User Manuals/Application Instructions

The recommended practices for use and application of PennzSuppress® D are contained in the document entitled *PennzSuppress® D Recommended Practices for Reducing the Generation of Airborne Particulate Matter from Unpaved Roads* (Appendix F). This document, available at www.pennzsuppress.com, is provided to distributors, applicators, and users of PennzSuppress® D. The document provides a description of unpaved roads that are appropriate candidates for PennzSuppress® D; instructions for preparation of the road surface prior to application of PennzSuppress® D; and instructions for the reapplication of PennzSuppress® D for maintenance treatments of unpaved roads. In addition, the website includes the instructions for transport, storage, mixing, and application as well as the Material Safety Data Sheet (MSDS) for PennzSuppress® D.

The application information provides guidance in determining specific parameters that enable effective use of PennzSuppress® D. Distributors or sales representatives assist customers in determining these application parameters. The principal application parameters include the dilution rate, application rate, number and frequency of applications, and whether special surface preparation may be required. Determination of these parameters is influenced by soil porosity, anticipated traffic, and other variables.

D. Operator Requirements

PennzSuppress® D is sold in the United States either via select distributors, or

directly by PennzSuppress® D sales representatives. Pennzoil-Quaker State Company trains their distributors and representatives about the product and its application. This arrangement is designed to ensure both accurate representation of the product, as well as its appropriate application. The distributors or representatives assist customers in determining whether PennzSuppress® D will be effective for a certain application, and if so, what dilution rate and application rate is suitable. Distributors in some cases may also provide equipment and operators to apply PennzSuppress® D.

Specific heavy equipment is required to apply PennzSuppress® D in order to achieve optimal dust suppression. PennzSuppress® D should be applied using a liquid application truck with a pressurized spray bar (20 to 30 psi) designed to apply the product evenly over the roadbed surface. For some situations, heavy equipment may also be needed to condition the roadbed before and after application. This equipment might include a milling/reclaiming machine, a motor grader with blade attachments, or a pneumatic rubber-wheel roller and vibratory steel drum roller. In any case, the distributor will either provide the equipment and operators to apply PennzSuppress® D, or recommend the proper methods and equipment to be used. It is assumed that customers that choose to apply PennzSuppress® D themselves will be properly trained in operating any necessary heavy equipment.

E. Warranties

Pennzoil-Quaker State Company warrants that PennzSuppress® D is free of

manufacturing defects and Pennzoil-Quaker State Company will replace any PennzSuppress® D product that does not meet manufacturing specifications when delivered from a Pennzoil-Quaker State Company facility.

IX. ENVIRONMENTAL AND ECONOMIC BENEFITS

As part of our review, we evaluated the potential air quality impacts of PennzSuppress® D. The use of PennzSuppress® D as a dust suppressant in accordance with manufacturer's instructions will likely result in a significant reduction of PM₁₀ emissions from unpaved roads without contributing to existing levels of VOCs. It should also be noted that under certain conditions, PM₁₀ emissions reductions resulting from the use of PennzSuppress® D as a dust suppressant on unpaved roads may be eligible for emission reduction credits. However, individual Districts in California should be consulted to determine the eligibility for any emission reduction credits.

X. RECOMMENDATIONS

After evaluating the information discussed in this report, the ARB staff recommends that PennzSuppress® D be certified under its Precertification Program. Specifically, we have independently verified the claim of Pennzoil-Quaker State Company concerning its PennzSuppress® D as presented in the claims section of the report.

By accepting Precertification under the ARB's program, Pennzoil-Quaker State Company assumes, for the duration of the three-year Precertification period, responsibility for maintaining the quality of the manufactured equipment and

materials at a level equal to or better than was provided to obtain this Precertification. Precertification under the ARB's program is also contingent on the recipient agreeing to be subject to quality monitoring by the ARB, as provided by law.

The ARB makes no express or implied warranties as to the performance of the manufacturer's product or equipment. Nor does the ARB warrant that the manufacturer's product or equipment is free from any defects in workmanship or material caused by negligence, misuse, accident, or other causes. The ARB staff believes, however that Pennzoil-Quaker State Company's PennzSuppress® D will achieve the performance levels presented in the claims section of this report. Our determination is based on our evaluation of the data submitted by Pennzoil-Quaker State Company, as well as the other information identified in this report. Our recommendations are predicated on the expectation that transportation, storage, and application are performed in accordance with the manufacturer's instructions contained in the document entitled PennzSuppress® D Recommended Practices for Reducing the Generation of Airborne Particulate Matter from Unpaved Roads.

XI. PRECERTIFICATION CONDITIONS

The recommendations in this report are conditional upon PennzSuppress® D being manufactured, transported, sold, stored, applied and disposed of in accordance with manufacturer's instructions contained in the document entitled *PennzSuppress® D Recommended Practices for Reducing the Generation of Airborne Particulate*

Matter from Unpaved Roads. A copy of this document must be provided to each distributor, applicator, and user of PennzSuppress® D, prior to its application on an unpaved road. In order for the Precertification to remain valid, Pennzoil-Quaker State Company must retain the manufacturing rights for PennzSuppress® D.