

## **I. INTRODUCTION**

This report discusses Soil-Sement<sup>®</sup> dust suppressant manufactured by Midwest Industrial Supply, Inc. The report also discusses the performance claims 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 General Information section provides background information on the ARB's Equipment and Process Precertification (Precertification) Program. The next three sections (Summary of Scope, Statement of Claims, and Description of Technology) discuss the breadth of our evaluation, the performance claims, and a detailed description of Soil-Sement<sup>®</sup>.

The Technical Evaluation and the Evaluation of Claims sections present detailed information on the ARB staff's technical review and assessment of Soil-Sement<sup>®</sup>. The Quality Management and Environmental Benefits sections provide supporting information on Soil-Sement<sup>®</sup> and a brief assessment of the potential air quality impacts of the technology.

The Recommendations section discusses the ARB staff's determination of the performance of Soil-Sement<sup>®</sup> relative to the company's claims. The Precertification Conditions section provides 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. The remaining appendices contain the detailed information that supports the evaluation in this report.

## **II. GENERAL INFORMATION**

On June 14, 1996, the ARB adopted section 91400, California Code of Regulations, which included the criteria for the Equipment and Process Precertification Program. This regulation became effective on November 30, 1996.

Under this regulation, equipment or processes eligible for the Precertification Program 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 or the environment. Furthermore, applicants must demonstrate that they have sufficient control over the manufacturing of the equipment or process to ensure that they can consistently and reliably produce equipment that performs at least as well as equipment used in this evaluation.

### **A. ARB's Equipment Precertification Program Background**

Under the 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 notifies 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.

The ARB received a request from Midwest Industrial Supply, Inc. that the ARB staff determine if Soil-Sement<sup>®</sup> was eligible for the Precertification program. After receiving confirmation from the ARB staff that Soil-Sement<sup>®</sup> was eligible for the program, Midwest Industrial Supply, Inc. submitted a Precertification application package. As part of our review of the application package, we evaluated the results of emissions testing programs, and other information concerning the performance of Soil-Sement<sup>®</sup> to determine whether the claims were verifiable.

## **B. Relationship to Air Quality**

### **1. PM<sub>10</sub> Emissions**

PM<sub>10</sub> 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 PM<sub>10</sub> emissions from a broad spectrum of activities. PM<sub>10</sub> 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, 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.

### **2. Control of PM<sub>10</sub> Emissions from Unpaved Roads**

The measures available to suppress PM<sub>10</sub> 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 PM<sub>10</sub>. Many of these plans have included the development of rules governing a number of sources of fugitive dust, including unpaved roads. For example, the 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, San Joaquin Valley Air Pollution Control District (SJVAPCD), and other districts 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 United States 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 PM<sub>10</sub> 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 Soil-Sement<sup>®</sup> reduces fugitive dust emissions from unpaved roads, the ARB evaluated Soil-Sement<sup>®</sup> as air pollution control equipment.

### **3. Polycyclic Organic Matter**

As defined by the ARB and the U.S. EPA, polycyclic organic matter (POM) consists of over 100 compounds. POM is defined by the Federal Clean Air Act as organic compounds with more than one benzene ring that have a boiling

point greater than or equal to 100 degrees Centigrade. POM can be divided into the subgroups of polycyclic aromatic hydrocarbons (PAHs) and PAH-derivatives.

#### **4. Ozone-depleting Substances**

The earth's stratosphere extends from about 10 to 50 kilometers above the earth's surface. Most stratospheric ozone is concentrated at about 15 to 30 kilometers above the earth's surface. This ozone layer absorbs a portion of the ultraviolet (UV) radiation produced by the sun.

Exposure to UV radiation has been linked to various skin cancers; cataracts; suppression of the human immune system; damage to crops, materials, and aquatic organisms.

Stratospheric ozone-depleting substances (ODSs) are carried intact up to the stratosphere where they break down under the effect of direct sunlight to produce radicals (reactive molecules having an unpaired electron.) The radicals released by this chemical decomposition react with ozone molecules in the ozone layer and convert them into oxygen.

ODS's include chlorofluorocarbons (CFC's), hydrochlorofluorocarbons (HCFC's), halons, carbon tetrachloride, and methyl chloroform.

#### **5. Global Warming Compounds**

Greenhouse gases occur naturally in the environment and also result from human activities. Greenhouse gases include carbon dioxide, methane, nitrous oxide, HFC's,

perfluorocarbons and sulfur hexafluoride.

Since the beginning of the industrial revolution concentrations of greenhouse gases have been increasing. The increase of these gases causes more heat energy from the sun to be redirected to the earth's surface. The increase in heat radiation causes the earth's atmospheric temperature to rise.

#### **C. Health and Environmental Impacts**

As part of its evaluation, the ARB staff consulted with other governmental agencies to conduct a cursory review of the potential health and environmental impacts associated with Soil-Sement<sup>®</sup>.

Based on our review of the Material Safety Data Sheet (MSDS) for Soil-Sement<sup>®</sup>, we determined that Soil-Sement<sup>®</sup> would not likely present health impacts significantly different from those associated with 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.

Regional water quality control boards (board) require 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 Soil-Sement<sup>®</sup> 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 November 19, 2001, that it did not oppose ARB's performance precertification of Soil-Sement<sup>®</sup>.

The concentrated form of Soil-Sement<sup>®</sup> 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. According to Midwest Industrial Supply, Inc. 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 regional offices regulate the management of hazardous waste in California. DTSC has not been asked to concur with Midwest Industrial Supply, Inc.'s determination that Soil-Sement<sup>®</sup> is non-hazardous. After reviewing the Soil-Sement<sup>®</sup> application package, the DTSC indicated that it does not have any concerns with the ARB's precertification of Soil-Sement<sup>®</sup> for air-related claims.

Soil-Sement<sup>®</sup> contains hydrocarbons that are primarily C-25 and higher. The results of laboratory analyses submitted to the ARB by Midwest Industrial Supply, Inc., showed no

detectable levels of reactive VOCs in Soil-Sement<sup>®</sup>. Therefore, it is reasonable to expect that the use of Soil-Sement<sup>®</sup> will not contribute to existing levels of VOCs.

Midwest Industrial Supply Inc., its distributors, and/or applicators of Soil-Sement<sup>®</sup> 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 Soil-Sement<sup>®</sup>.

#### **D. Manufacture/Ownership Rights**

The ARB precertification is contingent upon Midwest Industrial Supply, Inc. having the legal rights to produce and/or market Soil-Sement<sup>®</sup>. Midwest Industrial Supply, Inc. provided written documentation to the ARB staff of its ownership rights on October 25, 2001.

### **III. SUMMARY OF SCOPE**

Midwest Industrial Supply, Inc. claims that when unpaved roads are treated with Soil-Sement<sup>®</sup>, fugitive dust emissions are reduced, specifically particulate matter that is less than 10 microns in size. In addition, Midwest Industrial Supply, Inc. claims that Soil-Sement<sup>®</sup> reduced PM<sub>10</sub> emissions by approximately 84 percent after 339 days and 6,780 vehicle passes on an unpaved road consisting of a silty, sandy loam. Generally, the control of fugitive dust emissions involves using surface modification, surface treatment, speed control, or reduction of vehicular trips. Midwest Industrial Supply, Inc. also claims that Soil-Sement<sup>®</sup> does not contain any polycyclic organic matter (POM)

which includes polycyclic aromatic hydrocarbons (PAHs) as defined by the Federal Clean Air Act (CAA) section 112(b). In addition, Midwest Industrial Supply, Inc. claims that Soil-Sement<sup>®</sup> does not contain fluorinated or brominated compounds that could be expected to contribute to stratospheric ozone depletion or global warming.

#### **IV. STATEMENT OF CLAIMS**

The following are the claims verified by the ARB staff concerning Midwest Industrial Supply, Inc. Soil-Sement<sup>®</sup>. The verification of these claims is predicated on the presumption that Soil-Sement<sup>®</sup> is manufactured, transported, sold, stored, applied, and disposed of in accordance with manufacturer's instructions.

- 1. When topically applied as a dust suppressant in accordance with the manufacturer's instructions, including a target concentration of 0.28 gallons of concentrate per square yard of treated surface applied in multiple passes on a single day, Soil-Sement<sup>®</sup> reduced PM<sub>10</sub> emissions by approximately 84 percent after 339 days and 6,780 vehicle (predominantly light-duty) passes on an unpaved road consisting of a silty, sandy loam.**
- 2. Soil-Sement<sup>®</sup> does not contain detectable levels of polycyclic organic matter which includes polycyclic aromatic hydrocarbons as defined by the Federal Clean Air Act**

**section 112 (b); nor does Soil-Sement<sup>®</sup> contain detectable levels of fluorinated or brominated compounds that could be expected to contribute to ozone depletion or global warming.**

It should be noted that Soil-Sement<sup>®</sup> can be applied to a range of surfaces and substrates to prevent fugitive dust emissions. The reduction in fugitive dust may vary depending on surface substrate, Soil-Sement<sup>®</sup> volume and frequency of application, environmental conditions, and the volume and nature of traffic.

#### **V. DESCRIPTION OF TECHNOLOGY**

##### **A. Product Composition**

The undiluted form of Soil-Sement<sup>®</sup> was evaluated for this report. Soil-Sement<sup>®</sup> is a product composed primarily of an acrylic, acrylate, and acetate liquid polymer. Its specific gravity ranges from 1.0 to 1.2, density from 8.4 to 9.5 pounds per gallon, and pH from 4.0 to 9.5. Soil-Sement<sup>®</sup> is soluble in water and its minimum solids content is approximately 40 percent based on oven-dry solids. The MSDS for Soil-Sement<sup>®</sup> states that it is composed of 5 to 50 percent by weight of polymer and 50 to 95 percent of water by weight, depending on whether the product is concentrated or diluted.

##### **B. Mechanism of Action**

Soil-Sement<sup>®</sup> relies upon its high carbon-index polymers to bind a road's soil particles and increase the cohesion among the aggregate particles. The agglomeration or binding 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 a road is treated with Soil-Sement<sup>®</sup>, the polymer in the road becomes harder and starts to take on the appearance of concrete.

Soil-Sement<sup>®</sup> does not dissolve and wash away when exposed to rain. Because of its low solubility in water, Soil-Sement<sup>®</sup> is not influenced by moisture in the atmosphere, and thus can be used in both arid and humid environments.

### **C. Appropriate Uses**

Soil-Sement<sup>®</sup> is used as a dust suppressant, as a soil-stabilization agent, and to control erosion and silt runoff. Candidates for use include, but are not limited to, soil composed of clays; silty, sandy loams; and well graded aggregates. It can be applied to unpaved roads, building pads, parking lots, parks, fields, off-highway motor vehicle parks, and other similar high dust areas.

Soil-Sement<sup>®</sup> has a wide variety of applications other than road surfaces. Soil-Sement<sup>®</sup> has been used to stabilize asbestos-containing soils. Soil-Sement<sup>®</sup> can also be used on slopes as a tackifier in hydroseeding applications. Soil-Sement<sup>®</sup> can also be used to reduce windblown dust from ore and coal storage piles, stockpiles, mine tailing sites, power plant ash ponds, construction sites, military

applications (vehicle staging areas, helicopter landing zones, trails for rubber tire and tracked vehicles, rapid deployment runways), and to control dust mites in orchards and vineyards. However, this Precertification only evaluates the effectiveness of Soil-Sement<sup>®</sup> in suppressing fugitive dust emissions from unpaved road consisting of a silty, sandy loam.

Soil-Sement<sup>®</sup> 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 32 degrees Fahrenheit.

Soil-Sement<sup>®</sup> is sold in the United States and internationally by either select distributors, or directly by Midwest Industrial Supply, Inc. representatives. Midwest Industrial Supply, Inc. trains its distributors and representatives about the product and its application. The distributors or representatives assist customers in determining whether Soil-Sement<sup>®</sup> 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 Soil-Sement<sup>®</sup>.

### **D. Application Procedures**

This section summarizes Soil-Sement<sup>®</sup> manufacturer's instructions contained in the document entitled Reference Manual for the Application of Soil-Sement<sup>®</sup> Dust and Erosion Control Agent, August 1998. This

document is available from Midwest Industrial Supply, Inc. Soil-Sement<sup>®</sup> is delivered to distributors in rail cars, tanker trailers, in 275 gallon totes (mini bulk tanks), or 55 gallon drums. During shipping and storage, Soil-Sement<sup>®</sup> should not be allowed to freeze or boil. Soil-Sement<sup>®</sup> should be applied at temperatures above 32 degrees Fahrenheit.

For optimal dust control, Midwest Industrial Supply, Inc. recommends a target concentration rate of 0.28 gallons of concentrate per square yard of unpaved road surface consisting of a silty sandy loam. This is the same concentration rate that was achieved in the emissions testing results that were reviewed for this evaluation. However, Midwest Industrial Supply, Inc. recommends that a site evaluation and soils analysis be a prerequisite to any site application recommendation. The site application recommendation takes into account the polymer concentration, ground inventory of Soil-Sement<sup>®</sup>, and depth of penetration into the soil. Soil-Sement<sup>®</sup> application variables are controlled by the water-to-concentrate ratio, as well as, the total volume of the diluted product per area.

Soil-Sement<sup>®</sup> is applied using a liquid application truck with a pressurized spray bar (typically operated at 20 to 25 pounds per square inch) designed to apply the product evenly over the roadbed surface. For some situations, where Soil-Sement<sup>®</sup> is blended into the surface rather than topically applied, heavy equipment may 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, a vibratory steel drum roller, or a compactor.

Some soil types are best treated with a one-time heavy application of Soil-Sement<sup>®</sup>, 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 Soil-Sement<sup>®</sup> 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 Soil-Sement<sup>®</sup> into the soil matrix. In general, the application of Soil-Sement<sup>®</sup> is designed to control the depth of penetration. The application rate and the dilution ratio are not dictated by soil type, but rather the desired end result of the application.

Initial preparation of the unpaved road is essential to allow for even and effective treatment with Soil-Sement<sup>®</sup>. 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. Roads 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, Soil-Sement<sup>®</sup> is applied in multiple treatments to achieve the target concentration of polymer or ground inventory. Because Soil-Sement<sup>®</sup> 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, Soil-Sement<sup>®</sup> cures in less than an hour. Cure times increase as temperatures decrease.

The frequency of treatments necessary to maintain the ground inventory of Soil-Sement<sup>®</sup> will depend on the soil conditions and amount of vehicle (heavy, moderate or light) traffic. The common industry practice is to retreat with a dust suppressant, in response to the nature and amount of traffic. It is reasonable to assume that after repeated treatments of Soil-Sement<sup>®</sup>, the amount of product required to achieve dust suppression will, to a point, likely decrease over time.

## **VI. TECHNICAL EVALUATION**

### **A. Description of Testing**

#### **1. Field Testing**

Midwest Industrial Supply, Inc. contracted with Desert Research Institute (DRI) to evaluate the effectiveness of Soil-Sement<sup>®</sup> in controlling fugitive dust emissions from unpaved roads. DRI conducted

three studies on Fields Road, a public unpaved road in Merced County, California (see Appendix B, Figure B-1) between July 1995 to June 1996 to estimate the control efficiency of Soil-Sement<sup>®</sup> on PM<sub>10</sub> emissions. The sampling results are contained in DRI's Field Evaluation of Soil-Sement<sup>®</sup> (DRI Document No. 685-5200.1F1, December 31, 1996).

Fields Road is graded twice a year to reduce dust emissions. Principal users of Fields Road are ranchers who live and work in the area and golfers traveling to a golf course located to the northeast. Traffic during the sampling period primarily consisted of light duty vehicles traveling between 40 and 55 miles per hour.

Eight days prior to initial testing, four passes of Soil-Sement<sup>®</sup> were applied to the controlled road section in a single day. Each pass was applied at a rate of 0.07 gallons per square yard of road, using a dilution rate of 6.8 parts water to one part of concentrate. The total ground inventory of Soil-Sement<sup>®</sup> after these treatments was 0.28 gallons of concentrate per square yard of unpaved road.

The testing equipment setup was used by DRI to quantify particulate emissions from the segregated untreated (uncontrolled) and treated (controlled) portions of the test road. The testing setup provided simultaneous measurement of particulate concentrations at various points over the effective height of the plume generated by passing vehicles. The sampling equipment

was placed downwind of the test area at heights of 1.3, 2.0, 2.5, 5.0, and 10.0 meters. The duration of the sampling periods was six hours per day. Figure B-2 in Appendix B displays a layout of the test site and the testing equipment setup.

The testing setup also included meteorological instrumentation that monitored wind direction. The deployment of the particulate samplers and the meteorological equipment is consistent with that used to develop the 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.

## **2. Laboratory Testing**

Midwest Industrial Supply, Inc. contracted with Tri-State Laboratories, Inc. (TSL) to verify their second claim. TSL tested Midwest Industrial Supply, Inc. Soil-Sement<sup>®</sup> on November 13, 2001. The objective of the laboratory test was to determine if Soil-Sement<sup>®</sup> contained any detectable levels of POM and fluorinated or brominated compounds that could contribute to ozone depletion or global warming.

TSL used the U.S. EPA Test Method 8260 to analyze volatile (chlorinated hydrocarbons and aromatics

compounds). The semi-volatile (phthalates and PAHs) compounds were analyzed using the U.S. EPA Test Method 8270. To analyze fluoride and bromide concentration, TSL used the U.S. EPA Test Method 340.2 and the Test Method 4500Br-B, respectively.

## **B. Description of Test Results**

### **1. Desert Research Institute Test Results**

Table C-1 in Appendix C contains DRI testing data for Soil-Sement<sup>®</sup>. DRI divided the test program into three phases – Intensive-1, Intensive-2, and Intensive-3. Eight days after Soil-Sement<sup>®</sup> was applied to Fields Road, the Intensive-1 measurements started. Intensive-2 measurements started 95 days after Soil-Sement<sup>®</sup> was applied. Intensive-3 measurements started 334 days after Soil-Sement<sup>®</sup> was applied.

DRI completed a total of 34 PM<sub>10</sub> sampling runs —17 runs from a portion of the road treated with Soil-Sement<sup>®</sup> and 17 runs from a portion of the untreated road. The ARB staff evaluation identified some anomalies in some of the PM<sub>10</sub> sampling runs. The upwind PM<sub>10</sub> concentrations for a total of four sampling runs for Intensive 1 and Intensive 2 were higher than the downwind concentrations (Appendix C, Table C-1). DRI postulated that this anomaly could be caused by a shift of wind direction or by wind turbulence induced by vehicles. Because of the anomalies in Intensive-1 and Intensive-2, the ARB staff evaluated only the runs from Intensive-3 for the Midwest Industrial

Supply, Inc. claims verification process.

The average traffic counts were 20 vehicles per day with cumulative vehicle traffic totaling 6,780 vehicle passes over the 339 days period.

DRI determined, through laboratory analysis of the sampler filters, the airborne PM<sub>10</sub> concentrations for the treated and untreated road surfaces. Using this information, DRI derived emission factors (expressed in grams per vehicle mile traveled) to calculate the control efficiency of Soil-Sement<sup>®</sup>. Using a simpler approach (expressed in micrograms per cubic meter), ARB staff calculated the control efficiency for each of the runs of Intensive-3 by comparing emission measurements from the roads treated with Soil-Sement<sup>®</sup> to the untreated roads. Using this approach and the DRI raw data, the ARB staff obtained results that were consistent with those obtained by DRI. A detailed explanation of the ARB staff's evaluation is provided in Appendix D of this report.

Although the ARB staff confirmed the control efficiencies calculated by DRI, the ARB evaluation concluded that the average PM<sub>10</sub> control efficiency of Soil-Sement<sup>®</sup> 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 Soil-Sement<sup>®</sup>.

## **2. Tri-State Laboratories Test Results**

TSL analyzed Soil-Sement<sup>®</sup> samples using two gas chromatograph/mass spectrometer (GC/MS) systems and specific ion probes. One GC/MS was used to detect volatile compounds (liquids and gases with a boiling point of less than 200 degrees Centigrade), while the other GC/MS was used to detect semivolatiles (liquids and solids with general boiling point of 200 to 350 degrees Centigrade). The volatiles included chlorinated hydrocarbons and aromatics, and the semivolatiles included phthalates and PAH's. The fluoride and bromide analysis was done in TSL's inorganic laboratory using specific ion probes.

The ARB staff reviewed and verified the TSL test results. The test results showed no detectable levels of volatiles, semivolatiles, fluoride, or bromide.

### **C. Site Visit**

As part of our evaluation, we contacted one of the current users of Soil-Sement<sup>®</sup> in California. The ARB staff visited a landfill in Northern California where Soil-Sement<sup>®</sup> was applied to reduce PM<sub>10</sub> emissions on an unpaved wet weather disposal pad. During the site visit, the ARB staff observed that Soil-Sement<sup>®</sup> performed satisfactorily. The user indicated that they have been pleased with the performance of Soil-Sement<sup>®</sup> as a dust suppressant.

## 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 Soil-Sement<sup>®</sup> 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 claims 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.

- 1. When topically applied as a dust suppressant in accordance with the manufacturer's instructions, including a target concentration of 0.28 gallons of concentrate per square yard of treated surface applied in multiple passes on a single day, Soil-Sement<sup>®</sup> reduced PM<sub>10</sub> emissions by approximately 84 percent after 339 days and 6,780 vehicle (predominantly light-duty) passes on an unpaved road consisting of a silty, sandy loam.**
- 2. Soil-Sement<sup>®</sup> does not contain detectable levels of polycyclic**

**organic matter which includes polycyclic aromatic hydrocarbons as defined by the Federal Clean Air Act Section 112 (b); nor does Soil-Sement<sup>®</sup> contain detectable levels of fluorinated or brominated compounds that could be expected to contribute to ozone depletion or global warming.**

ARB used a mass concentration approach to verify DRI's data. The data suggest that cumulative number of vehicle passes appears to heavily influence the control efficiency of Soil-Sement<sup>®</sup>. Over the 334-339 days test period, the control efficiency ranged from 79 to 89 percent. (See Table D-2) The minimum control efficiency suggested by the results of the test program was obtained 339 days after the treatment and after 6,780 vehicle passes.

In recognition of the design limitations of the DRI study, the ARB-verified Soil-Sement<sup>®</sup> control efficiency is based on the average control efficiency that was suggested by the results of the Field Roads test program. Specifically, the six test-average from Intensive-3 produced an 84 percent control efficiency. (See Table D-2)

The Midwest Industrial Supply, Inc. Soil-Sement<sup>®</sup> sample was tested by TSL and demonstrated no detectable levels of volatiles and semivolatiles (including PAH), fluorides, and bromides.

## **VIII. QUALITY MANAGEMENT**

### **A. Practices and Standards**

Midwest Industrial Supply, Inc. has extensive quality management practices and standards for Soil-Sement<sup>®</sup>. The standards are described in detail in the Midwest Industrial Supply, Inc. Quality Control Manual, Revision 1, October 1999. Midwest Industrial Supply, Inc. The quality control manual contains established quality management practices for the following areas:

- Management Responsibility, and Quality System
- Contract Review, Design Control
- Purchasing, Product Identification, and Traceability
- Process Control, Inspection, and Testing
- Control of Inspection, Measuring, and Test Equipment
- Inspection, Test Status, and Control of Nonconforming Product
- Corrective and Preventive Action
- Handling, Storage, Packaging, Preservation, and Delivery
- Control of Quality Records, and Training
- Servicing and Statistical Technique

The ARB staff reviewed Midwest Industrial Supply, Inc.'s quality management practices and standards as a part of the evaluation of Soil-Sement<sup>®</sup>. As a result of the review, the ARB staff has determined that the quality management program is sufficiently comprehensive to support precertifying Midwest Industrial Supply, Inc.'s Soil-Sement<sup>®</sup>.

### **B. Other Certifications/Approvals**

Environmental and transportation agencies for the states of Arizona, Nevada, Ohio, Pennsylvania, Georgia, Iowa, Michigan, Minnesota, Massachusetts, New Jersey, New York, Washington, Virginia, West Virginia, and California have granted approval for use of Soil-Sement<sup>®</sup> as a dust suppressant. Product safety and performance information was reviewed to varying degrees by each state. Many of the states also approved Soil-Sement<sup>®</sup> 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. Copies of these letters of approval can be obtained from Midwest Industrial Supply, Inc. The Canada Environmental Technology Verification Program also verified Midwest Industrial Supply, Inc.'s Soil-Sement<sup>®</sup> air-related claims on March 25, 1999.

### **C. User Manuals/Application Instructions**

The recommended practices for use and application of Soil-Sement<sup>®</sup> are contained in the documents entitled Reference Manual for the Application of Soil-Sement<sup>®</sup> Dust and Erosion Control Agent, and Unpaved Roadway Dust Control Factors for Best Results. These documents are available from Midwest Industrial Supply, Inc. and its distributors, applicators, and users of Soil-Sement<sup>®</sup>. These documents provide a description of unpaved roads that are appropriate candidates for Soil-Sement<sup>®</sup>; instructions for preparation of the road surface prior to

application of Soil-Sement<sup>®</sup>; and instructions for the reapplication of Soil-Sement<sup>®</sup> for maintenance treatments of unpaved roads. In addition, the Midwest Industrial Supply, Inc. website ([www.midwestind.com](http://www.midwestind.com)) includes the instructions for transport, storage, mixing, and application as well as, the MSDS for Soil-Sement<sup>®</sup>.

Distributors or sales representatives assist customers in determining specific application parameters that enable the effective use of Soil-Sement<sup>®</sup>. 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**

No licenses are required to apply Midwest Industrial Supply, Inc. Soil-Sement<sup>®</sup>. Midwest Industrial Supply, Inc. qualified distributors are trained to follow the guidelines established in the Policies and Procedures Manual. They utilize detailed process instructions provided in the Site Application Plans. This arrangement is designed to ensure both accurate representation of Soil-Sement<sup>®</sup>, as well as, its appropriate application. The distributors or representatives assist customers in determining whether Soil-Sement<sup>®</sup> 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 Soil-Sement<sup>®</sup>.

Specific heavy equipment may be required to apply Soil-Sement<sup>®</sup> in order to achieve optimal dust suppression. Soil-Sement<sup>®</sup> should be applied using a liquid application truck with a pressurized spray bar (20 to 25 psi) designed to apply the product evenly over the roadbed surface. For road stabilization, 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 or other form of compactor. In any case, the distributor will either provide the equipment and operators to apply Soil-Sement<sup>®</sup>, or recommend the proper methods and equipment to be used. It is assumed that customers that choose to apply Soil-Sement<sup>®</sup> themselves will be properly trained in operating any necessary heavy equipment.

#### **E. Warranties**

Midwest Industrial Supply, Inc. warrants that Soil-Sement<sup>®</sup> is free of manufacturing defects and Midwest Industrial Supply, Inc. will replace any Soil-Sement<sup>®</sup> product that does not meet manufacturing specifications when delivered from a Midwest Industrial Supply, Inc. facility.

### **IX. ENVIRONMENTAL BENEFITS**

As part of our review, we evaluated the potential air quality impacts of

Soil-Sement<sup>®</sup>. We have determined that the use of Soil-Sement<sup>®</sup> as a dust suppressant, in accordance with manufacturer's instructions, will result in a significant reduction of PM<sub>10</sub> emissions from unpaved roads without contributing to existing levels of VOCs. It should also be noted that under certain conditions, PM<sub>10</sub> emissions reduction resulting from the use of Soil-Sement<sup>®</sup> as a dust suppressant on unpaved roads may be eligible for emissions reduction credits. However, individual Districts in California should be consulted to determine the eligibility for emissions reduction credits.

#### **X. ARB's RECOMMENDATIONS**

After evaluating the information discussed in this report, we recommend that Soil-Sement<sup>®</sup> be precertified under the ARB's Precertification Program. Specifically, we have independently verified the claims of Midwest Industrial Supply, Inc. concerning its Soil-Sement<sup>®</sup> as presented in the claims section of the report.

By accepting Precertification under the ARB's program, Midwest Industrial Supply, Inc. assumes, for the duration of the three years 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 the Midwest Industrial Supply, Inc. Soil-Sement<sup>®</sup> 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 Midwest Industrial Supply, Inc., as well as the other information identified in this report. Our recommendations are predicated on the expectation that transportation, storage, application, and disposal are performed in accordance with the manufacturer's instructions contained in the documents entitled Reference Manual for the Application of Soil-Sement<sup>®</sup> Dust and Erosion Control Agent, and Unpaved Roadway Dust Control Factors for Best Results.

#### **XI. PRECERTIFICATION CONDITIONS**

The recommendations in this report are conditional upon Soil-Sement<sup>®</sup> being manufactured, transported, sold, stored, applied, and disposed in accordance with manufacturer's instructions contained in the document entitled Reference Manual for the Application of Soil-Sement<sup>®</sup> Dust and Erosion Control Agent, and Unpaved Roadway Dust Control Factors for Best Results. A copy of these documents must be provided to each distributor, applicator, and

user of Soil-Sement<sup>®</sup>, prior to its application on an unpaved road. In order for the Precertification to remain valid, Midwest Industrial Supply, Inc. must retain the manufacturing rights for Soil-Sement<sup>®</sup>.

Precertification does not relieve the person from compliance with any local air district rules or regulations.

Any manufacturer's modification that affects the claimed performance or emissions of Soil-Sement<sup>®</sup> shall void this precertification. This precertification is valid only for the dust suppressant tested for this evaluation.