

**Interim Report  
Soil Sement® Demonstration  
Kern County Road Shoulders**



Prepared for

San Joaquin Valley Air Pollution Control District

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## Introduction

This interim report provides the initial results of a demonstration using Soil Sement® as an alternative to paving for fugitive dust control from unpaved road shoulders. Midwest Industrial Supply/ArrowTek will provide another interim report in approximately three to four months.

## Background

The San Joaquin Valley has a severe ambient particulate matter problem. In response to that problem the USEPA mandated the San Joaquin Valley Air Pollution Control District revise its regional nonattainment area plan for particulate matter and commit to the rapid adoption and implementation of best available control measures. One such BACM is the paving of unpaved road shoulders.

The Kern County Roads Department indicated that roughly 500 miles of county roads could be subject to the proposed road shoulder-paving requirement (i.e., 25% of higher ADT roads in rural areas). Kern County is but one of eight counties in the Air District and the total miles of road potentially subject to the shoulder-paving requirement could exceed several thousand miles at a cost in excess of \$100,000,000.

Midwest Industrial Supply manufactures and applies Soil Sement®, a nontoxic and nonhazardous California Air Resources Board Certified, and USEPA Verified fugitive dust palliative. Midwest Industrial Supply/ArrowTek proposed a demonstration program to the Air Pollution Control District and Kern County Roads Department to evaluate the cost and feasibility of using Soil Sement® as an interim and low cost solution to the road shoulder paving requirement.

Table 1 illustrates the potential cost implications of using a product like Soil Sement® as a Valley-wide interim solution. As indicated, the table assumes

- ✓ The Air District and local transportation agencies must adopt and implement BACMs as fast as possible.
- ✓ Transportation funding cannot absorb the cost of paving of all applicable road shoulders in the near-term.
- ✓ 2,000 miles of road would be subject to the shoulder paving requirement
- ✓ 200 miles of road could be paved each year with available funding,
- ✓ Soil Sement® would be used on unpaved shoulders starting next year and phased out as shoulders are paved.
- ✓ Primary Soil Sement® applications would be biennial (every other year) and one sixth of the shoulders would be retreated each year following the primary treatment to ensure a high efficiency.

As indicated, we estimate that the use of a certified and nontoxic product like Soil Sement® would add 16% of the cost of paving, while providing immediate and high efficiency dust control over the ten year paving period.

### Demonstration Project

Because Soil Sement® has already undergone extensive verification and certification testing by CARB and USEPA, the objective of the demonstration was therefore to evaluate the method of application, costs, and feasibility in Kern County. A secondary objective was to familiarize transportation-planning agencies with the use of a nontoxic and certified dust palliative.

The road locations identified by the Kern County Roads Department, application rates and costs are summarized in Table 2. Photo 1 illustrates the basic configuration and location of the unpaved shoulders. On September 21, 2003 Soil Sement® was applied topically using a computerized spray truck (see Photo 2). As indicated by Table 2, the demonstration included the evaluation of three different application rates.

### Initial Results

With Kern Co. Roads staff, Midwest/ArrowTek returned to the demonstration site six weeks after the topical application. The results are depicted graphically in the Photos 1 - 8. Preliminary initial observations include:

1. The Soil Sement® topical application has provided a hard stabilized surface and is effectively eliminating dust on the road shoulders (for example, see Photos 7 and 8). The after treatment photo was taken from a shoulder treated with the medium application rate.
2. The medium and heavy-duty rates are withstanding shoulder traffic better than the light rate, which is expected. Kern County Roads staff indicated that they suspected vehicles tires had slipped off the road surface onto the shoulder and/or crossed the road shoulder to dirt access road in several places before the Soil Sement® had cured indicating a possible need to cone-off treatment areas for a short period for future applications (for example, see Photo 5).
3. Soil Sement® provides a durable surface. See Photos 4 and 6 for an indication of performance and durability.
4. Agriculture and petroleum industry access are common in Kern County and cross county road shoulders. At these points fairly heavy-duty vehicles quickly stop or start while turning creating substantial stress on the shoulder surface (see Photo 5). This is a standard problem for all unpaved road shoulders regardless of the method of stabilization. In future applications Midwest suggests that transportation planning

agencies consider stabilizing approximately 20 feet of the access road to help protect stabilized road shoulders.

As a part of its standard operating practices, Midwest has assessed the shoulders after application and is in the process of scheduling spot retreatment applications (e.g., see Observation 2). This is standard practice and is included in the base cost.

Table 1  
Estimated Costs

Road Shoulder Paving Costs Estimate Valley Wide

<b>Year</b>	<b>Miles Paved</b>	<b>Cost/mi</b>	<b>Cost</b>
1	200	\$70,000	\$14,000,000
2	200	\$70,000	\$14,000,000
3	200	\$70,000	\$14,000,000
4	200	\$70,000	\$14,000,000
5	200	\$70,000	\$14,000,000
6	200	\$70,000	\$14,000,000
7	200	\$70,000	\$14,000,000
8	200	\$70,000	\$14,000,000
9	200	\$70,000	\$14,000,000
10	200	\$70,000	\$14,000,000
<b>Total</b>	<b>2,000</b>		<b>\$140,000,000</b>

Soil Sement® Treatment Costs on Unpaved Shoulders Valley Wide

<b>Year</b>	<b>Miles Treated</b>	<b>Cost/mi</b>	<b>Cost</b>
1	1,800	\$4,224	\$7,603,200
2	300	\$2,281	\$684,288
3	1,400	\$4,224	\$5,913,600
4	233	\$2,281	\$532,224
5	1,000	\$4,224	\$4,224,000
6	167	\$2,281	\$380,160
7	600	\$4,224	\$2,534,400
8	100	\$2,281	\$228,096
9	200	\$4,224	\$844,800
10	33	\$2,281	\$76,032
<b>Total</b>	<b>5,833</b>		<b>\$23,020,800</b>

Notes:

1. Discussion: Assumes 2,000 miles of shoulder would be subject to the paving requirement and annual transportation funding would be available to pave 200 miles of shoulder each year.
2. To be conservative, we assumed a very high application rate for Soil Sement® and some shoulder preparation (compaction).
3. We expect Soil Sement® to remain effective for two years.
4. To further the conservative nature of the assessment, we also assumed one sixth of the road shoulders would require a topical application between biennial primary treatments to retain high efficiency.
5. We did not account for the fact that shoulder maintenance with Soil Sement® would keep shoulders in better condition, which would reduce the cost of shoulder paving.

Table 2

<b>Sq ft per Gallon</b>	<b>Cost Per Sq Ft</b>	<b>Length ft</b>	<b>Width ft</b>	<b>Location</b>	<b>Applied Cost</b>
40	\$0.090	2640	4	East side of Allen between Kratzmeyer and Snow	\$950
65	\$0.054	8448	4	East side of Allen between Snow and Seventh Standard	\$1,825
80	\$0.045	5808	4	West side of Allen between Kratzmeyer and Seventh Standard	\$1,045
Total					\$3,821

Midwest Cost Share	\$2,292
Kern Co. Roads Cost Share	<u>\$1,528</u>

Photo 1  
Untreated Shoulder – Looking South on Allen Rd. between Snow and Kratzmeyer



Photo 2  
Soil Sement – First Coat Looking North on Allen between Kratzmeyer and Snow



Photo 3  
Soil Sement® - Medium Application Rate Six Weeks After Application  
Looking North on Allen Road Between Kratzmeyer and Snow



Photo 4  
Demarcation Between Untreated Soil and Soil Sement®  
A Vehicle Used the Shoulder and Performed a Hard Acceleration



Photo 5  
Damage to a Section of Soil Sement® Treated Shoulder  
Access Road to an Adjacent Oil Field  
Heavy-duty Weight with Significant Lateral Force and Braking



Photo 6  
Hard, Straight Acceleration on Soil Sement®



Photo 7  
Shot Out of Rear Window at 40 mph on Soil Sement® Treated Shoulder  
Medium Application Rate on Allen between Snow and Seventh Standard Rd.



Photo 8  
Shot out of Rear Window on Untreated Shoulder at 40 mph  
Next Block South of Kratzmeyer on Allen

