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DATE: March 4, 2009

TO: MAG Specifications and Details Committee Members

FROM: Peter Kandaris, SRP Representative

RE: **Request for Modifying MAG 792 "Dust Palliative"**

Purpose: Provide revisions to MAG 792 to (a) update products information based on changes in the market, (b) include submittal of compliance requirements for product data, and (c) provide more defined environmental requirements.

Rational: The existing specifications (last revised in 2000) do not give methods to objectively qualify vendors or their products. Changes are proposed so that quantitative data can be obtained and reviewed instead of just relying on vendor sales information.

Since the last time these specifications were revised there have been a number of changes in dust control materials. Additionally, other area agencies have revised their specifications to include their experiences and updated practices. It is recommended that the dust palliative specifications be updated to include the most recent improvements in product and vendor verification.

SECTION 792

DUST PALLIATIVE

792.1 GENERAL:

Dust palliatives shall consist of various chemical dust suppressants which work by binding together lighter soil particles.

All materials must meet the environmental requirements of Section 792.3 and must be approved by the Engineer prior to their use.

792.2 TYPE OF MATERIALS AND APPLICATION RATES:

Emulsions shall be miscible with water in all proportions as noted in Table 792-1. The dilution ratio will vary based upon the local soil and weather conditions. The ratios shall be proposed by the Contractor and agreed upon by the Engineer.

The rate of application noted in Table 792-1 shall be for the treatment, method and use specified by the Contracting Agency, or as directed by the Engineer. To compensate for local conditions, the Contractor may adjust the application rate within the ranges specified.

Products specifically formulated as tackifiers which prevent wind-blown erosion shall not be acceptable as dust palliatives for vehicular traffic, but may be used for their intended purposes.

TABLE 792-1

DUST PALLIATIVE DILUTION RATIOS AND APPLICATION RATES

Product Type	Use/Treatment (1)	Dilution Ratio (2)		Application Rate (3) (gal/sy) [l/m²]
		Range	Typical	
Acrylic Copolymer and Polymer	Topical - Road or parking Lot	20:1 to 4:1	9:1	~~0.20 to 0.10~~ 0.20 to 0.15
	Topical - Road Shoulder	20:1 to 4:1	15:1	~~0.16 to 0.09~~ 0.16 to 0.12
	Surface Course (per inch of depth)	20:1 to 4:1	9:1	~~0.10 to 0.06~~ 0.08 to 0.06
Petroleum Resin Emulsified	Topical - Road or parking Lot	4:1	4:1	0.15 to 0.10
	Topical - Road Shoulder	10:1 to 7:1	8:1	0.15 to 0.07
	Surface Course (per inch of depth)	4:1	4:1	0.11 to 0.07
Lignin-Based Type (Lignosulfonate)	Topical - Road or parking Lot	1:1	1:1	0.10 to 0.05
	Topical - Road Shoulder	7:1 to 4:1	4:1	0.05 to 0.03
	Surface Course (per inch of depth)	1:1	1:1	0.30 to 0.10
Organic Resin	Topical - All	10:1 to 2:1	5:1	0.25 to 0.15
	Surface Course (per inch of depth)	2:1 to 1:1	1:1	0.15 to 0.10
Other	As approved by the Engineer			

(1) Topical application rates shown are to obtain 1/2 to 1 inch penetration. Higher rates should be used if greater penetration is anticipated.
(2) The dilution ratio (water:product) is variable and shall be appropriate for the local soil and weather conditions, as proposed by the Contractor and agreed upon by the Engineer.
(3) Application rate of undiluted concentrate.

(A) Acrylic Copolymer and Polymer Types:

The material shall be a white or clear emulsion that can penetrate, saturate and bond together treated soils to create a hard, dust-free and water resistant surface. The material shall have the following properties in its undiluted state:

Based on input from product vendors, the values for polymers needed to be adjusted. Also, the market is now broadened to both polymers and copolymers. Changes are intended to keep up with changes in products.

Paragraph included to insure testing and product compliance are performed, with the responsibility on the contractor.

Contractor shall submit with the bid proof of conformance in the form of test reports to verify that the dust palliative product proposed for use meets the minimum material requirements specified in this section. Testing must be specific to the proposed product and not generic to similar type palliative products. Testing shall be performed by independent AASHTO accredited laboratories, and signed and sealed by Professional Engineers registered in the State of Arizona. The Contractor is responsible for any costs associated with the testing of soil and palliative product prior to the application of as specified herein.

Specification Designation	ASTM Test Method	Requirements
Composition	–	Acrylics, acrylates & acetates
pH	E 70	4.0 - 9.5
Residue (active solids content), %	D 244	40 min.
Flash Point, °F	D 92	None
Absolute Viscosity (Brookfield), cP, 77 °F.	–	1500 max.
Specific Gravity, 60/60 °F.	D 1298	1.00 - 1.15

(B) Petroleum Resin Emulsified Types:

The materials shall be a light yellow petroleum resinous emulsion suitable for use as an agglomerate for soil particles. The material shall have the following properties in its undiluted emulsified state:

Specification Designation	ASTM Test Method	Requirements
Kinematic Viscosity, SFS at 77 °F.	D 244	15 min.
pH	E 70	4.0 - 7.0
Residue, % wt. (1)	D 244	64±4
Sieve Test, % wt. Retained (2)	D 244	0.1 max.
Particle Charge Test	D 244	Positive
Flash Point of base product, CO, °F.	D 92	400 °F. min.
Specific Gravity of base product, 60/60°F.	D 1298	1.00 to 1.04

(A) ASTM test modified by heating 50 g of sample to 300 °F. until foaming ceases, then cooling immediately and calculation results.

(B) Replace 2% sodium oleate solution with distilled water in test.

The emulsion shall be stable, i.e., should not break when stored in clean closed containers at temperatures between 35°F. and 200 °F. for a minimum of 3 months. The sequestering agents shall make the preparation stable against hard water, thus permitting dilution of the emulsion with almost all types of water. The emulsion shall be non-corrosive to metal containers. The materials shall penetrate into the soil and not form a skin at the surface or a crusted surface.

(C) Lignin-Based Types:

Lignin-based dust palliative shall be an aqueous lignosulfonates (a residual co-product of wood pulping by the sulfite process in the manufacturer of cellulose products) that dispersed readily in water to yield a stable, brown-colored solution. The material shall have the following properties in its undiluted state:

Specification Designation	ASTM Test Method	Requirements
Absolute Viscosity (Brookfield), cP, 77°F.	–	< 1,000
Residue (total solids content), %	D 244	48 min.
Lignin sulfonate content (% of solids)	D 244	60 min.
pH	E 70	5.0 - 7.0
Specific Gravity (liquid), 77/60°F.	D 1298	1.00 min.

Language from COP Aviation specification for acrylic products to quantify the binding characteristics of the product.

Acrylic Copolymer/Polymer Performance Tests: Product shall be blended at the specified stabilizer content application rate with soil that is either representative of the site soils to be treated or be a local A-7 (as determined by the Engineer) and tested in accordance with ASTM D1883. Results of treated soil must show a minimum 25% increase in CBR (California Bearing Ratio) value over the untreated soil for the acrylic copolymer/polymer product to be accepted for either topical dust suppression or soil stabilization.

Test Method: Testing shall be in accordance with ASTM D1883, as modified herein. Test reporting shall include all the information required by ASTM D1883, Section 10.0 for both treated and untreated CBR samples. In addition, the penetration vs. stress plow for each test shall be included (ASTM D1883, Fig. 2). CBR specimens, after molding, shall be left in their mold, on their sides and cured in the laboratory air for 7 days prior to being immersed in water for 96 hours and then tested for CBR. At least three CBR test specimens shall be compacted at the optimum moisture content, both treated and untreated (ASTM D698, method C), with the result reported as the average value. The surcharge weight shall be 10 pounds.

(D) Organic Resinous Types:

The material shall be a tan emulsion designed specifically for dust control of unpaved roads, traffic surfaces, and road shoulders that utilizes non-petroleum based organic esters and resins combined with other additives to penetrate, bond and coat treated soils. The material shall have the following properties in its undiluted state:

Specification Designation	ASTM Test Method	Requirements
Absolute Viscosity (Brookfield), cP, 77°F	–	50 - 200
PH	E 70	3.0 - 9.0
Residue (active solids content), %	D 244	45 min
Flash Point	D 92	None
Specific Gravity, 60/60°F	D 1298	1.00 min.

(E) Other Types:

Other types of dust palliative may be approved for use by the Engineer. Test methods, requirements, dilution ratios and application rates shall be as specified by the manufacturer.

792.3 ENVIRONMENTAL CRITERIA:

Products shall not contain or emit chlorinated fluorocarbons (CFS's Freon's) and shall not contain or emit volatile organic compounds (VOC's) that exceed Federal, State or Local air quality limitations.

Products and their degradation products shall not be composed of elements, compounds, mixtures or produce runoffs with the characteristics identified under Arizona Revised Statutes 36-2822 of the Arizona Hazardous Waste Management Act, emit or off-gas during placement, use or degradation of any hazardous air pollutant listed under Section 112 of the Federal Clean Air Act [42 U.S.C. § 7412], be a hazardous chemical substance or mixture pursuant to Section 7 of the Federal Toxic Substances Control Act [15 U.S.C.§ 2606], be designated by rule an extremely hazardous chemical substance pursuant to the Arizona Environmental Quality Act, ~~produce runoffs that contain concentrations exceeding the parameters designated in Section 2.18 'Table 5' of the National Pollutant Discharge Elimination System (NDES) Multi-Sector General Permit for Industrial Activities (see Note A),~~ be prohibited for use by the Arizona Department of Environmental Quality, the Environmental Protection Agency, or any applicable law, rule or regulation.

Products or their components and degradation products shall be tested and certified by the manufacturer not to be substances or composed of substances known to be, or reasonably anticipated to be carcinogenic or toxic by the U.S. Department of Health and Human Services.

Products must have hazardous Materials Identification System (HMIS) ratings equal to or less than the following for each category: H=1; F=1; R=1; PPE=X.

Note A: Parameter benchmark values shall be provided by the Engineer and based on the Contracting Agency's requirements.

End of Section

Paragraph included to insure testing and product compliance are performed, with the responsibility on the contractor.

Contractor shall submit proof in the form of test reports and certificates to verify that the dust palliative product is in environmental compliance. Verification and certification shall be submitted to the Buyer at time of bid. The Contractor is responsible for any costs associated with the testing of soil and palliative product prior to the application of as specified herein.

Included to provide more defined method to insure environmental compliance (language adapted from COP Aviation specification).

Product runoff and their degradation product runoffs shall not contain concentrations that exceed the parameters designated in Section 2.18 'Table 5' of the National Pollution Discharge Elimination System (NDES) Multi-Sector General Permit for Industrial Activities (see Note A). Adequate proof can be shown by providing one of the following:

A. Complete aquatic toxicity test for lethal concentration at 50% (LC50).

B. Provide complete and accurate listing of all individual chemical constituents (including proprietary chemical information) and percentage of each in a given volume of pure chemical product.

C. Surface water runoff test. This test involves running distilled water over a treated soil area, collecting the test water, and submitting to a certified lab for analysis.

Contractor shall obtain from the dust palliative product manufacturer independent verification and certification of performance and environmental claims by a recognized agency of the United States or Canadian Precertification or Environmental Technology Verification programs for chemical dust suppressants.