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USACE / NAVFAC / AFCESA / NASA **UFGS-02786A (December 2004)**

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UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 23 June 2005
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DIVISION 02 - SITE CONSTRUCTION

SECTION 02786A

POLYMER CONCRETE- MICRO-OVERLAY (PCMO) FOR FUEL AND ABRASION RESISTANT WEARING SURFACES

12/04

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SECTION 02786A

POLYMER CONCRETE- MICRO-OVERLAY (PCMO)
FOR FUEL AND ABRASION RESISTANT WEARING SURFACES
12/04

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NOTE: This guide specification covers the requirements for Polymer Concrete Micro-Overlay (PCMO) for fuel and abrasion resistant wearing surfaces.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.
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PART 1 GENERAL

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NOTE: PCMO is to be used primarily as an alternative to coal-tar seal coats placed over asphalt surfaces to provide fuel resistance. PCMO also has application as a seal coat over asphalt surfaces not requiring fuel resistance. For airfields, PCMO may be used on taxiways and parking aprons, it is not recommended for runway use. PCMO shall not be applied to grooved surfaces, as it will fill the grooves. PCMO may be used on roads and parking lots as a fuel and abrasion resistant wearing surface.

This guide specification only pertains to the polymer concrete micro-overlay aspects of the project and not to any surface preparation

requirements. Surface preparation requirements should be covered by either including them in this guide specification or by adding pertinent sections to the project documents.

This specification utilizes a Quality Assurance and Quality Control (QA/QC) construction management philosophy. Quality Assurance refers to the actions performed by the Government to assure the final product meets the job requirements. Results of QA testing are the basis for pay. Quality Control refers to the actions of the Contractor to monitor the construction and production processes and to correct these processes when out of control. Results of QC testing are reported daily on the process control charts maintained by the Contractor. Quality Control is covered in paragraph ContractorR QUALITY CONTROL. Quality Assurance is covered in paragraph MATERIAL ACCEPTANCE AND PERCENT PAYMENT.

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1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 117	(2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	(2005) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 144	(2003) Aggregate for Masonry Mortar

ASTM C 150	(2005) Portland Cement
ASTM C 33	(2003) Concrete Aggregates
ASTM C 387	(2004) Packaged, Dry, Combined Materials for Mortar and Concrete
ASTM C 67	(2003a) Sampling and Testing Brick and Structural Clay Tile
ASTM D 2939	(2003) Emulsified Bitumens Used as Protective Coatings
ASTM D 3699	(2004) Standard Specification for Kerosine

1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Mix Design[; G][; G, [_____]]

Proposed JMF.

Contractor Quality Control[; G][; G, [_____]]

Quality Control Plan

SD-04 Samples

Cement

Sample of 10 kg 22 lb for mix design verification

Aggregates

Sample of 20 kg 44 lb for mix design verification

SD-06 Test Reports

Aggregates[; G][; G, [_____]]
QC Monitoring

Aggregate and QC test results

SD-07 Certificates

Cement[; G][; G, [_____]]

Copies of certified test data

Testing Laboratory[; G][; G, [_____]]

Certification of compliance

1.3 DESCRIPTION OF WORK

The work consists of placing, at least, one application of a polymer concrete seal coat, with mineral aggregate, applied on an existing, previously prepared bituminous surface for the area shown on the drawings or as designated by the Contracting Officer. The material is primarily intended for use as an alternative to coal-tar, as a fuel resistant asphalt pavement sealer, but also has application as a wearing surface for asphalt.

1.4 DESCRIPTION OF PCMO

Two types of PCMO products exist: a 'wet' mixture that is a blend of liquid polymer emulsion, cement, aggregate, and pigment (in some cases), herein referred to as WPCMO; and a 'dry' mixture that is a blend of dry polymer, cement, aggregate, and pigment (in some cases), herein referred to as DPCMO. For all products, Material Safety Data Sheets (MSDS) must be available upon request. For all materials, certification sheets shall be made available verifying the composition of each separate material employed in the PCMO without revealing proprietary information. For PCMO, this requires certificate of analyses (COA) or quality control certificates (QCC). All materials will meet the requirements as given in this specification. The COA/QCC should be traceable to the batch/lot of materials received from the supplier of polymer emulsion and

cement/aggregate or dry polymer/cement/aggregate mix. Batch/lot identification shall be clearly marked on all packaging and shall be traceable to a specific COA/QCC for that particular batch. All COAs/QCCs and batch/lot identifications shall be made available upon request and shall include all required information required in PART 2 of this specification, including allowable tolerances.

1.5 METHOD OF MEASUREMENT

Measurement of the quantity of PCMO, per square yard placed and accepted, shall be made for the purposes of assessing payment.

1.6 BASIS FOR PAYMENT

****
NOTE: For unit-price contracts, include first bracketed set and delete the second. For lump-sum contracts, delete the first bracketed set and include the second. Include prescriptive unit price based on the Government estimate for payment adjustment.
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[Quantities of PCMO mixture, determined as specified above will be paid for at respective contract unit prices. Payment shall constitute full compensation for furnishing all materials, equipment, plant, surface preparation, and tools; and for all labor and other incidentals necessary to complete the required work.] [The measured quantity of PCMO, per square yard placed and accepted, will be paid for and included in the lump-sum contract price. Payment shall constitute full compensation for furnishing all materials, equipment, plant, surface preparation, and tools; and for all labor and other incidentals necessary to complete the required work.]

1.7 EQUIPMENT AND TOOLS

The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of the work. Requirements for the mixing and placement equipment are specific to the manufacturer's product and will not be specified herein. However, the mixing and placement equipment shall be approved of in writing by the Contracting Officer following approval of the PCMO test section.

1.8 WEATHER LIMITATIONS

PCMO shall not be applied when the surface is wet, unless specified by the manufacturer, or when the humidity or impending weather conditions will not allow proper curing. PCMO shall be applied only when the pavement temperature is 7.5 degrees C 45 degrees F and rising and is expected to remain above 7.5 degrees C 45 degrees F for 24 hours, unless otherwise directed. Pavement temperatures should not exceed 50 degrees C 130 degrees F for PCMO application. Ideal conditions for placement are 15 to 32 degrees C 60 to 90 degrees F and humidity levels between 50 and 60%.

PART 2 PRODUCTS

2.1 CEMENT

Cement for PCMO shall conform to ASTM C 150 for Type I Portland Cement.

2.2 WATER

The water used in mixing shall be potable and free from harmful soluble salts. The temperature of the water added during mixing shall be at least 10 degrees C 50 degrees F and not above 32 degrees C 90 degreesF. The pH of the water added during mixing shall conform to the requirements of the manufacturer.

2.3 AGGREGATES

The aggregate shall either be a natural or manufactured angular aggregate and shall be composed of clean, hard, durable, uncoated particles, free from lumps of clay and all organic matter. The aggregate shall meet the criteria outlined in ASTM C 33 and the gradation shall be as given in the following table, when tested in accordance with ASTM C 144. All aggregate test results and samples shall be submitted at least 14 days prior to start of construction.

2.4 CEMENT/AGGREGATE MIXTURE

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NOTE: Select the wording within the first subparagraph for the WPCMO process and the second subparagraph for the DPCMO process.

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2.4.1 WPCMO Mixture Requirements

The cement/aggregate dry blend used for WPCMO shall conform to ASTM C 387 for a Type M mortar. Cement content shall be 33 ± 1.0 percent by weight of total dry mix and aggregate content shall be 67 ± 1.0 percent by weight of total dry mix. The cement/aggregate dry blend comes prepackaged in 1361 kg 3000 lb tote units. Weight tolerance shall be 1361 ± 11 kg 3000 ± 25 lbs for each tote unit. For small applications, the cement/aggregate dry blend comes prepackaged in 27.2 kg 60 lb bags. Weight tolerance shall be 27.2 ± 0.25 kg 60 ± 0.5 lbs for each bag.

2.4.2 DPCMO Mixture Requirements

The dry polymer/cement/aggregate blend for DPCMO shall consist of 50 percent cement by weight of total dry mix. The aggregate content shall be 47 percent by weight of total dry mix. The polymer percent by weight of total dry mix is 2.225% polymer. The cement/aggregate dry blend comes prepackaged in 1227 kg 1350 lb tote units. For small applications, 22.7 kg 50 lb bags are available. The total dry mix percent per 22.7 kg 50 lb bag is 49.225%.

2.5 AGGREGATE GRADATION

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NOTE: A selection must be made in regards to aggregate gradation based on whether the WPCMO or the DPCMO process is used. Delete the gradation that does not pertain to the process selected. Changes to the listed gradations, as specified by the Contracting Officer are allowed to account for regional differences in aggregate stockpiles.

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The aggregate gradation shall conform to gradations specified in the following tables, when tested in accordance with ASTM C 136 and ASTM C 117, and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa, but grade uniformly throughout the gradation.

Table 1. WPCMO Aggregate Gradations

Sieve Size, mm	Percent Passing by Mass	Allowable Tolerance Percent
2.36	95-100	± 2
1.18	70-100	± 2
0.60	40-75	± 2
0.30	10-35	± 2
0.15	2-15	± 1
0.075	0-5	± 1

Table 1. WPCMO Aggregate Gradation

Sieve Size, inch	Percent Passing by Mass	Allowable Tolerance percent
No. 8	95-100	± 2
No. 16	70-100	± 2
No. 30	40-75	± 2
No. 50	10-35	± 2
No. 100	2-15	± 1
No. 200	0-5	± 1

Table 2 DPCMO Aggregate Gradations

Sieve Size, mm	Percent Passing by Mass	Allowable Tolerance percent
1.18	99-100	± 2
0.60	87-99	± 2
0.30	38-87	± 2
0.15	3-38	± 1
0.075	1-3	± 1
Below 0.075	Less than 1	N/A

Table 2 DPCMO Aggregate Gradations

Sieve Size, inch	Percent Passing by Mass	Allowable Tolerance percent
No. 16	99-100	± 2
No. 30	87-99	± 2
No. 50	38-87	± 2
No. 100	3-38	± 1
No. 200	1-3	± 1
Below 0.075	Less than 1	N/A

2.6 MIX DESIGN

The Contractor shall develop the mix design and shall submit the recommended formulation of water, emulsion, and cement/aggregate dry blend and estimated application rate proposed for use at least 14 days prior to the start of operations. Exact application rates cannot be determined

until the test section is placed (as outlined in PART 3) due to the variability in surface textures of asphalt pavement. The mix design shall be as agreed upon by the Contracting Officer and manufacturer. The formulation shall pass the fuel resistance test in Appendix A. The specific JMF selected will be submitted in writing and approved by the Contracting Officer prior to the start of the project.

2.6.1 Composition

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NOTE: Select the wording in the first subparagraph for the WPCMO process and the second subparagraph for the DPCMO process.
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2.6.1.1 WPCMO Process

WPCMO shall consist of liquid polymer emulsion, water, cement, and aggregate in the specified proportions and in accordance with the specific manufacturer's requirements. A pre-determined job mix formula (JMF) cannot be specified due to the range of different PCMO products available, the local climatic zone, local temperature during application, and pavement surface conditions.

2.6.1.2 DPCMO Process

DPCMO shall consist of a dry polymer, water, cement, and aggregate in the specified proportions and according to the specific manufacturer's requirements. A pre-determined job mix formula (JMF) cannot be specified due to the range of different PCMO products available, the local climatic zone, local temperature during application, and pavement surface conditions. Some manufacturers may require a pavement primer to be applied prior to placement of DPCMO.

2.6.2 Acceptability

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NOTE: The designer will specify the fuel resistance testing required (either Appendix A or Appendix B). Appendix A is the laboratory fuel-resistance test and Appendix B is the field fuel-resistance test conducted on the test section. For field testing, the test area must be allowed to cure at least overnight, and preferably, 24 hours prior to testing. A minimum of three field fuel resistance tests (see Appendix B) should be conducted at locations selected by the Contracting Officer. All testing and test results will be conducted, recorded, and furnished to the Contracting Officer by the Contractor.
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The job mix formula for each mixture shall be in effect until modified in writing by the Contracting Officer. Improper formulations of PCMO will produce coatings that crack prematurely, do not cure properly, and/or may not adhere properly to the pavement surface. A minimum of 1 day following the placement of the test section is recommended prior to job mix approval to allow for proper curing, fuel resistance testing (if specified), and an overall assessment of the PCMO test section.

2.6.3 Adjustments to JMF

The JMF shall be in effect until a new formula is approved in writing. Should a change in sources of any materials be made, a new mix design shall be performed and a new JMF approved before the new material is used.

PART 3 EXECUTION

3.1 PREPARATION OR THE UNDERLYING SURFACE

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NOTE: The designer shall specify the time period or whether detergent washing of the surface, in lieu of the 30-day minimum time requirement, may be used. In order to ensure adequate adhesion and minimize cracking and curling, the pavement surface must be sufficiently cured prior to application of the seal coat. Experience has shown that a minimum of 30 days and an average of approximately 90 days of hot weather (daytime temperatures of 21 degrees C (70 degrees F)) are needed for adequate curing of a HMA surface prior to application of a PCMO. One means of determining if the pavement has cured adequately is to pour a cup of water on the pavement surface (on a warm day) and observe if any oils appear in the standing water. If oils appear, the surface is not sufficiently cured to accept a seal coat. These test results WILL NOT BE in lieu of the 30-day minimum time requirement prior to placement of PCMO or detergent washing. Detergent washing according to Contractor's specifications has been used successfully in several instances.

The Contracting Officer will specify the appropriate method of treating cracks depending on the frequency and severity, this may include filling or routing and filling with a compatible crack filler, filling with a sand slurry at the time it is applied to the pavement surface, milling, the Contractor's methods for crack repair, etc. The recommended preparation prior to crack filling is routing followed by a thorough cleaning of the crack faces using high-pressure water followed by compressed air to dry. The designer is referred to UFGS 02975 SEALING OF CRACKS IN BITUMINOUS PAVEMENTS for more information on crack repair.

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Prior to placing PCMO, the surface of the pavement shall be clean and free from dust, dirt, or other loose foreign matter, grease, oil, or any type of objectionable surface film. When directed, the existing surface shall be cleaned with a vacuum sweeper or a combination of wire brushes and a power blower. Where vegetation exists in cracks, the vegetation shall be removed and the cracks cleaned to depth of two inches where practical. Those cracks shall be treated with a concentrated solution of an herbicide approved by the Contracting Officer. Cracks shall then be [_____]. Bituminous pavement surfaces softened by petroleum derivatives, or that have failed due to any other cause, shall be removed to the full depth of

the damage and either replaced with new bituminous concrete similar to that of the existing pavement or repaired according to the Contractor's methods for repairs underlying PCMO surfaces. Areas of the pavement surface to be sealed with PCMO shall be in a firm consolidated condition, and shall be sufficiently cured so that there is no concentration of oils on the surface. A period of a minimum of 30 days shall elapse between the placement of a bituminous surface course and the application of the seal coat unless detergent washing is chosen as an alternative to the time requirement.

3.2 TEST SECTION

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NOTE: The test section affords the Contractor and the Government an opportunity to determine the exact application rate, quality of the mixture in place, and the performance of the equipment. The section must be free of excessive quantities of pinholes, air bubbles, inconsistent thickness, lumps, and other visible defects.

The application rate depends on the pavement surface texture, desired PCMO thickness, PCMO aggregate size, and equipment used during PCMO placement. If operational conditions preclude placement of a test section on the pavement to be seal coated, it may be applied on a pavement with similar surface texture.

The fuel resistance testing on the test section may be waived by the Contracting Officer if the Contractor provides test results documenting the fuel resistance of the PCMO (see Appendix A). A minimum of three field fuel resistance tests (see appendix B) should be conducted at locations selected by the Government if the Contracting Officer chooses to perform fuel-resistance testing according to Appendix B. All tests should receive a 'Pass' rating. If the test section fails the criteria in Appendix B, the test section will be removed and replaced at no cost to the Government and another test section constructed.

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Prior to full production, the Contractor shall prepare a quantity of mixture in the proportions shown in the approved mix design. The amount of mixture shall be sufficient to place a test section a minimum of 76.2 square m 250 square yard at the rate specified in the job mix formula. The area to be tested will be designated by the Contracting Officer and will be located on a representative section of the pavement. The test application rate will be determined as agreed upon by the manufacturer and Contracting Officer during placement of the test section and will depend on the condition of the pavement surface. The test section shall be used to verify the adequacy of the mix design and to determine the actual application rate for the project. The Contractor shall provide test results, performed by an approved Testing Laboratory, showing that the mixture provides satisfactory fuel resistance, according to the test method given in Appendix B. The same equipment and method of operations shall be used on the test section as will be used on the remainder of the work. If the test section should prove to be unsatisfactory, the necessary

adjustments to the mix composition, application rate, placement operations, and equipment shall be made. Additional test sections shall be placed and evaluated, if required. Full production shall not begin without approval.

3.2.1 Sampling and Testing for Test Section

If field fuel resistance (Appendix B) testing is chosen, this test will be conducted on the test section. If the fuel resistant test results (see Appendix B) meet the specified requirements, the test section shall remain as part of the project pavement. If the test section fails the criteria in Appendix B, the test section shall be removed and replaced at no cost to the Government and another test section shall be constructed.

3.2.2 Additional Test Sections

If the initial test section should prove to be unacceptable, the necessary adjustments to the JMF and placing procedures shall be made. A second test section shall then be placed. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Full production shall not begin until an acceptable section has been constructed and accepted.

3.3 APPLICATION

The mixture shall be continuously agitated from the initial mixing until its application on the pavement surface. The distributor or applicator, pumps, and all tools shall be maintained in a satisfactory working condition. The PCMO seal coat shall be applied in one or two coats depending on the specifications. When, in the opinion of the Contracting Officer, an area will be subjected to significant fuel spillage, a double coat of PCMO may be placed in the appropriate area at an approved application rate. The application rate and number of applications will be as shown on the project drawings. The application rate submitted with the job mix formula shall be verified during placement of the test section. The application rate for the second coat of PCMO may vary significantly from the underlying PCMO coat due to changes in the surface texture of the surface after PCMO application.

3.3.1 Calibration

The Contractor shall furnish all equipment, materials, and labor necessary to calibrate the equipment to assure that it will produce and apply a mix that conforms to the job mix design. All calibrations shall be made with the approved job materials prior to applying the PCMO to the pavement and shall be accomplished as part of the test section. A copy of the calibration test results shall be submitted.

3.3.2 Curing

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NOTE: A minimum of 4 hours is necessary for the initial PCMO set. 24 hours is recommended before application of traffic where possible.
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The mixture shall be permitted to cure for a minimum of 4 hours after the final application before opening to traffic and shall be sufficiently cured to drive over without damage to the seal coat. Any damage to the uncured mixture due to early traffic will be the responsibility of the Contractor

to repair. The PCMO contains Portland cement and although an initial set occurs within a few hours and provides enough strength to accept traffic, ultimate strength requires 28 days of cure.

3.3.3 Weather

PCMO shall not be applied when the surface is wet unless specified by the manufacturer or when the humidity or impending weather conditions will not allow proper curing. PCMO hall be applied only when the atmospheric or pavement temperature is 7.5 degrees C 45 degrees F and rising and is expected to remain above 7.5 degrees C 45 degrees F for 24 hours, unless otherwise directed. Pavement temperatures exceeding 50 degrees C 130 degrees F are not recommended for PCMO application. Ideal conditions for placement are air temperatures between 15 and 32 degrees C 60 and 90 degrees F and humidity levels between 50 and 60%. PCMO should be allowed to cure a minimum of 4 hours with 24 hours recommended before application of traffic.

3.4 JOINTS

All joints shall overlap with the adjacent PCMO section and have the similar texture as other sections of the PCMO.

3.5 ContractorR QUALITY CONTROL

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NOTE: The Contractor may be able to meet the specified quality control requirements with in house capability or may have to hire a material testing firm to provide the required quality control testing.

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3.5.1 General Requirements

The Contractor shall develop an approved Quality Control Plan. PCMO for payment shall not be produced until the quality control plan has been approved. The plan shall address all elements that affect the quality of the pavement including, but not limited to:

a. Mix Design.
b. Aggregate Grading.
c. Quality of Materials.
d. Fuel Resistance Testing.

3.5.2 QC Monitoring

The Contractor shall submit all QC test results on a daily basis, as the tests are performed. The Contracting Officer reserves the right to monitor any of the Contractor's quality control testing and to perform duplicate testing as a check to the testing.

3.5.3 Sampling

When directed, the Contractor shall sample and test any material which appears inconsistent with similar material being produced, unless such material is voluntarily removed and replaced, or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

3.6 APPENDICES

APPENDIX A

LABORATORY FUEL RESISTANCE TEST

1. Scope. This method determines the resistance of the PCMO to kerosene. This procedure is found in ASTM D 2939. Some slight modifications to the standard method have been made to accommodate PCMO.

2. Apparatus.
   a. Two 150 X 150 mm 6 X 6 inch square 16 gauge sheet metal masks with a 100 by 100 mm 4 by 4 inch square center removed.

   b. One 150 X 150 mm 6 X 6 inch unglazed white ceramic tile with an absorption rate of 10-18 percent (according to ASTM C 67).

   c. Brass ring, 50 mm 2 inch diameter and 50 mm 2 inch high.

   d. Kerosene meeting requirements of ASTM D 3699.

   e. Silicone rubber sealant or fast-setting epoxy.

3. Procedure
   a. Immerse the ceramic tile in distilled water for a minimum of ten minutes.

   b. Remove excess water from the tile to produce a damp surface before applying the seal coat.

   c. Using the mask described in 2.a apply one layer of the PCMO blend (mixed as specified). Spread even with the top of the mask using a spatula or other straight edge.

   d. Allow the sample to cure for 24 hours at 24 degrees C + 1 77 + 2 degrees and 50 + 10 percent relative humidity.

   e. Position a second mask on top of the first mask. Apply a second coat of PCMO emulsion mixture. Spread even with the top of the second mask.

   f. Cure as in step 3.d.

   g. After curing, affix the brass ring to the seal coat on the tile with silicone rubber or epoxy. Epoxy often adheres better to the PCMO than silicone.

   h. Fill the brass ring with kerosene. Add a small amount of coloring to the kerosene, asphalt works well for this. The coloring may be necessary to determine if the kerosene breached the PCMO surface.

   i. After 24 hours, remove the kerosene from the brass ring, blot dry and immediately examine the film for softness and loss of adhesion. Immediately after the film is examined, break the tile in half, exposing that part of the tile whose film was subjected to the kerosene.

   j. Evaluate for penetration of kerosene through the sealer and loss of adhesion.

4. Report. Report the results as pass or fail. Visible evidence of leakage

APPENDIX A

LABORATORY FUEL RESISTANCE TEST

through or discoloration in the tile shall constitute failure of the test.

5. Criterion. A "pass" rating in the fuel resistance test is required.

APPENDIX B

FIELD FUEL RESISTANCE TEST

1. Scope. This field method is recommended to verify the resistance of the PCMO to aviation fuel. This procedure is adapted from a field test proposed for use with coal-tar materials. Some slight modifications to the method have been made to accommodate PCMO. This test is best conducted in conditions of little wind and moderate temperatures (around 21-24 degrees C 70-75 degrees F).

2. Apparatus

a. A 150 mm 6-inch diameter metal, glass, or PVC pipe at least 76 mm 3 inches long.

b. A lid for the pipe.

c. RTV silicone rubber sealant or fast-setting epoxy for affixing the pipe to the pavement surface.

d. Silicone rubber sealant or fast-setting epoxy

e. A ruler.

3. Procedure

a. Locate a clean, flat surface on the pavement to be tested.

b. Place the pipe on the pavement surface and seal the edge with silicone or epoxy. Firmly mold the adhesive between the pipe and the surface of the pavement to prevent leakage.

c. Allow the adhesive to cure for 24 hours.

d. Pour approximately one inch of aviation fuel or kerosene inside the pipe. Determine baseline of fluid by placing the ruler inside the pipe and measuring the distance from the surface of the fluid to the top of the pipe. Record this distance. Place the lid on the top of the pipe.

e. After 30 minutes remove the lid and measure the distance from the top of the fluid to the top of the pipe. Record this distance. Any discoloration of the fuel or softening of the PCMO surface should be recorded.

f. If seepage occurs between the bottom of the pipe and the pavement surface through the adhesive, the test is invalid and must be repeated in a different location.

4. Report. Report the distance from the surface of the fluid to the top of the pipe immediately after placing the fluid and after 30 minutes. Determine the difference between the two readings. If less than 5 mm 0.2 inches of fluid has penetrated the surface, a 'Pass' rating is given. If more than 5 mm 0.2 inches of fluid penetrates the surface, the pavement surface is deemed 'Failed' and may be unacceptable for fuel resistance. If any discoloration of the fuel or softening of the PCMO surface is evident, the PCMO surface is deemed 'Failed' and may be unacceptable for fuel resistance.

5. Criterion: A "pass" rating in the fuel resistance test.

APPENDIX B

FIELD FUEL RESISTANCE TEST

-- End of Section --