

TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): Virginia DOT

INSTRUCTIONS:

Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.

Transportation Pooled Fund Program Project # <i>(i.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX))</i> TPF-5 (225)	Transportation Pooled Fund Program - Report Period: <input type="checkbox"/> Quarter 1 (January 1 – March 31) <input type="checkbox"/> Quarter 2 (April 1 – June 30) <input type="checkbox"/> Quarter 3 (July 1 – September 30) <input checked="" type="checkbox"/> Quarter 4 (October 1 – December 31)	
Project Title: Validation of Hot-Poured Crack Sealant Performance Based Guidelines		
Name of Project Manager(s): Imad L. Al-Qadi	Phone Number: 217-265 0427	E-Mail alqadi@illinois.edu
Lead Agency Project ID: VCTIR 98160	Other Project ID (i.e., contract #):	Project Start Date: 09/01/2010
Original Project End Date: 09/01/2014	Current Project End Date: 09/01/2014	Number of Extensions:

Project schedule status:

- On schedule
 On revised schedule
 Ahead of schedule
 Behind schedule

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Percentage of Work Completed to Date
730,000	150,912.73	25%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
33,464.30 (as of 11/30/2011)	33,464.30 (as of 11/30/2011)	31.3%

Project Description:

Recently, performance-based guidelines were developed as a systematic procedure to select hot-poured bituminous crack sealants. These guidelines are the outcome of the pool-funded North American Consortium led by the University of Illinois at Urbana-Champaign and the National Research Council of Canada. The work proposed a "Sealant Grade" (SG) system to select hot-poured crack sealant based on environmental conditions. A special effort was made to use the equipment originally developed by the Strategic Highway Research Program (SHRP), which was used to measure binder rheological behavior as part of the Performance Grade (PG) system.

These developed laboratory tests allow for measuring hot-poured bituminous-based crack sealant's rheological and mechanical properties over a wide range of service temperatures. Preliminary thresholds for each test were identified to ensure desirable field performance. Then, the preliminary thresholds were utilized in the SG system based on extensive laboratory testing, limited between-laboratory testing, and limited field performance data.

However, because the preliminary thresholds were determined based on only limited field data, mainly from Canada, a comprehensive field study is urgently needed to validate and fine-tune the present threshold values.

Furthermore, the developed guidelines should be validated in several states under various climate zones.

Tasks:

I. Laboratory Validation

II. Field testing and installations

III. Test section monitoring

IV. Threshold value fine tuning

V. Cost effectiveness quantification

VI. Development of crack sealant selection procedures and installation guidelines.

Objectives:

The developed laboratory tests and the new guidelines must be verified for precision and bias between laboratories as well as within laboratories. In addition, since preliminary thresholds were established for each test based on extensive laboratory testing but with limited field and within-laboratory data, an extensive field study is urgently needed to validate and fine-tune the threshold values. Hence, this proposed study aims 1) to validate the developed laboratory tests, 2) to determine the thresholds using a more diverse array of field performance data, and 3) to implement crack sealant guidelines for field application.

Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):**Meetings:**

No meetings took place this quarter. A meeting is scheduled on February 22nd in Charlottesville.

Task-I: Laboratory Validation (25% completed):

Mechanical and rheological characterization of products used in the small kettle study is currently underway to evaluate the effects of kettle-aging of sealants during construction. Bending beam rheometer (BBR) and rotational viscometer (RV) tests are being conducted for comparison. Gel permeation chromatography tests were also added to the matrix to get an insight on the changes of molecular structure with different aging methods and time.

A laboratory melter was acquired for homogenization of sealant blocks in accordance with the ASTM standards. This melter simulates kettle's heating mechanisms.

A test matrix is prepared to compare the effects of different aging protocols. The matrix includes the following:

1) Homogenized (but unaged) 2) Vacuum oven aged (VOA) 3) Laboratory melter aged (MA); and 4) Kettle aged (FK).

The objective is to identify a lab aging that best simulates field aging.

Temperature data collected in the kettles during test site installations and laboratory kettle study were analyzed.

Task-II: Field Testing and Installation (45% completed):

Test site installations in New Hampshire were completed during this quarter.

Test site search in Michigan, New York, Colorado, and Rhode Island is underway.

Task-III: Test section monitoring (0% completed).

First evaluations are planned in the second week of February in Minnesota followed by other sites in March.

Task-IV: Threshold value fine tuning (0% completed).

Task-V: Cost effectiveness quantification (0% completed).

Task-VI: Development of crack sealant selection procedures and installation guidelines (0% completed).

Anticipated work next quarter:

1. Field evaluations in Minnesota, New Hampshire, Wisconsin, Ontario and Virginia are planned as part of Winter evaluations.
2. Laboratory validation efforts will be continued.
3. Candidate test sites for New York, Michigan, Colorado and Rhode Island will be determined. A test matrix (with the sealant products) for each site will also be prepared.
4. A meeting will be held in Charlottesville to discuss the progress in the project.

Significant Results:

Laboratory Validation:

Heating time in kettle (2 to 5 hours) did not exhibit significant differences in their viscosity and stiffness values.

Some products degrade over the heating time (decrease in stiffness and viscosity) whereas some exhibited an increase in stiffness and viscosity.

Temperature data collected during field site installations and laboratory kettle study shows that various kettles may exhibit significant differences. The results from kettles from two different manufacturers were analyzed. One kettle may require up to 3-4 hours achieving recommended temperatures whereas the other type can reach target temperatures within 2 hours of heating time.

Circumstance affecting project or budget. (Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints set forth in the agreement, along with recommended solutions to those problems).

No problems encountered in this quarter.

Potential Implementation:

Based on the field validation study at various test sites, performance thresholds will be updated for the laboratory tests designed for sealant grading. These thresholds were initially determined based on limited field data. The finalized grade system can be used by the states on the selection of sealants in their climatic region. Sealant field installation guidelines will also be available at the end of this project for the use of states.