

## 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.*

<b>Transportation Pooled Fund Program Project #</b> <i>(i.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX))</i>  TPF-5 (225)	<b>Transportation Pooled Fund Program - Report Period:</b>  <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)	
<b>Project Title:</b>  Validation of Hot-Poured Crack Sealant Performance Based Guidelines		
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<b>Lead Agency Project ID:</b> VCTIR 98160	<b>Other Project ID (i.e., contract #):</b>	<b>Project Start Date:</b> 09/01/2010
<b>Original Project End Date:</b> 09/01/2014	<b>Current Project End Date:</b> 09/01/2014	<b>Number of Extensions:</b>

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	333,096.66	50%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
21,274.85	21,274.85	58.3%

**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.

**Task-I: Laboratory Validation (50% completed):**

Lab aging study has been conducted on the materials Ad, Bb, Ca, Da, Ed, Fb, Jd, Mb, Ob, and Kc using test protocols including CSBBR, CSRv, adhesion, and DSR. The main objective of this task is to verify and fine-tune aging procedure developed in the first phase of the study. Short-term and long-term aging were considered using a lab melter, kettle aging, and field aged. The results have been compared to accelerated laboratory vacuum oven aging procedure.

Samples from the ATREL test section were collected after 12 months for characterization. The samples were sliced into two parts: "bottom" and "crust". Characterization of 1 year field-aged samples is completed utilizing CSBBR and DSR tests.

The samples for inter-laboratory testing were prepared. Sealant kit and molds for BBR testing were ordered and received. Aged samples along with testing kits will be shipped to the laboratories in February.

For field tracking test validating, the research team will use an accelerated test section at ATREL. Two sections are routed and cleaned. Loading will be applied after installation to simulate tracking failure of sealants. Six sealants are considered in the study. Each sealant will be installed in three routs. A mini-melter was purchased and was used during the installation process.

Testing has started on the samples collected from Michigan test site. The testing program includes BBR, DSR, adhesion (AT), and direct tension (DT). Initially, the testing program will be completed on four sealant samples that exhibited poor and good performance according to the field surveys.

Task-II: Field Testing and Installation (90% completed):

Test site selection and installation for San Antonio is underway. San Antonio test site is scheduled for installation in January 2013. Virginia test section installation was cancelled due to bad weather. Scheduling for another test site in Virginia is under consideration.

Task-III: Test section monitoring (20% completed).

Scheduling for second round of surveys has been initiated. Surveys will start with Ontario test section in late February and evaluation of other sections will follow during 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 installation in San Antonio is scheduled for January 2013.
2. Laboratory validation efforts will be continued on lab-aged and field-aged samples using adhesion, cohesion and DSR tests.
3. Inter-laboratory testing packages will be sent at the beginning of the next quarter and the results will be collected from laboratories at the end of the quarter.
4. Annual meeting for the pool fund study will be held at the University of Illinois.
5. Second round of field surveys of the test sections will be conducted.
6. Field tracking resistance test will be conducted using the accelerated testing facility at ATREL.
7. Sealant grading process will start for all sealants used in the test matrix.
8. Laboratory evaluation will continue on the sealant samples from Michigan test section. The results will be analyzed and correlations between field and lab performance tests will be investigated.
9. One year and half field-aged samples will be collected from ATREL test section.

**Significant Results:**

DSR and BBR results show that the sealant samples collected from ATREL test site exhibited significant stiffening one year after installation (samples subjected to one winter and one summer). The stiffening was observed throughout the 25 mm; greater stiffness was on the top 5mm  
DSR yield test, complex modulus and BBR test results also showed the aging effect.

**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).**

**Potential Implementation:**

Based on the field validation study at various test sites, performance thresholds use in Sealant Grade System will be Updated. These thresholds were initially determined based on limited field data. The finalized grade system can be used by States and other agencies for selecting sealants based on climatic region. Sealant field installation guidelines will also be available at the end of this project.