

## 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 checked="" type="checkbox"/> Quarter 3 (July 1 – September 30) <input 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	506,883	65%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
56,987	56,987	77.1%

**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 in the last quarter.

**Task-I: Laboratory Validation (70% completed):**

Progress in the laboratory testing is summarized as follows:

- Low temperature SG determination of 9 materials to correlate with 4 sections' field performance data was completed. These materials are Ad, Bb, Da, Ed, Fb, Gd, Kc, Mb, Ob. A preliminary summary of laboratory test results and its correlation to field performance were provided with the previous quarter report.
- Testing of three field samples (Fb from Minnesota, Wisconsin and ATREL) collected during second survey from different sites has been completed for BBR.
- Low temperature testing (including BBR, cohesion, and adhesion) of all sealants used in test site installations is in progress (BBR testing for all sealants has been completed for all sealants)
- BBR test on Da and Ed sample for inter-laboratory testing were repeated and the results are matching with those of New Hampshire and Minnesota labs.

A laboratory report summarizing the tests conducted on the samples installed in different sites and aging study is in progress.

The research team will use an accelerated test section at ATREL for tracking test validation. Two sections were routed and cleaned in Spring of 2013. Loading will be applied after installation to simulate tracking failure of sealants.

Six sealants will be considered. Accelerated testing is delayed due to technical problems with the testing facility. Accelerated testing will be conducted after the repair is completed.

Task-II: Field Testing and Installation (100% completed):  
This task was completed.

Task-III: Test section monitoring (60% completed).  
No progress in this task this quarter.

Task-IV: Threshold value fine-tuning (50% completed).  
The work on the field survey data continued. Survey data were analyzed to investigate the effects of rout geometry, overbanding, installation temperature, and treatment type. Correlation between field and laboratory performance data is being investigated. Some of the preliminary results were provided in the previous quarter report. This work will continue quarter to analyze field data with some statistical techniques.

Task-V: Cost effectiveness quantification (0% completed).  
No progress in this task this quarter.

Task-VI: Development of crack sealant selection procedures and installation guidelines (5% completed).  
First draft of the installation guidelines is in progress.

**Anticipated work next quarter:**

1. A document will be prepared to summarize laboratory testing program.
2. Field tracking resistance test will be conducted using the accelerated testing facility at ATREL if the repair can be completed and weather conditions allow.
3. Sealant grading process will be completed for all sealants used in the test matrix.
4. Laboratory testing will be conducted on the samples collected from ATREL sealants after summer.
5. Planning for the third round of winter surveys will initiate.
6. First draft of the installation guidelines will be prepared. The initial draft will be shared with the pooled fund partners for their review in this quarter.

**Significant Results:**

Based on the analysis of field survey data, under-heating of sealants may result in poor performance as it was shown with a comparison of Wisconsin and Minnesota test site survey results. Overbanding clearly improved the performance of sealant treatments as shown in the New Hampshire and Ontario test section results.

**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).**

Budget revisions were needed due to some problems in improper allocation of some invoices. The research team came up with a tiered approach to handle budgetary issues. In the first step, budget within existing funds allocated for the project will be revised to generate budget items to charge some of the expenses appropriately (mostly related to service charges and travel expenses). A tele-conference meeting took place with pooled fund partners to discuss budget issues and revisions.

**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.