**Literature Search:** LRRB Support / more involvement with NRRA  
**Date:** April 28, 2020

### Most Relevant Results

**Title:** Assessing Bio-Based Fog Seal for Asphalt Pavement Preservation  
**Source and date:** TRB Transportation Research Circular E-C248 (2019)  
**Abstract:** Pavement preservation consists of applying a suitable treatment on deteriorated roads to maintain good conditions and extend their service lives. Fog seal is a low-cost application of liquid asphalt or emulsion derived from petroleum or coal tar to slow down microcracking propagation, prevent oxidation, and seal against water infiltration. The conventional fog sealants need heating before spraying on the pavement surface, and the recommended spray temperature should be between 52°C and 71°C (125°F and 160°F). Although such petroleum-based traditional fog sealers have been successfully used to maintain road surfaces for many years, they not only need a long curing time, which results in delayed traffic opening, but they can also cause health issues from chemical components such as polycyclic aromatic hydrocarbons. Furthermore, the use of fossil fuel-based products increases the risks associated with an energy crisis and environmental contamination. In recent years, a few bio-based fog sealers have been developed as sustainable alternatives to traditional petroleum-based sealers; **soy-based fog sealant** derived from agricultural oil is one such product. The manufacturers of the bio-sealant claim that it protects asphalt from oxidation, potholing, edge rutting, and cracking and can extend the life of paved asphalt surfaces when applied every 3–5 years; the other advantages and disadvantages are summarized in Table 1. States such as Missouri and Ohio have reported success in using bio-based products for county road preventive maintenance. Even though the reported observations include quick shedding of water from roadways treated with bio-sealant while retaining the skid resistance of normal pavement, documentation of construction and performance experience is limited. Based on the successful use of bio-sealant in other states, this study aimed at evaluating a bio-based product as a fog sealant for low-volume asphalt pavements in Iowa. With the intent of checking the effect of such bio-sealant on skid resistance, pavement-marking retroreflectivity, water absorption, and permeability, the construction process and consequent field and laboratory investigate.  
**Full text:** [http://www.trb.org/Publications/Blurbs/179567.aspx](http://www.trb.org/Publications/Blurbs/179567.aspx)

**Title:** Development of High RAP–High Performance Thin-Lift Overlay Mix Design Using a Soybean Oil-Derived Rejuvenator  
**Source and date:** ASCE Journal of Materials in Civil Engineering, vol. 32, no. 6 (2020)  
**Abstract:** A laboratory study was conducted to develop a thin-lift overlay (Thinlay) mix design containing a polymer-modified PG58-34E+ binder with a 3.5% add to the mix, and 40% fine reclaimed asphalt pavement (RAP) that would meet the criteria for the State of Iowa using a bioderived rejuvenator called sub-epoxidized soybean oil (SESO). Two groups of binder and mix specimens were created for this investigation: (1) a control with no SESO, and (2) a rejuvenated group with 0.28% SESO by total mix weight (4.88% by total binder content-RAP binder + PG58-34E+), where the binder groups were evaluated using the multiple stress creep recovery (MSCR) test and bending beam rheometer (BBR), while the mix groups were evaluated using rutting, low-temperature, and fatigue performance tests. Binder results showed that the optimal dosage of SESO must be higher than 8% to achieve a PG46-26E+ to account for RAP inclusion in the mix design. Binder performance had a significant effect on low-temperature mix and fatigue performance, while rutting performance was found to be acceptable for the rejuvenated group.  
**Full text:** [http://www.trb.org/Publications/Blurbs/179567.aspx](http://www.trb.org/Publications/Blurbs/179567.aspx)

### Other

**Project:** Investigating Merits of Bio-Rejuvenation to Extend Pavement Service Life  
**Source:** Center for Pavement Preservation UTC  
**Abstract:** The overall goal of this project is to extend pavement service life by applying timely preventive and corrective low-cost maintenance approach. As a step toward this goal, the specific objective of the project is to use bio-rejuvenation as a means of restoring aged asphalt pavement properties. The research team mainly starts counting pavement age after pavement placement and compaction is done, however, it should be noted that aging also occurs during plant mixing which promotes chemical imbalance within asphalt colloidal structure. The research hypothesis is that by applying bio-rejuvenator at periodic intervals during pavement life, one can restore the chemical balance of asphalt (asphaltene/maltene ratio) which is critical to maintain an adequately ductile pavement. This, in turn, would ensure pavement proper release of stress to prevent stress accumulation. It should be noted that when the pavement surface appears weathered and crusted, it has already lost its ductility and compliance capacity, this, in turn, would reduce pavement ability to release stress giving rise to stress accumulation due to traffic and environmental loading. When the stress level exceeds pavements’ ultimate strength, cracks initiate and continue to propagate compromising pavement integrity and performance.  
**Final report/deliverable doesn’t seem available yet.**