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Rheological Evaluation of Emulsion Residues Recovered Using Newly Proposed Evaporative Techniques

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ABSTRACT

Increasing use of emulsified asphalts and the introduction of modified emulsions to the market has resulted in the need for development of a new residue recovery method. The conditions specified in ASTM D244 for residue recovery results in degrading of the polymer network developed in modified residues, creating a disconnect between material properties measured in the laboratory and material being placed in the field. Furthermore, the change in binder specifications to the PG system, has created a need to transition to evaluation of emulsion residue properties through rheological testing and performance grading. The first impediment to this transition is development of a residue recovery method with the ability to produce emulsion residue with properties reflective of the material placed in the field. This study is focused on evaluating a proposed ASTM evaporative recovery procedure through measuring performance related binder properties using common rheological test methods to monitor the change in performance of the residue over recovery time. Specifically, the development of resistance to deformation and strain tolerance of the emulsions are evaluated using Multiple Stress Creep and Recovery (MSCR) and strain sweep testing. The study is focused on emulsions for chip-seals, therefore, neat, polymer modified, and latex modified cationic rapid set emulsions were selected. Testing results show the ability to discriminate between modified and un-modified emulsions, indicating that the polymer network was not degraded during recovery. Results also reveal rheological differences between the emulsion residue and base asphalt, indicating the potential for aging to occur during the proposed recovery procedure.