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**15. Supplementary Notes**

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**16. Abstract**

The State of Iowa currently has approximately 69,000 miles of unpaved secondary roads. Due to the low traffic count on these unpaved roads, paving with asphalt or Portland cement concrete is not economical. Therefore to reduce dust production, the use of dust suppressants has been utilized for decades. This study was conducted to evaluate the effectiveness of several widely used dust suppressants through quantitative field testing on two of Iowa's most widely used secondary road surface treatments: crushed limestone rock and alluvial sand/gravel. These commercially available dust suppressants included: lignin sulfonate, calcium chloride, and soybean oil soapstock. These suppressants were applied to 1000 ft test sections on four unpaved roads in Story County, Iowa. To duplicate field conditions, the suppressants were applied as a surface spray once in early June and again in late August or early September. The four unpaved roads included two with crushed limestone rock and two with alluvial sand/gravel surface treatments as well as high and low traffic counts. The effectiveness of the dust suppressants was evaluated by comparing the dust produced on treated and untreated test sections. Dust collection was scheduled for 1, 2, 4, 6, and 8 weeks after each application, for a total testing period of 16 weeks. Results of a cost analysis between annual dust suppressant application and biennial aggregate replacement indicated that the cost of the dust suppressant, its transportation, and application were relatively high when compared to that of the two aggregate types. Therefore, the biennial aggregate replacement is considered more economical than annual dust suppressant application, although the application of annual dust suppressant reduced the cost of road maintenance by 75 %. Results of the dust collection indicated that the lignin sulfonate suppressant outperformed calcium chloride and soybean oil soapstock on all four unpaved roads, the effect of the suppressants on the alluvial sand/gravel surface treatment was less than that on the crushed limestone rock, the residual effects of all the products seem reasonably well after blading, and the combination of alluvial sand/gravel surface treatment and high traffic count caused dust reduction to decrease dramatically.

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