UTC Spotlight

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New Procedure with Dust Column for Measuring Effectiveness of Dust Control Palliatives

Surveys conducted by the Alaska Department of Environmental Conservation (DEC) in 2007, 2010, 2011 and 2016 indicate that 90% of Alaskan communities report road dust as a problem (DEC 2018). The Federal Highway Administration (FHWA) (1998) estimates up to one inch of surface aggregate is lost on unpaved roads annually. That equates to 10 million tons of dust released into the atmosphere (EPA 2017). This poses health hazards, safety concerns, and environmental impacts along these roads, degrading the mobility of both people and goods to communities connected by such roads.

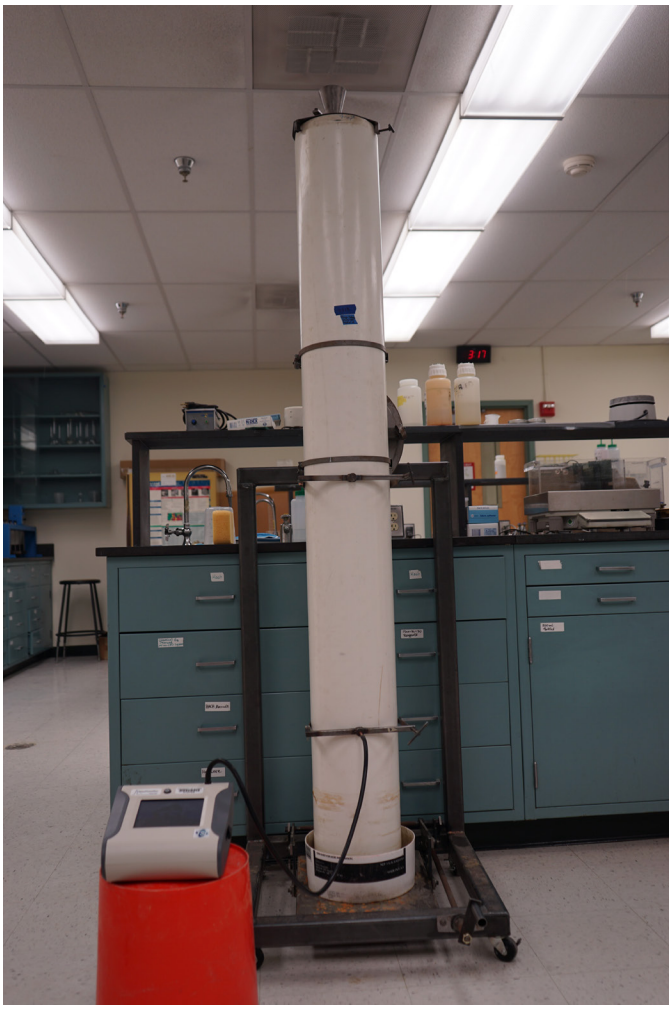
Nathan Belz

Dust plume on the Dalton Highway, Alaska.

Researchers from the Pacific Northwest Transportation Consortium (PacTrans) at the University of Alaska Fairbanks (UAF) have been working with Alaska state agencies and the Environmental Protection Agency (EPA) to reduce dust in rural Alaskan communities through institutional controls, improvements in surfacing materials and the use of dust suppressants. Until now, there was no available testing for the effectiveness of dust suppressants before they were applied. As a result, selection of dust suppressants was made through manufacturer's literature, word of mouth, and experience. With more than 250 available products, there was often confusion as to which product was most appropriate for road conditions. Application of these suppressants is costly—$10,000-$20,000 per mile—so getting it right is important as this can represent the entire road maintenance budget for small communities.

PacTrans recently funded a research project titled "Development of a Laboratory Procedure for Measuring the Effectiveness of Dust Control Palliatives," with matching funds from the Alaska Department of Transportation and Public Facilities (DOT&PF). This work developed a method to test the effectiveness of dust suppressants, with the goal to help select the right suppressant and to determine the appropriate application rate.

The UAF Dust Column test applies simple physics of particles falling through air. A sample of soil treated with a dust suppressant is dropped through an 8-inch column. A commercially-available particle size analyzer is used to measure the instantaneous concentration of PM10 (particulate matter 10 micrometers or less in diameter). Using these measurements, practioners can now test the time it takes for the PM10 to drop back to background levels, indicating all of the particles have cleared the column. The slope of the resulting decay curve indicates the



Billy Connor

The UAF Dust Column

effectiveness of the dust suppressant. The more effective the suppressant, the steeper the slope.

PacTrans researchers worked with the AK DOT&PF to implement the test method based on the Dust Column standard to measure the effectiveness of a dust suppressant. The test will be used to both select and measure the appropriate application rate for use on a project before being accepted. The test is also used in the field for assurance and acceptance testing after application. Field testing can also be used to establish when to reapply the dust suppressant.

The implementation of the UAF Dust Column test maximizes the chances of municipalities choosing the appropriate dust suppressant at the right application rate.

Billy Connor

Comparison of untreated soil(right) and treated soil(left) falling through air.

References

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About This Project

The Pacific Northwest Transportation Consortium (PacTrans) is the Regional University Transportation Center (UTC) for Federal Region 10, housed at the University of Washington (www.pactrans.org). PacTrans, which focuses on improving the mobility of people and goods, includes a consortium of transportation professionals and educators from Oregon State University (OSU), the University of Alaska, Fairbanks (UAF), University of Idaho (UI), University of Washington (UW), Washington State University (WSU), Boise State University (BSU), and Gonzaga University (GU). Billy Connor (bgconnor@alaska.edu) is the Director of the Alaska University Transportation Center, University of Alaska Fairbanks.