Alaska Department of Transportation & Public Facilities

Alaska University Transportation Center

Construction Dust Amelioration Techniques

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Dust produced on seasonal road construction sites in Alaska is both a traffic safety and environmental concern. Dust emanating from unpaved road surfaces during construction severely reduces visibility and impacts stopping sight distance, and contributes to the local burden of PM 2.5, small particulates that present an important environmental air quality concern. This research aims to assist ADOT&PF in developing safe, efficient techniques for short-term dust suppression. Experts believe applying a dust-control palliative like calcium chloride, Enviroclean, Durasoil, or EK35 to the unpaved surface during road construction will solve the dust problem. This research will gather necessary information to determine when, what type, in what concentration, and how often the dust-control palliative should be applied. The amount and size of the dust particles, the time the surface is to remain unpaved, the makeup of the unpaved road surface, local environmental conditions, and the availability and cost of the dust control palliatives are factors to consider. The project is especially valuable because measurement systems used in other states involve special equipment and/or certification of observers, neither of which may be practical in Alaska with our remote locations and short construction season.

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Executive Summary

Many road construction projects require that traffic must be maintained during construction. This requires that public and construction vehicles drive on unpaved road surfaces. The duration that the vehicles have to drive on the unpaved road surface varies from hours to several months depending on size of the project and construction schedule. Dust generated from the traffic during road construction can impact traffic safety. The dust can significantly reduce sight visibility below the AASHTO minimum stopping sight distance and also pose a health hazard to workers in the vicinity of the construction project.

Current Alaska DOT/PF practice for temporary dust control on highway construction projects is to periodically apply water to the gravel road surface. For relatively hot dry (70 degrees F & 40% relative humidity) weather, the road needs to be watered every 20-25 minutes to maintain acceptable visibility for traffic safety. The primary disadvantages of this practice are the high cost and the difficulty in scheduling construction equipment for the application frequency necessary to minimize the level of dust for adequate sight distance.

The primary objective of this research project is to evaluate the feasibility and effectiveness of using long term dust palliatives at a reduced application rate to provide temporary dust control on road construction projects. Nine test sections were constructed to evaluate three dust palliatives (*Freedom Binder 400, Durasoil, and Soiltac*) at three different application rates required for three different performance periods – 1 week, 2 weeks and 1 month.

In addition, the hand held *DustTrak II Model 8532* and the UAF-DUSTM aerosol monitors were evaluated as tools to determine the levels of dust concentration for enforcement of construction contract specifications.

The conclusions of this project are:

- Watering is more cost effective than *Durasoil, Soiltac* and the *Freedom Binder 400* for temporary (1-4 weeks) dust control for construction projects.
- The *Durasoil, Soiltac* and the *Freedom Binder 400* are more difficult to apply than water as a dust palliative. The *Soiltac* and *Freedom Binder 400* require mixing with water. All three palliatives tested required that the lane be closed to apply the palliative. The *Soiltac* also required a 20 minute cure time between each of the four applications.
- The *Durasoil, Soiltac*, and *Freedom Binder 400* palliatives were not successful in providing the desired 7 day, 14 day and 28 days of acceptable temporary dust control using the following application (undiluted) rates.

Performance Period	*Freedom Binder 400*	*Durasoil*	*Soiltac*
1 week	.008 (125 sft/gal)	.014 (70 sft/gal)	.013 (80 sft/gal)
2 week	.0125 (80 sft/gal)	.020 (50 sft/gal)	.017 (60 sft/gal)
3 week	.025 (40 sft/gal)	.025 (40 sft/gal)	.020 (50 sft/gal)

Application Rates (gal/sft)

- The additional 200-250 trucks per day due to the construction activities had a significant impact on the performance of the dust control measures.
- An alternative to reducing the amount of watering required to control dust is to lower the speed limit through the construction zone.
- The quantity of dust generated by a vehicle is dependent on the vehicle size and speed. A large truck traveling at 45 MPH generates significantly more dust than a smaller passenger vehicle traveling 30 MPH.
- It was not practical to measure the dust concentrations on a high volume high speed road with the UAF-DUSTM.
- It was not practical to reliably measure the dust concentrations with the handheld *DustTrak II Model 8532*. The vehicles would slow down and move to the other lane when they see a person standing on the road taking dust concentration measurements.

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