Summary Test Calcium Chloride Spraying:

a solution for the swirling of fine dust along motorways

Within the framework of the Cleaner, Quieter and More Homogeneous Asphalt competition, the SSH-1 VOF syndicate came up with a solution for reducing the swirling of fine dust along motorways. The SSH-1 syndicate represented a collaborative effort by BAM Infra, Multiconsult, Nido, Nedmag and KOAC-NPC. The solution consists of spraying a calcium chloride solution on the motorway, which leads to a reduction in the swirling of fine dust. The results of the practical test carried out on the highway A50, which demonstrated the effect of spraying calcium chloride, are referred to in this summary.

Air Quality

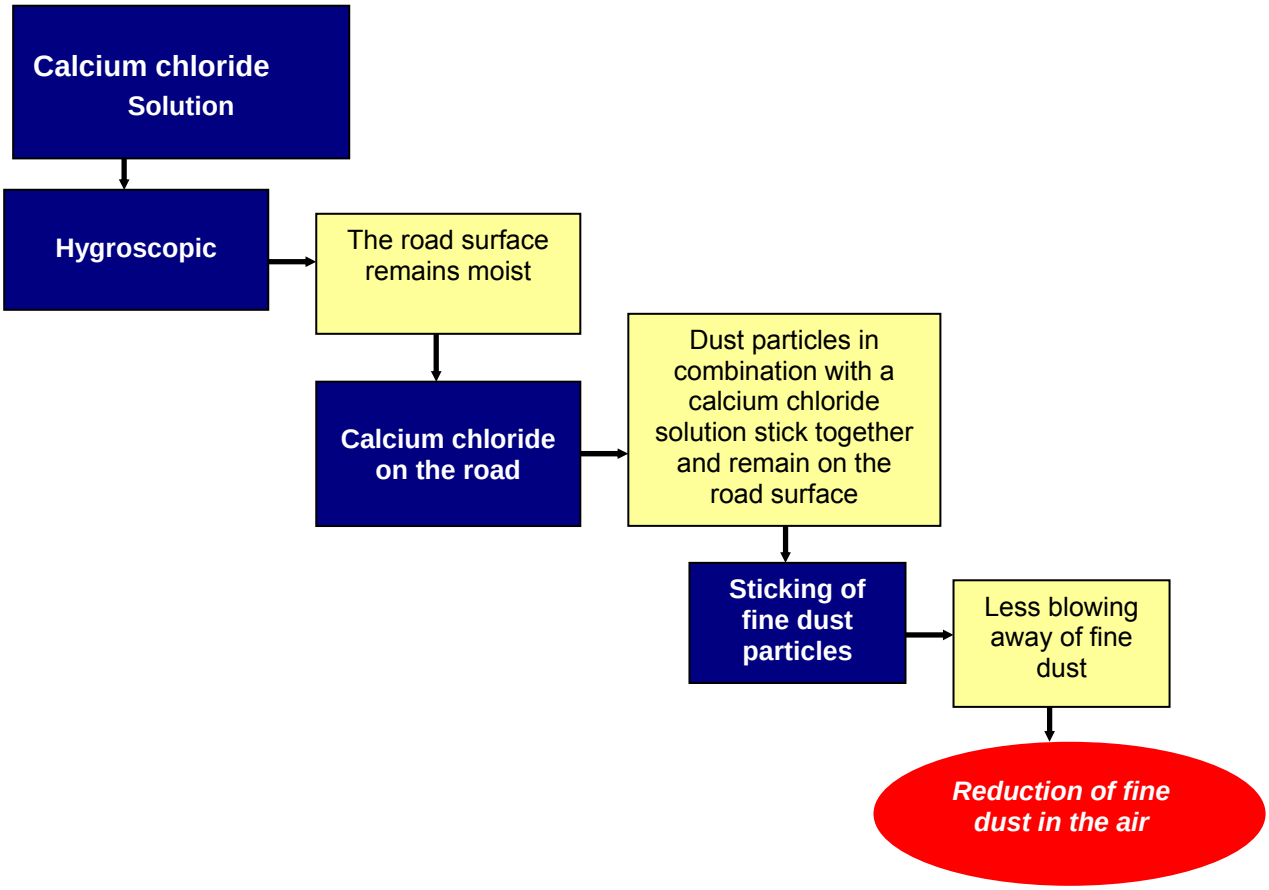
The current European regulations concerning air quality prescribe that the concentration of fine dust should not exceed the daily average of 50 µg/m^3 for more than 35 days per year.[1] Unfortunately, this threshold limit value is regularly exceeded in the Netherlands.[2] One of the sources of fine dust is small dust particles being blown away by passing vehicles.[3] In order to reduce the swirling of fine dust by passing vehicles a calcium chloride solution can be sprayed.

Duration	Fine dust content
Maximum 35 days	50 µg/m^3
Maximum yearly average	40 µg/m^3

[1] Source: Air quality decision, www.overheid.nl.wetten
[2] Source: National Air Quality Network of the Dutch National Institute for Public Health and the Environment, www.lml.rivm.nl/data
[3] Source: Source of inspiration, contribution from express way traffic to emissions and concentrations of NO2 & PM10, IPL, Sept. 2005.

The hygroscopic characteristic of calcium chloride

Calcium chloride is a salt. The same salt that in most places in the Netherlands is used as wet salt component to combat icy road. Calcium chloride is a hygroscopic product. This means that in dry form it attracts water from the environment. Through spraying of a calcium chloride solution on the motorway the road surface remains moist, as a result of which the dust particles do not blow away, but stick to the road. By spraying calcium chloride on days on which the maximum percentage of fine dust in the air threatens becoming too high the percentage of fine dust particles will remain below the standard.



The test

On the A50 to the south of Apeldoorn the effect of calcium chloride on the swirling of fine dust by passing vehicles was tested under Dutch circumstances. Two measurement sites about 50 meters apart were treated with and without calcium chloride. By measuring the difference in the quantity of fine dust blown up between the two sites the effect of calcium chloride was determined.

Test results

During the test period fine dust measurements were carried out on 10 days, on 5 of which calcium chloride was sprayed. On all testing days fewer fine dust particles were blown up by passing traffic in the testing area treated with calcium chloride than in the untreated testing area. On one of the testing days, 7 hours after spraying, a reduction of at least 28% was measured in the quantity of fine dust blown up and on a second testing day, 15 hours after spraying, a reduction of at least 58% was measured. A higher reduction was not significantly indicated during the test, but certainly belongs to the possibilities

Adopting measure

Spraying calcium chloride is a so-called adopting measure which does not reduce the production of fine dust, but only reduces the whirling up of fine dust. Mitigating measures, which actually reduce the emission of fine dust from cars, for example, score better with regard to cost effectiveness and eco-balance. However, it is not reasonable to expect that in the short term there will be sufficient mitigating measures that can be carried out to reduce adequately any peaks in the fine dust present in the Netherlands. Until that time spraying of calcium chloride is a good alternative because this solution, with limited resources and limited side-effects, will lead to a direct reduction in the swirling of fine dust. The extra load on the environment is limited to the incidental spraying of calcium chloride with spreaders.

Cost effectiveness

The cost effectiveness of spraying with calcium chloride is linked to the necessary investments involved in applying calcium chloride as a “fine dust suppressant”. Because existing equipment and Ice Control Management Systems can be used these investments will be slight. Certainly in combination with the great reduction in fine dust measured during the test, the cost effectiveness of the solution can be considered high. For only a small investment a great positive outcome can be obtained.

Conclusion

Spraying calcium chloride to reduce the raising of fine dust by passing traffic has been put to the test with a convincingly positive result. Considering the nature and the seriousness of the fine dust problem, the SSH syndicate came to the conclusion that the method with calcium chloride can actually be implemented immediately.