



## Dustac Solutions for mining haul roads



### Dust on Mining Haul Roads

Roads on mines are often constructed in locations that are problematic, using materials that are far from ideal. This applies equally to haul and access roads, whether they are above or below ground. The problem is exacerbated by the inordinately heavy use that characterizes mining operations.

Dust emissions affect visibility and are a cause of accidents, increased wear and tear on vehicles and resultant maintenance costs. Roads that are not adequately stabilized require additional maintenance and replacement of gravel, resulting in lost time and additional cost.

OHS, mining and environmental regulations require that dust emissions be controlled. Currently water is widely used for this purpose. This approach is both expensive and inefficient. These factors as well as the reduced availability of water as a result of climate change mandate an alternative solution.

### Dustac Solutions

Using Dustac will:

- Improve visibility and road safety
- Provide a hard, smooth dust free surface
- Reduce road water usage by up to 90%
- Reduce gravel loss and increase the load-bearing capacity of existing road materials
- Reduce vehicle operating and maintenance costs
- Minimize road maintenance costs
- Lower road maintenance equipment requirement
- Ensure cost effective, high performance dust control

### Advantages

- Optimized health and safety standards
- Enhanced environmental compliance
- Increased financial performance

*Dustac is a green product  
non toxic, renewable and  
environmentally friendly*



## The Product

Dustac is a product derived from the pulp wood industry. It is non-toxic to humans, fauna and flora and is used in diverse products for the food industry, agriculture, construction and mining. It is biodegradable and made from entirely renewable sources. It works by bonding road base particles together and thereby reduces the need for the use of water and other aggregates. Dustac is easy to use, does not require the use of specialized application equipment and can either be incorporated during road construction or applied to formed road surfaces. Dustac is a green renewable cost effective solution to dust problems.

## How To Use Dustac?

Dustac is not material specific and performs effectively on a wide range of road base materials. It is however important to note that the road to be stabilised should be constructed to recognized standards and built using appropriate materials. These factors will determine the volume of Dustac to be applied and contribute significantly to the overall efficacy of the stabilisation. Application rates and methods are adapted to particular situations. In some cases soil tests will need to be performed.

Material selection guidelines for unsealed roads:

Characteristic	Guideline	
	Access	Haul
Maximised Size	37.5mm	75-100mm
Oversize index	<5%	<10%
Shrinkage product*	50 - 400	50 - 400
Grade Coefficient**	16 - 34	16 - 34
CBR***	>15	>40
Hardness****	20 - 65	20 - 65

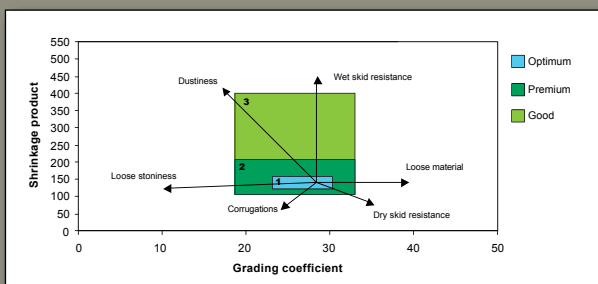
\* linear shrinkage x % passing on 0.425mm sieve

\*\* (% passing 26.5mm - % passing 2.0mm) x % passing 4.75mm/100

\*\*\* California bearing ratio - soaked at >95% Mod AASHTO

\*\*\*\* Treton impact value

The formation of typical defects such as corrugations, erosion, potholes, raveling and slipperiness is related to the use of inappropriate materials or poor construction and maintenance practices. The predicted performance of non-conforming materials is illustrated in the figure below.



## Surface Haul Roads

The performance-related material selection guideline in figure 1 is recommended for Dustac applications, where high riding quality, year-round access and low maintenance are required. The application rate of Dustac is determined by the soils mechanical properties rather than by soil chemistry. Dustac can be applied either to formed roads by an over the top application or incorporated to road base during construction. Dustac can be used to eliminate dust problems on unpaved roads, finely divided coal and mineral ores. Dustac has exceptional soil stabilization properties enhancing the appearance of the road, improving safety standards and providing a cost effective solution to dust and road surface deterioration.

## Underground Haul Roads

The guideline for underground haul roads is less stringent since these roads are generally unaffected by climatic factors (rainfall, and temperature / humidity fluctuations) and are usually level and supported by bedrock. The spray on method allows the treatment of vital transport arteries and detours without tying up traffic. Dustac reduces dust emissions by binding dust particles together, producing a firmly bound surface that adds traction, increases water runoff and reduces mud conditions.



## Economic Analysis

The table below, produced from road performance prediction models, indicates savings achieved under diverse circumstances using Dustac:

Gravel loss	multiply current rate of gravel loss by 0.5
Water reduction	multiply current water usage by 0.2 and up to 90% can be achieved
Grading frequency	multiply current grading frequency by the following factors: 8-14 days – multiply by 7.1 15-45 days – multiply by 4.0 46-90 days – multiply by 2.0 90-120 days – allow two per annum > 120 days – allow one per annum

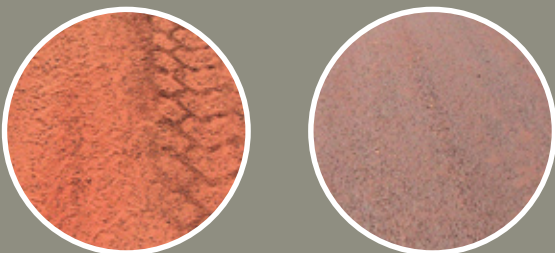
Significant cost reductions are also achieved in relation to vehicle operating, maintenance and lower equipment requirements.

“Research shows that unpaved roads treated with calcium lignosulphonate retained 42–61% more aggregate than the untreated test section. The cost savings of retaining aggregate on the treated test sections more than offset the costs of the dust suppressants, resulting in an estimated cost savings of 28–42% over the untreated control test section.”

(Effectiveness and Environmental Impact of Road Dust Suppressants by Thomas G. Saunders, PhD and Jonathan Q. Addo. Department of Civil Engineering, Colorado State University. December 1993)

## Key Elements to Product Application

- Dustac can be applied either as a spray-on or incorporated application.
- The three key issues are dosage, speed of application and product concentration.
- In order to achieve penetration of the road surface a pre watering with approximately 1 to 1.5L/m<sup>2</sup> is required.
- Aim to wet to a depth of 150mm.
- Calculate the concentration of Dustac to be used in relation to the absorption rate, in order to maximize penetration and prevent surface run-off.
- Dustac can be applied with available equipment – no specialised equipment is required.
- Ensure that Dustac is evenly applied across the entire surface (avoid irregular application on the middle or sides).
- The road must be shaped to allow for water run-off and prevent pooling.
- Compact the surface with a smooth roller for an optimum surface finish.



## Road Stabilisation

Dustac is very effective in stabilising and binding gravel roads. It can be applied as either a spray on or an incorporated application.

**Spray-on** or over the top applications of Dustac are most common as haul roads cannot normally be decommissioned to allow incorporated applications. The road surface should be well compacted to a density greater than 93%, firm and free of excess loose material and with sufficient camber to allow proper drainage. Ensure the surface is watered before each application. The product should be used in multiple applications using a 10% solution of product with water avoiding run-off and pooling. The road may be used immediately after treatment.

**Incorporated** applications are used to bind and stabilise a base layer with a thickness between 50 and 200 mm, eliminating individual particle movement. The product is incorporated into the road base during the water binding process. Conventional road making equipment is used. For incorporated applications, rip the road to 150mm breaking large clods to maximum 50 mm in diameter. Calculate the approximate volume of water required to reach optimum moisture content and add two-thirds of the product to be applied. Apply the solution to the prepared road surface in 4 to 6 applications, mixing the road base thoroughly between applications. Shape the surface to the required camber in order to allow for proper drainage. Compact the road with a roller to required density. The one third remaining product should be sprayed onto the finished compacted surface while still damp. The road may be used immediately after treatment.

## Dust Suppression

Dustac is very effective in suppressing dust in low volume traffic areas, such as road verges, lay down areas, car parks ect. It is applied as a spray on in a single application with a dilution of approximately 10:1 and aims to achieve 0.2 litres of Dustac m<sup>2</sup>

## Maintenance

Reapplication may be necessitated due to a lack of moisture during the dry season or after heavy, sustained bouts of rain. In order to keep the surface dust free it is essential to implement a planned road maintenance programme along with a Dustac rejuvenation schedule. The volume of Dustac to be applied and frequency of maintenance will depend on the material characteristics, application method, climate and traffic density and speed. Other factors influencing reapplication frequency are payload spillage, debris and fugitive dust blown onto the road surface. Rejuvenation should be carried out before significant deterioration has occurred. Rejuvenation should be done using between 0.08 litres of Dustac per square metre of area. This may vary considerably and should therefore be assessed by a Dustac representative.

*Dustac is easy to use  
and requires no  
specialised equipment*

# Dustac



## Other Quattro Solutions Services

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