LIME FOR SOIL STABILISATION

sma mineral

From stable rock to stable soil

SMA Mineral is one of the largest producers of lime products in the Nordic countries. We have extensive experience of lime and handling lime. Applying lime, a product of nature, is the most natural method of resetting the balance in nature.

The path lime travels to its different areas of use can be viewed as an eternal ecological process, where very little of the raw material is wasted.

And the areas of use are many: from gardens, forestry, agriculture, and lakes to power plants, flue gas cleaning, water purification, pulp industry, and the steel industry.

Lime is found in all geological formations, all over the world. It plays a versatile and practical role. SMA Mineral masters the many possibilities for using lime, as well as the technology, processes, and areas of use in which it plays a crucial role.

We have extensive experience of the industry. Our headquarters is located in Persberg, Värmland's largest mining region with a tradition stretching hundreds of years back in time.

One application in which SMA Mineral has specialised is soil stabilisation. Two methods of soil stabilisation are widely used throughout the world today, mass stabilisation and shallow mixing. In the Nordic region, however, another method is used, deep stabilisation with lime-cement columns. Our burnt lime has the high level of purity required for an effective stabilising agent.

Limestone quarry in Jutjärn: The limestone extracted from Jutjärn open-cast quarry is very pure. The lime content is around 99%. Supplies of raw materials are assured for at least 50 years.

Deep stabilisation

Deep stabilisation is an effective method used in various applications in soft soil, primarily to reduce subsidence and improve soil stability. This method is economic and reliable and it is often used to reinforce soil on road and railway embankments, slopes, pits and pipeline installations.

The durability of the columns increases over time after installation, which further improves the interaction between the pillars and the surrounding soil. Lime stabilisation is also an environment-friendly method, because the introduction of lime raises what is often a low pH value of the soil.

By far the most common stabilisation agent is a mixture of 50% lime and 50% cement. The amount used is usually 80-100 kg per cubic metre of stabilised soil.

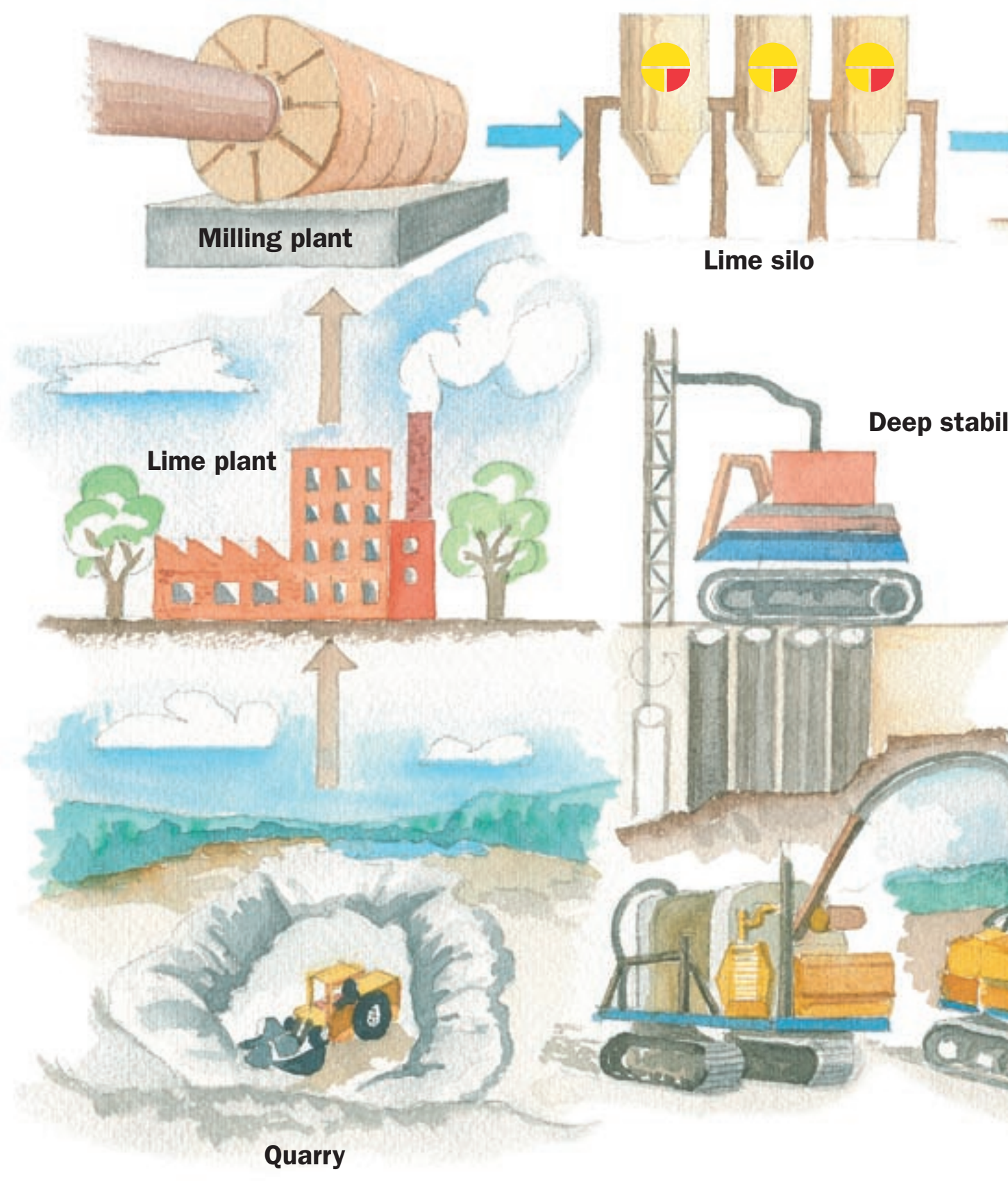
Burnt lime is produced by calcination of limestone in a lime kiln at temperatures above 1,000° C. Calcium carbonate ($CaCO_3$) is converted into calcium oxide (CaO) and carbon dioxide (CO_2). Active calcium oxide is highly reactive. In finely ground burnt lime a high level (80-90%) of calcium oxide guarantees good stabilisation reaction in the soil, favourable water reduction in the soil and a temperature increase upon slaking. Other factors that can have a significant impact are the BET surface and the silicate content. The particle size is 0-0.2 mm, which enables good flow properties.

Stabilisation concept: the basic principle is that the soil properties are changed by mixing in a stabilisation agent.

Stabilisation technique: is based on the heat development that occurs when burnt lime is slaked when it comes into contact with the soil, and on the quick increase in durability that cement provides.

Mixing tool: A rotating mixing tool is used to mix clay with a binding agent to form a secure and durable column in the soil. The columns are installed in different patterns, either singularly or joined together in overlap.

Lime show



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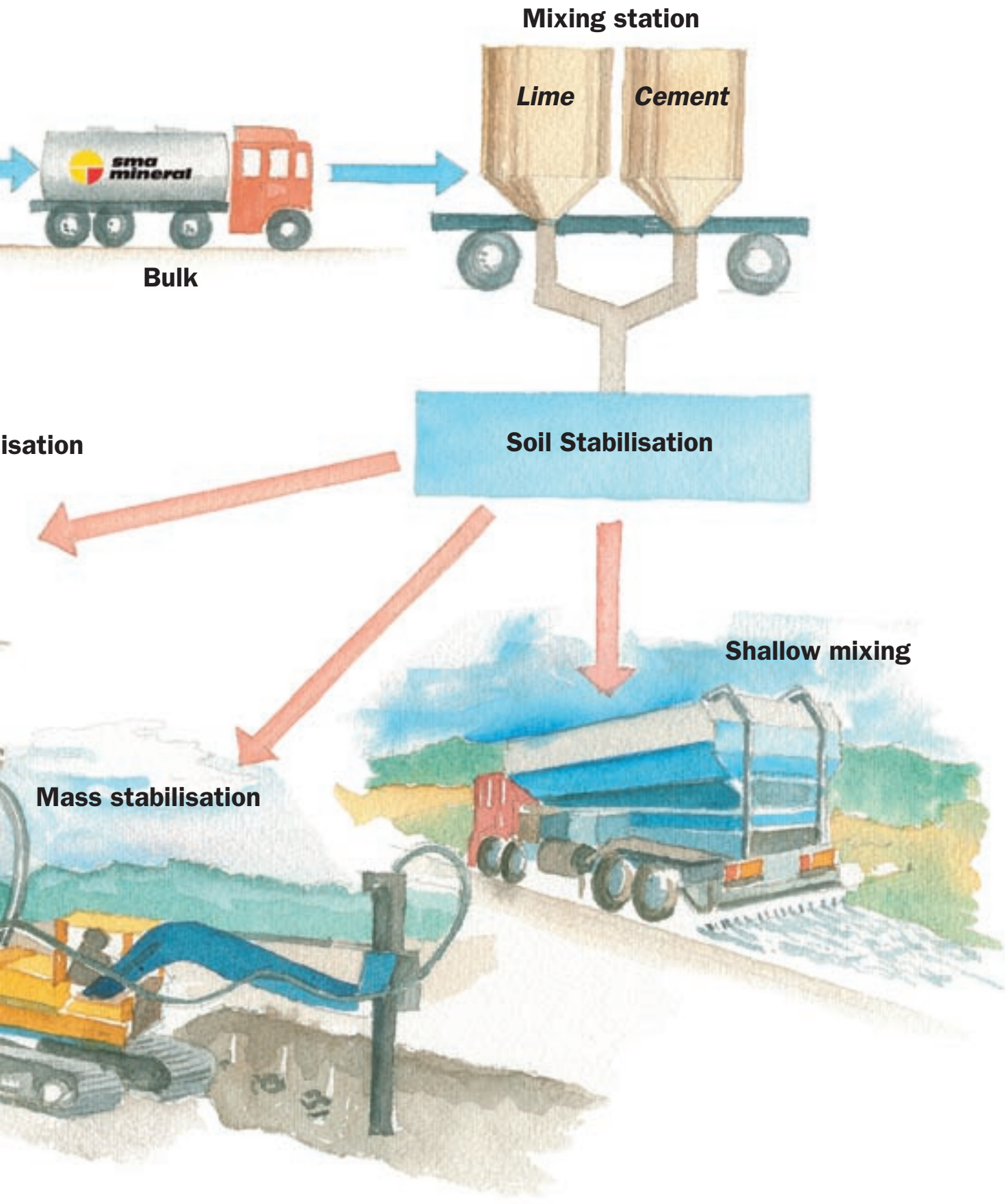
Mixing station
Lime
Cement
sma mineral
Bulk
isation
Soil Stabilisation
Shallow mixing
Mass stabilisation

Other methods

Mass stabilisation

Mass stabilisation is an environment-friendly method used for road and railway embankments. It can also be used to stabilise organic soil and to lock together contaminated masses. The method is applied both vertically and horizontally, which creates a stiff block.

Slaked lime and cement are used as activators in a binding agent that mainly consists of industrial by-products, such as fly ash and blast furnace sludge.

The binding agent is often customised for each specific project and type of soil. Deformation characteristics and durability increase are the key elements.

Shallow mixing

The purpose of shallow mixing is to improve the properties of the soil, so that it can act as a bearing layer before a road embankment is built. Slaked or burnt lime is used as a binding agent. It is spread on the surface and milled with a stabilisation mill. The process can be repeated as required and the soil can be watered between milling before being compacted with a roller and then levelled.

The advantage of lime stabilisation is that the bearing capability and stability of the soil increase while subsidence and erosion decrease. The method is not dependent on weather conditions and a stabilised surface can be used immediately. Lime also drives water out of the soil in a very efficient way, which reduces moisture content.

Soil drying

Lime is the most economical solution for improving accessibility for machinery on muddy sites. Both burnt and slaked lime can be used for soil drying. Burnt lime has a higher drying capacity than slaked lime. In general, burnt lime is used in pebble form, but also in ground and granular form. And slaked lime is also an excellent choice for this method.

Solid infrastructure

Large production and storage capacity combined with our own transport organisation are the foundations that secure reliable deliveries to our customers.

But products and distribution are not the only important factors. To meet customer demands it's also essential to handle and use lime products in the correct way. Continuous monitoring in our own laboratory eliminates product nonconformance.

SMA Mineral has ISO 9001 quality assurance and ISO 14001 environmental accreditation.

SMA KC Binder

Premixed product of ground burnt lime and cement. Available in different mixtures from terminals.

Burnt lime – Boda, Oxelösund, Mo i Rana, Röyttä

Shaft kiln burnt, pure lime with high reactivity and very low level of inert material.

Burnt lime – Rättvik

Rotary kiln burnt lime, normal or hard burnt.

Ground burnt lime – Boda, Röyttä

Burnt, reactive lime, high level of purity.

Slaked lime – Rättvik, Röyttä

Used when high dissolution speed is required. High level of purity.

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