



 **Nordkalk**

ENVIRONMENTAL REPORT 2009

Sustainable Development Is Based on Systematic Work

Nordkalk is the leading producer of high quality limestone-based products in Northern Europe. The products are used mainly in the paper, steel and building materials industries as well as in environmental care and agriculture. The product brand is Nordkalk. The company's net sales for 2009 totalled EUR 277.3 million and profit before taxes and minority interests amounted to EUR 12.9 million. Nordkalk employs some 1,200 people and has operations at more than 30 locations e.g. in Finland, Sweden, Norway, Poland, Estonia and Russia.

Nordkalk's environmental department was founded in 1995. Environmental work means striving systematically towards the essential goals and maintaining cooperation between the environmental management system and line organizations. Nordkalk's products and work processes are being developed to enable us to minimize the impacts of quarrying and refining on the environment. Goal-setting for the coming years emphasizes an effective use of energy and raw materials, reduced dusting as well as intensified monitoring of emissions from the activities to both air and water. Energy efficiency will be improved by means of new investments, and product processes will be optimized in order to reduce energy consumption and emissions. These aspects will also be included in the divisions' goal-setting in future years. The Nordkalk Group's operating policy includes policies for the environment, quality and occupational safety, and it presupposes ongoing development. In 2009 Nordkalk spent altogether EUR 3 million on environmental investments.

Nordkalk's new management system that covers the whole Group was taken into use in the beginning of 2009. The old subsystems have been integrated into a single management system including quality and environmental management sys-

tems, principles of an OHS system and other procedures and routines applicable to the whole Group. As planned, Nordkalk received so-called multi-site certificates in the beginning of the year 2009: the quality certificate (ISO 9001) is valid at all Nordkalk sites, the environmental management certificate (ISO 14001) at the Polish and Swedish sites as well as Finnish production plants, and the occupational health and safety certificate (OHSAS 18001) at the Swedish and Polish sites and in Lappeenranta, Finland.

Nordkalk also has a policy for closing down quarries, which defines the principles of after-treatment. Usually, efforts are made to restore the landscape, but another alternative is building on the special characteristic of a quarry. The United Nations has declared 2010 as the International Year of Biodiversity. A disused limestone quarry can offer an excellent growth environment for many rare plants and organisms and can so promote the nature's biodiversity.

Biodiversity was also the theme for the European Minerals Day event. In the middle of May over one 100 mines, quarries and plants in 22 countries participated. Out of Nordkalk's locations, Lappeenranta, Pargas, Köping and Storugns in Sweden and Rakke and Vasalemma in Estonia participated in the event. Besides the biodiversity theme, Minerals Day offered the public an opportunity to familiarize themselves with the mineral industry, which produces raw materials necessary in the production of many every day commodities.

Legislation

Nordkalk has participated in the discussion of the reforming of the Finnish mining act as a member of the Association of the Finnish Extractive Resources Industry. The company has emphasized that the mining act must further utilization of the deposits in the restricted areas where the vital mineral deposits are. No intersecting or controversial environmental regulation is to be incorporated into the act.



Participants of the European Minerals Day event in Vasalemma Quarry, Estonia.

The new chemical regulations of the European Union, REACH, entered into force on 1 June 2007. REACH aims at improving the protection of human health and the environment and maintaining the competitiveness of the EU's chemical industries. Nordkalk has met its obligations under the first phase of REACH and completed a preliminary registration of substances that are within the scope of this regulation. The company was also involved in establishing a European forum that discusses issues relevant to these substances and shares information on them. The actual REACH registration of substances will take place in November 2010.

Nordkalk Received Permit for Quarrying on Gotland, Sweden

The Swedish High Court for the Environment has approved Nordkalk's application to open a new limestone quarry in Bunge on Gotland, Sweden. The application was ruled out earlier by the Environmental Court. Nordkalk appealed to the High Court for the Environment, which gave its ruling on 9 October 2009. The decision has been appealed to the Supreme Court. The Supreme Court has yet to decide if there will be a hearing.

The limestone on Gotland is irreplaceable raw material for the Nordic steel industry, and opening a new quarry is necessary in order to ensure the supply of limestone. The present quarrying in the quarry on Gotland is expected to be able to continue until the end of 2012. The goal is to open the new quarry before this.

Nordkalk has together with consultants and authorities conducted extensive research on the environmental impacts of quarrying. The company is convinced that the unique natural values in Bunge and responsible quarrying of limestone can be combined according to the demands of the Environmental legislation.

One of the significant advantages of the Bunge area is that it is further from the residential area than the current quarry. Bunge

is admirably located in relation to the current infrastructure; it is situated about nine kilometres from Storugns, where the stone is sorted, processed and shipped.

Nordkalk is planning to open a limestone quarry also in the Finnish Lapland. The company's application for an environmental permit to reopen the closed down quarry of Ruonanoja in Kolari municipality was filed in December 2009. The application is expected to be handled during the first six months of 2010 and the test quarrying is expected to start during summer 2010.

Nordkalk has signed a land lease and excavation permit in April 2009 with the town of Lappeenranta for the next 60 years.

A New Lime Kiln in Norway

It was confirmed in spring 2009 that the joint venture of Nordkalk and Franzefoss Minerals AS, NorFraKalk's new lime kiln in Verdal, Norway, will be granted free emissions allowances. The Norwegian legislation threatened to leave the kiln without an allowance for the 2008-2012 period, but a strong reaction from the owners supported by the EU lead to the desired result in this issue. The kiln represents the latest technology which enables an environment friendly and cost effective production process. The technology of the kiln supports also the use of alternative fuels and it is very low on discharge.

The environmental system of NorFraKalk will be ready to be certified this year.

Environmental Products

Nordkalk's products are also used in environmental care as different kinds of limestone-based applications can be used to prevent and remedy environmental problems. Soil improvement is about liming the fields in order to reduce the acidity of the earth.



Lime products play an important role in water treatment. Limestone products, together with both quicklime and slaked lime, are used to purify drinking water and clean waste water. Liming of watercourses returns the quality of the water to a level preceding the acidification.

The flue gases of power plants can be efficiently purified with the help of quicklime or slaked lime, limestone powder or dolomite. Also the waste incineration emissions can be reduced with the help of different limestone-based products.

Nordkalk is involved in a number of water and water system projects, such as a project aiming at more efficient waste water treatment in sparsely populated areas. Long-term projects relevant to improving the quality of water systems are ongoing e.g. in Nokia and Kerimäki in Finland.

Raw Material and Production

Limestone is extracted from the bedrock in either quarries or underground mines. The stone is then transported for rough handling and sorting, after which it goes on to be processed further elsewhere. These operations cause vibration, noise and dust, and quarrying results in changes in the landscape. Other disadvantages are surplus stone as a result of the extraction process and the spin-offs of the production. Water collects in the quarries. This may affect the level of the ground water in the area.

Limestone products consist of crushed, ground or sieved limestone, or calcium carbonate (CaCO_3). The grinding of limestone is most often a dry process so that dust formation poses a major environmental problem in plants where this is done. The dust emissions can be effectively controlled, however, by passing them through filters.

Limestone products are used for soil improvement, to clean flue gases in coal-fired power plants and to reduce acidity in water courses. They are also used in different building materials, in animal feed and as filler in paper and asphalt.

Nordkalk produces calcite and wollastonite from the limestone extracted from the quarry in Lappeenranta. Nordkalk's subsidiary, Suomen Karbonaatti Oy, then further processes the calcite to make paper pigments. If necessary, water can be siphoned from the basins under controlled conditions into a nearby small river, into which water from the local water treatment plant flows, too.

Making the Most of the Resources

The extraction processes result not only in the actual profitable stone but also in surplus stone which can be used for macadam to some extent. The annual quantity of surplus stone produced depends on geological factors and the quarrying plan. Nordkalk aims to a further increased use of surplus stone and to environmentally friendly quarrying. In Finland 70% of the surplus stone produced is reused. A local plan for handling and storing of the surplus stone is made at every Nordkalk quarry. This ongoing project started last year.

Nordkalk aims to expand its use of soil. Its goal is to sort the material that can be used for restoration purposes e.g. humus and clay, and store these separately for future use. There is a landscaping project on at the Karinu quarry in Estonia, where the soil material removed from the quarry area is being utilized.



Energy

The process of crushing, grinding and sifting carbonate products consumes electricity. Moreover, liquid gas or fuel oil is used for drying carbonate products.

Quicklime is produced by heating crushed and sorted limestone to a temperature of some 1100 °C in either a rotary or shaft kiln. Coal, oil, gas or alternative fuels are used to fuel the process.

Quicklime is grainy or floury in appearance. It is sifted into different fractions or ground to a fine flour. The products are used in the manufacturing of iron and steel, for processing sulphite ores, for making pulp and paper pigments, for stabilizing the soil and for cleaning water. Quicklime is the raw material of paper pigment PCC.

Slaked lime is made by adding water to quicklime. The calcium dioxide reacts with the water to produce calcium hydroxide ($\text{Ca}(\text{OH})_2$), slaked lime, which is dry, powder like flour, light in colour. The process of slaking lime releases heat and steam. Efficient dust removal, however, means that the quantity of particles discharged into the air is insignificant. Slaked lime is used by local authorities and industry in water purification plants, for cleaning flue gases and by the building materials industry.

Energy Efficiency as Goal

Nordkalk works hard to continuously improve energy efficiency in all production locations. Energy efficiency is stressed in new investments, and existing production processes are optimized to reduce the energy consumption. In 2009, energy efficiency became a part of the Group's management system and Operating Policy. In Finland, Nordkalk committed to the Finnish trade's and industry's energy efficiency agreement, which supports the introduction of new energy effective technology and increased use of renewable energy sources.

Energy issues are examined in internal audits and management reviews in the entire Group. In Estonia and Russia, work is underway to build up an environmental system in compliance with the ISO 14001 standard. In these countries, energy issues will be introduced in the system right from the beginning.

The changes made to the compressed air network in Lappeenranta and Tytyri in Finland have enabled considerable energy savings. The optimization of the grinding of coal that took place in Pargas, Finland in 2008 has in practice proved to be functional, and it enables an even more energy efficient process.

The use of compressed air has been made more efficient also in Köping, Sweden by modifying the equipment handling the lime kiln's flue gases.

In Uddagården, Sweden, the consumption of both electricity and fuel has been managed to cut down by about 10 per cent in the last two years thanks to the rationalization of the activities.

The training of economical driving of mine vehicles has continued in the quarries.

Alternative Fuels

Nordkalk is striving to replace fossil fuels with carbon dioxide neutral alternatives. Primarily, this means fuels based on clean biomass, and secondarily sorted waste that will be gasified into an inflammable form. In Köping, Sweden, implementing the use of alternative fuels is progressing well. During 2009 a new permanent feeding unit was installed. This enables continuous use of alternative fuels. Thanks to the new system, the selection of fuels can be widened and the feeding of the fuels can be controlled more closely. In 2010 the system will be developed further by building, among other things, a new reception station for fuels. The target is to increase the portion of alternative fuels to 25%.



Limekiln in Köping, Sweden

At the lime kiln in Pargas a successful test drive with bio fuel was made. Part of the normally used coal was successfully replaced by a carbon dioxide free alternative.

In the lime kilns in Tytyri an experiment of burning of recycle oil in stead of oil fuel and coal has been successful. The relevant emission testing showed acceptable results.

District Heating

The waste heat of the lime kilns is utilized in the district heating network in the Finnish towns of Lappeenranta, Lohja and Pargas. If the corresponding amount of heat were to be produced by fuel oil, carbon dioxide would be released into the atmosphere. In 2009, the amount of heat delivered by Nordkalk was equivalent to an amount needed for heating almost 2000 houses. The amount decreased compared to the previous year because of the reduced production of quicklime. Waste heat is utilized besides in Lappeenranta, Lohja and Pargas, in Nordkalk's own production in KPAB on Gotland.

Emissions

Dust and Emissions into the Air

Reducing dust emissions is one of the most important environmental measures in Nordkalk's operations, and efforts to cut the amounts of dust released are being continuously improved. By scattered dust emissions is meant that fine particles are spread by the wind, principally from loading bays and storage sites and from the wheels of vehicles. Better traffic arrangements at Nordkalk's different industrial sites can reduce the amount of dust released and improve safety. Asphalting roads and yards facilitates the cleansing, and last year plant areas were asphalted for example in Ignaberga, Sweden. Other means to reduce dusting are wetting, rinsing of wheels and chassis of vehicles, building protection embankments and planting trees. As far as possible, water from the company's own mines or quarries is used for wetting dusty areas and roads. Last summer the suitability of using snow cannon in binding dust was tested in Lappeenranta, with promising results. In Uddagården, Sweden the conveyor into the storage was covered and in Tytyri the loading equipment was improved. The effects of the measures taken are monitored, and the majority of the plants measure the dust fall-out at their locations regularly. The measurements taken at Sipoo, for example, show that the amount of dust in the air around the plant has been reduced to a quarter of what it was in the early 1980's.

In Miedzianka, Poland, a new crushing and washing plant was inaugurated last summer, in the building of which great importance was focused on environmental aspects. There are units and sprinkling systems for dust removal included in the new plant. The level of noise will also decrease, because of covered conveyors and on-to-train car loading station that will considerably reduce the work of mobile loading machines and shorten the loading time. The products of this plant are mainly for to the Polish and German steel industry and for the building of the Polish infrastructure.



A new crushing and washing line in Miedzianka, Poland, was taken into use in July 2009. The new plant reduces strain on the environment, improves utilization of raw material and brings increased effectiveness and bigger product flexibility.

Flue Gases

Flue gases contain oxides of nitrogen (NO_x), carbon dioxide (CO₂) and varying amounts of sulphur dioxide (SO₂). The manufacturing process also releases dust into the air and, in order to reduce this, the emissions are passed through electric or textile filter. Extremely good resolution capability is expected of a filter. Filters were renewed last year in Luleå, where also a lime kiln filter was renovated. In Tytyri a dust removal equipment was mended and a new silo filter assembled.

Some of Nordkalk's emissions of carbon dioxide emanate from its consumption of energy but carbon dioxide is also released into the atmosphere during the actual process of making quicklime. Carbon dioxide is released from calcium carbonate under the influence of heat and the final product is calcium oxide, quicklime. Theoretical calculations indicate that about a third of the carbon dioxide produced by Nordkalk comes from the fuel used and the rest from the raw material. Quicklime is an irreplaceable raw material for both environmental and industrial purposes. In some processes employed by Nordkalk's customers, such as the manufacture of PCC used for paper pigments, for example, the carbon dioxide released when the lime is burnt is reintroduced into the product when recarbonisation occurs.

Nordkalk uses coal free electricity at all of its plants in Finland.

Nordkalk participates in a study of recycling and final repository of carbon dioxide. The knowledge gained from such research leads to higher energy and material effectiveness, reducing the impact on the environment. The research also covers carbon dioxide sorting methods that are suitable for the lime burning process.

Noise and Vibration

Nordkalk's plants make continuous improvements in efforts to cut the noise from machines and other equipment. Another important consideration is to update the work routines so that exposure of both workers and the environment to noise can be reduced. Noise was reduced last year in Orsa, Sweden by isolating the factory walls and the filter's fan. Noise was measured in the new unloading terminal of quicklime in Köping, Sweden. It was found that the noise remained under the level accepted in the environmental permit.

The quarries are located near residential areas, which is taken into consideration when planning and carrying out quarrying. Residents who live by the quarries occasionally send inquiries about the vibration. In such cases the situation will be looked into and, if necessary, technical adjustments to blasting or quarrying methods will be made in order to reduce vibration. In Tytyri in Lohja, Finland, vibration was measured in several properties last year, but based on the measurements no further actions were deemed necessary. A new residential area is being built near the quarry. Nordkalk strives in cooperation with the authorities to make sure that the possible environmental affects of the quarrying will be taken into account in beforehand in town planning.

At Pargas and Lappeenranta in Finland and at Storugns in Sweden blasting has been developed in order to reduce the vibration in the vicinity of the quarry. The drilling meters, the direction of the drilling holes and the amount of the used explosives are optimized so that the stone loosens as easily as possible, which means less vibration. Efforts are also being made by taking greater account of the geological conditions, using several different kinds of explosives at the same time and by limiting and directing the explosion areas.

A master's thesis will be completed in Lappeenranta in spring 2010 on the affects of the vibration caused by blasting on the stability of the pit slope. The pit slopes are built of stone banks, with which the soil masses are being stabilized. The research produces a spreadsheet tool with the help of which the amount of blasting material can be optimized taking the economics and safety of each area into account.

Water

Ground water seeps by way of fissures in the bedrock into the mines, and surface water collects in the quarries. This may affect the level of the ground water in the area. The state of both ground and surface water is subject to continuous monitoring. Analyses carried out at Lappeenranta, for example, indicate that the water released into watercourses from the industrial site consists mainly of rainwater and is of good quality. Nordkalk also monitors the state of ground water; there are some twenty measuring points within the Lappeenranta industrial site. The level of the ground water has not dropped even though mining continues at increasingly lower levels.

In Miedzianka, Poland, building of a new system for treatment of rain and industrial waters will start.

The Miedzianka plant supplies ground water to nearby households and the Tytyri plant in Finland supplies ground water to the local waterworks. Water sales from Tytyri increased last year by about 20% by renewing the pumping line and increasing effectiveness.

After-Care of Quarries

Nordkalk has a policy for closing of quarries, in which the after-care of a discontinued quarry is specified. There is an individual plan for every quarry; the last plans will be finished during this year. These preliminary plans will be specified taking the special features of the area's nature and the needs of the society into account. The life span of quarries is decades, so the plans will be updated while the excavation proceeds.

The basis for the after-care is ensuring the safety of the quarry area e.g. by fencing. Often the steep walls of the quarry will be rounded-out and the quarry will be landscaped to fit its environment.

At the Vasalemma quarry in Estonia the after-care plan was made in cooperation with the Tartto University. This cooperation has continued for years, and a similar after-care plan has been made earlier for the Kurevere quarry.

The UN has proclaimed 2010 as the International Year of Biodiversity. Many rare plants and organisms can be found in calcareous quarry areas, and a discontinued limestone quarry provides an excellent habitat for plants enjoying a calcareous soil. Biodiversity is at its highest everywhere in Finland just in calciferous areas and always clearly higher than that of the lime poor habitats of the neighborhoods. The number of species in the calciferous areas in Väståboland has been stated to be the highest in Finland among many studied organism populations.

Finland's environmental administration surveyed last year the lichen and moss vegetation in the quarries in Tytyri and Mustio in Lohja and in the Pargas quarry area in Väståboland. As a result of the survey several rare and partly endangered species were found. Nordkalk is planning to survey its quarries. Limestone quarries play an important role as a preserver of the biodiversity, which opens doors for guided nature tourism.

The special features of quarries can be utilized in many other ways as well. There is a museum, an exhibition room and a ball room located in the disused areas of Nordkalk's underground mine in Tytyri, Finland. Part of Tytyri's empty mine shafts are being utilized as a disposal site for the ashes of a power plant.

A motor race track has been built in the old quarry at Storugns on Gotland, Sweden. Also concerts have been organized in quarries and the sceneries of the active quarry in Pargas, Finland, have been caught in photos, commercials and even in a film. As an example of economical utilization of the soil is cultivation of valuable truffles in quarry areas.



In the Klinthagen quarry on Gotland landscaping is going on in disused parts while quarrying proceeds in other parts of the quarry. This means that steep slopes are flattened and vegetation is planted. Some of the slopes are kept as they are because they represent typical natural landscape on Gotland. The water that collects on the bottom of the quarry has turned into a small lake frequented by birds.

The Nordkalk Corporation's Operating Policy

Nordkalk extracts, processes and delivers limestone and offers services related to these operations.

Guidelines for operations

- The working environment shall be good and safe for everybody.
- We comply with environmental legislation regulations and agreements.
- We strive to minimise the environmental impact of our operations.
- Our values - Trust, Competence and Quality - guide our operations.
- We deliver the right product, quality and service at the agreed time.

Continuous improvement

Our aim is to continuously improve our products and services and processes while taking into consideration economic aspects, the environmental impact and the energy consumption of our operations.

We maintain active communication with our customers and we improve our performance by following up any shortcomings.

As part of our strategic and annual planning we make plans for improvements that cover work environment, quality and environmental aspects and energy related costs together with goals, measures and investments related to these. When an investment is evaluated in Nordkalk, an assessment of its impact on the working environment and the environment must be carried out.

We regularly monitor our targets for working environment, quality and environmental impact.

Responsibility

All persons in supervisory position are required to ensure that the personnel understand their role and have the authority and competence needed for their work. We all bear a duty to point out defects and errors. Nordkalk's president has overall responsibility for ensuring that the operating policy is followed.

Communication

This policy is reviewed regularly and updated when necessary. It is distributed to the personnel and is also available to Nordkalk's stakeholders.



 **Nordkalk**
www.nordkalk.com