

# ENVIRONMENTAL REPORT 2002



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# THIS IS PERSTORP

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## The Perstorp Group

Sydsvenska Kemi AB acquired Perstorp and Neste Oxo at the end of June 2001. The acquired companies have been integrated in the Group, and since the beginning of 2002, Sydsvenska Kemi's business operations are operated under the Perstorp name.

Perstorp has a strong technological platform and long value-adding chains in selected segments of markets for specialty chemicals and materials technology. Perstorp has leading global market positions for several of the Group's specialty chemicals products and chemical intermediate products, primarily for customers in the coating and plastic-processing industries and in markets for cutting-edge composite materials and compounds. Perstorp has 2,200 employees and manufacturing units in eight countries in Europe, North America and Asia. Sales in 2002 totaled SEK 6 billion.

## Focus on two main areas

In the future, the Group will focus on core business in two main areas: Specialty Chemicals and Materials Technology. Specialty Chemicals consists of four business areas: Perstorp Coating Intermediates, Perstorp Oxo Intermediates, Perstorp Performance Chemicals and Perstorp Formox. Materials Technology consists of the business area Perstorp Engineering Materials.

## Perstorp Coating Intermediates

Perstorp Coating Intermediates is a world-leading manufacturer of several types of polyols, polyol acids and other intermediates, primarily for the coating industry. In addition to paint and varnish systems, the products are used in liquid adhesives, plastic additives and lubricants, and as building blocks in several other chemical products.



## Perstorp Oxo Intermediates

Perstorp Oxo Intermediates manufactures chemical intermediate products that are subsequently refined in the coating, varnish and plastic-processing industries. They consist primarily of monomers for paint resins and solvents, plasticizers for vinyl and safety glass, and agricultural chemicals such as propionic acid, which is used in livestock feed, among other applications. Production is mainly conducted in Stenungsund, Sweden, as well as in two smaller plants, one in Sweden and one in Belgium.

## Perstorp Performance Chemicals

Perstorp Performance Chemicals, which has production plants in several countries, offers several types of performance chemicals in different markets. The business area has three business units:

BU Formates includes such products as sodium and calcium formates, formic acid and sodium sulfate.

BU Food & Feed comprises such products as silage agents, acetic acid and Creosan.

BU Concrete Admixtures comprises liquid and powder concrete admixtures (superplasticizers) that are used in the construction industry to improve the flow properties of concrete.



# THIS IS PERSTORP

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## Perstorp Formox

Perstorp Formox is the world leader in formaldehyde technology, with unique expertise that includes formaldehyde processes and production, as well as formaldehyde catalyst development and production. Perstorp Formox designs and supplies complete plants for the production of formaldehyde, based on an effective proprietary process. Perstorp Formox also produces the formaldehyde that is used as raw material within the Perstorp Group and, to some extent, by external customers. Other products are environmental catalysts for the treatment of industrial emissions of solvents.



## Perstorp Engineering Materials

Materials Technology, one of the Group's two business sectors, is based on the Group's core expertise in thermoset chemistry and fiber-reinforced resin systems. Operations are conducted within the Perstorp Engineering Materials business area and include fiber-reinforced composite materials that are used in advanced applications within the automotive and aerospace industries, as well as urea and melamine-based plastics that satisfy stringent demands for durability and heat resistance in, for example, electrical and interior-design components. Production plants are located in Sweden, Italy, Belgium, the USA and Indonesia.

## Perstorp websites

[peramin.com](http://peramin.com)  
[peran.com](http://peran.com)  
[perstorpatika.nu](http://perstorpatika.nu)  
[perstorpformox.com](http://perstorpformox.com)  
[perstorpindustripark.com](http://perstorpindustripark.com)  
[perstorplantbruk.nu](http://perstorplantbruk.nu)  
[perstorppolyols.com](http://perstorppolyols.com)  
[perstorp.com](http://perstorp.com)  
[polyol.com](http://polyol.com)  
[sipab.com](http://sipab.com)  
[sydsvenskakemi.se](http://sydsvenskakemi.se)  
[thermosets.com](http://thermosets.com)  
[vyncolit.com](http://vyncolit.com)  
[ylainc.com](http://ylainc.com)

# MANAGEMENT

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# MANAGEMENT

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## - Introduction

**The main purpose of the "Environmental Report 2002"** is to present the work on the Environment, Health & Safety (EHS) of the Perstorp Group during 2002. The environmental report is a complement to the Group's annual report which contains a short summary of the EHS work for 2002. The EHS section in the annual report mainly addresses the financial players, while Environmental Report 2002 addresses a large group of stakeholders, including neighbours, suppliers/contractors, environmental authorities, students and industrial organizations. The Group considers it to be of great value to inform all stakeholders about the ongoing EHS work.

**The structure of the environmental report** is based on a number of main headlines and starts with a presentation of the Perstorp Group. This is followed by a presentation of how the company views and drives EHS issues from the management perspective. A more comprehensive presentation of the Group's work on the environment, health and safety is shown under the detailed headlines. A separate section describes the Group's communication with the different stakeholders. The environmental report ends with the environmental-related financial figures and presentation principles.

**The environmental impact of the operations** of the Perstorp Group consists mainly of emissions to the air and water. The operations also cause waste and noise. Each production unit has its own EHS objectives, adapted to the prevailing conditions. At the Group level, a number of EHS objectives have been set relating to the common issues that are considered the most interesting, such as ozone-depleting compounds, waste, EHS management and the working environment.

**For several years**, Perstorp has been using a computer-based system (EHS-Frango) to collect and store environmental figures related to the EHS issues. In addition, a Lotus Notes database is used to gather annual text information related to the EHS. Environmental Report 2002 is based on the information from both of these systems. The environmental report is published on the Internet and no printed version is issued.



*The Perstorp Group with headquarters in Perstorp, Sweden, has been issuing a separate environmental report on its environmental work since 1994.*

# MANAGEMENT

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## - Comments from the CEO

**Environment, health and safety** are high on the agenda for everyone within Perstorp Group, whether relating to production and processes, applications and sales, research and development or some other area. In fact, environment, health and safety are prerequisite for profitability and growth.



**Our aim is to become** a world-class specialty chemicals company. We are striving to achieve continuous improvement and will always carefully consider our contribution to sustainable development and how we can minimize our impact on the environment, while ensuring good health and a high level of safety. An example of how our efforts and environmental issues go hand in hand is the Group's investment in materials technology. Through collaboration with companies in the automotive industry, we are helping to develop new components that, with equal or better performance, will lower the weight of a vehicle and thus improve fuel consumption.

**Perstorp the company was founded** in a village of the same name, surrounded by forests. Many of us still live and work in this environment. It has therefore always been natural for us to care about the environment, the health and safety of our employees and the community in which we operate, and by extension to the other communities where we now have sites, in order to achieve sustainable development. For us, sustainable development means working continuously, always considering the best way to protect our employees and the environment. To systematically integrate this process into our day-to-day work, we introduced an environmental management system (based on Responsible Care and ISO 14001) at an early stage. The majority of our units are now certified. We are continually analyzing and assessing the impact of our products and processes, setting new goals and drawing up preventive programs with the aim of achieving long-term sustainable development.

Our policy for the environment, health and safety demonstrates our core values and principles concerning:

- Continuous improvement and the least possible impact on people and the environment
- Safe working place
- High level of safety for preventing serious chemical accidents
- Effective management systems
- Active research and development
- Fulfilling legislative requirements by a broad margin
- Openness and communication with all stakeholders
- High demands on suppliers, contractors, consultants and transport companies

Compliance with our policy for the environment, health and safety, as well as applicable laws, is the responsibility of every employee and contractor acting on our behalf. The management within each unit is responsible for training and motivating employees so that they understand and comply with this.

A handwritten signature in black ink, appearing to read 'L. Holm', written in a cursive style.

Lennart Holm  
President and CEO

# MANAGEMENT

## - Corporate policy for Environment, Health & Safety

Perstorp is active in specialized chemicals markets through production units in several countries. The Group prioritizes continuous improvement in the field of the environment, health and safety in order to prevent accidents and achieve sustainable development. Important features of environment, health and safety (EHS) work include emissions to the air and water, the occurrence of waste and noise and the handling of chemicals.

### *Perstorp strives for:*

**A safe and sound** working environment in which special priority is assigned to the physical and psychological health of employees, and to promoting personal development and commitment with the help of interesting duties, clear-cut division of work and assignments, goal-oriented training and open communication. As a result of job satisfaction and mutual respect in each organization, all employees participate in the workplace community.

**Continuous improvements** in processes and products to minimize their environmental impact. A closed-cycle approach and economization of natural resources shall be prioritized.

**A high level of safety standards** through risk analyses, preventive measures, emergency preparedness and a long-term technical approach. We believe that all accidents can be prevented. Risks, incidents and accidents are analyzed, so that the appropriate preventive or corrective measure can be implemented.

**Effective management systems** for environment, health and safety issues by including delegation of responsibilities and job descriptions. The Group's operations shall be subject to high standards of health and safety and have a good internal and external environment, which is to be achieved through continuous improvements based on new goals and action programs as well as strict follow-up work.

**Active research and development** work that generates know-how for selections of raw materials, processes and transports to limit harmful impact on health and the environment.

**Fulfilling legislated requirements** by a broad margin.

**Open and continuous communication** with neighbours, authorities, customers, mass media and other stakeholders. Risks, measures and emergency planning are to be communicated to the the general public and authorities.

**Subjecting suppliers and subcontractors** to the same rigorous demands in environment, health and safety matters as those applied to the Perstorp Group as a whole.

This revised environmental policy applies to the entire Perstorp Group effective June 1, 2003. Perstorp's policy, objectives and work in the environment, health and safety area are presented annually in the Group's environmental report on the Internet.

# MANAGEMENT

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## - Vice President - Corporate Environment, Health & Safety



**Investments in the field of** the environment, health and safety continued during 2002. Environmental work within the Perstorp Group goes back several decades and is now a natural feature of our day-to-day operations. Although many measures aimed at improving the environment have been implemented, there still remain many challenges regarding the reduction of waterborne discharges and waste, for instance. Continued work on emissions into the air and noise is also required. Our ambition is to achieve both industrial development and a good internal and external environment.

**During 2002**, VOC emissions within the Perstorp Group fell slightly compared with 2001. In several areas the Group has implemented improvements, optimization and supplementing of existing cleaning equipment, with the aim of further reducing emissions.

*Jan Petersson, President of Perstorp Support AB,  
is in charge of EHS (environment, health and safety) in the Perstorp Group.*

**Methanol constitutes** the Perstorp Group's largest single emission of volatile compounds. Methanol emissions take place at several of the Group's units, including the unit in Pontianak, Indonesia, which represents the Group's largest emission of methanol at present. It is anticipated that emissions of methanol in Pontianak can be reduced by almost 50% during 2003 through a transition to formalin with a lower methanol content. The unit in Vapi, India, which is also responsible for a considerable proportion of the Group's methanol emissions, is planning a waste gas combustion plant in 2005 for the treatment of methanol emissions.

**The proportion of** inorganic emissions (primarily sulfur dioxide) has increased in 2002, primarily at the unit in Vapi, India. The reason for the increase in sulfur dioxide emissions is increased production.

**Water issues maintain** very high priority within the Perstorp Group, above all at the Group's largest unit in Perstorp, Sweden. A comprehensive project has been launched that affects the entire industrial park, with the aim to reduce the hydraulic load on the wastewater treatment plant and the thermal load on the receiving water. The reduction of waterborne impurities in the form of TOC has also been given high priority.

**Various kinds of hazardous waste** occur within the Perstorp Group. The largest fractions are made up of distillation by-products and production volume-related "returned methanol". Other examples of hazardous waste include oil, solvents, laboratory waste, etc. The proportion of hazardous waste has increased by just over 1,300 tons in 2002. Other waste is made up of many different types of waste, primarily mother lye, organic by-products, ash, filter cake and sludge. The amount of other waste has increased by almost 5,000 tons in 2002. Many of the increases in waste in 2002 have taken place at the unit in Perstorp, Sweden, and are due to production increases. Increases in hazardous waste mainly comprise methanol and ethanol, while increases in other waste mainly comprise mother lye, ash and sludge. Reducing production-volume-related waste flows is a major challenge, and one that we have to prioritize over the next few years.

**The number of occupational injuries** that did or did not result in leave of absence totaled 169 in 2002, a reduction compared with 214 in 2001. In 2002, 48 occupational injuries resulted in leave of absence compared with 58 in 2001. Burns and stress injuries were responsible for most of these. Chemical injuries such as spills and splashes were responsible for a large proportion of the injuries that did not result in leave of absence.

# MANAGEMENT

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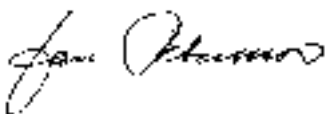
## - Vice President - Corporate Environment, Health & Safety

**From having largely focuses** on traditional working-environment duties associated with risk inventories and safety rounds, we are now increasingly having to work with leave of absence, its causes and consequences. Several companies in the Group conducted comprehensive employee surveys in 2002. The result of these will be used to improve the workplace and factors such as psycho-social conditions. From 2003 we will be following a number of key indicators for all activities. These include sick leave and the number of occupational injuries that do and don't result in leave of absence.

**Management training** is another area in which Perstorp is currently investing heavily. This long-term project requires stamina, and investments are tied to the needs of the individual unit.

**We are also working to establish** a global Group database for registering all accidents and risks. This has been in operation for several years at some of our units, including the unit in Perstorp.

**Traditional safety work** has focused both on preventive and remedial measures relating to fire and explosions, for instance. The insurance companies are now stipulating more far-reaching demands for the units to be able to demonstrate preventive risk and consequence investigations. Documentation and internal audits are important aspects of this work.



Jan Petersson  
President  
Perstorp Support AB

# MANAGEMENT

## - Perstorp's objectives for Environment, Health & Safety

### The Perstorp Group's EHS objectives

In connection with the restructuring of the Perstorp Group during 2001, new overall EHS (Environment, Health & Safety) objectives for the period 2002-2004 have been set.

The following objectives must be achieved by the end of 2004:

- 1. Emissions of ozone-depleting compounds**  
Coolant leakage must not exceed 4% of the installed amount.

#### Comment

At the start of 2003, the Group had around 0.01 tons of installed CFC in plants in the USA. There was no leakage of CFC during 2002.

#### **Leakage of**

<b>HCFC</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>Goal 2004</b>
Installed amount(kg)	4 220	3 956	3 805	-
Leakage (kg)	858	1 521	392	-
Leakage (%)	20	38	10	4

The installed amount of HCFC in the Group in 2002 was around 3.8 tons, and the corresponding leakage of HCFC during the year amounted to around 0.39 tons, i.e. approximately 10% of the installed amount. This is a reduction since 2001, when the corresponding emissions stood at around 38%. Major leakage occurred in 2002 at the units in Toledo, USA (89 kg), Florence, USA (94 kg) and Vyncolit N.V., Belgium (204 kg). The primary causes were leakage from or breakdowns of older installations, which were subsequently replaced or repaired.

Read more about leakage of ozone-depleting compounds under the heading **The Ozone layer**.

- 2. Waste**  
Process changes and improved yields must reduce the amount of non-hazardous waste for landfill by at least 30% compared to 2001.

#### Comment

This objective has been satisfied for 2002. Non-hazardous waste for landfill within the Perstorp Group has fallen by 44% between 2001 and 2002.

	<b>2000</b>	<b>2001</b>	<b>2002</b>
Non-hazardous waste for landfill (tons)	3 396	3 398	1 903

Read more about **Waste**.

# MANAGEMENT

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## - Perstorp's objectives for Environment, Health & Safety

### 3. Certified environmental management system

All wholly-owned production units must be certified in accordance with ISO 14001.

#### Comment

The following companies in the Perstorp Group are certified according to ISO 14001:

#### **Perstorp Coating Intermediates / Perstorp Performance Chemicals**

Perstorp Specialty Chemicals AB, Perstorp, Sweden

Perstorp SpA, Castellanza, Italy

Perstorp Polyols Inc., Toledo, USA

The units in Germany and India have not been awarded ISO 14001 certificates. The unit in Vapi, India, is planning to be certified in accordance with ISO 14001 during 2003.

#### **Perstorp Formox**

Perstorp Formox AB, Perstorp, Sweden

#### **Perstorp Oxo Intermediates**

Perstorp Oxo AB, Stenungsund and Nol, Sweden

The unit in Gent, Belgium, does not have an ISO 14001 certificate, but expects to be certified in accordance with ISO 14001 during 2004.

#### **Perstorp Engineering Materials**

Perstorp Compounds AB, Perstorp, Sweden

Perstorp Chemitec SpA, Castellanza, Italy

Vyncolit N.V., Gent, Belgium

The units in the USA and Indonesia have not been awarded ISO 14001 certificates. The unit in Florence, USA, is expecting to be certified in accordance with ISO 14001 during 2004.

#### **Perstorp Support**

Perstorp Support AB, Perstorp, Sweden

Read more about the **Management system for Environment, Health and Safety**.

# MANAGEMENT

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## - Perstorp's objectives for Environment, Health & Safety

### 4. Working environment

Perstorp is aiming to achieve zero occupational accidents.

The number of occupational accidents must be cut in half for each unit compared to 2001.

In addition, the LTAR value for the Group must be less than 2 by the end of 2006.

LTA = Lost Time Accident, occupational accident resulting in one or more days' leave of absence

LTAR = Lost Time Accident Rate, occupational accident frequency, the number of LTAs per million man-hours

#### Comment

The LTAR has been reduced from 22.6 to 13.3 since 2000. In some plants with previously high accident rates, targeted efforts had resulted in a reduced accident frequency and a positive trend. However, the work will need to be further intensified in order for the objective of LTAR=2 to be achieved by 2006.

This work naturally includes the preventive work through risk identification and preventive measures, as well as corrective work and the transfer of knowledge after an accident has occurred. Since 2000, Perstorp in Sweden has documented accidents and risks in a shared database. The aim is to introduce this database throughout the Group, and this work is proceeding. New data technical solutions are in the pipeline, and the aim is for all the plants to report risks and accidents online in a shared database that will become accessible to all personnel from 2004.

Read more about **Health & Safety**

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Each production unit within the Group has its own EHS objectives. The most significant environmental aspects are an important basis for these objectives.

The **main goals** for the production units are to:

- Reduce the use of raw materials and energy
- Reduce organic and inorganic emissions to the air
- Reduce waterborne discharges with regard to pollution and hydraulic load
- Reduce hazardous waste

# MANAGEMENT

## - Management system for Environment, Health & Safety

### Environmentally certified units

Since 1994, the Perstorp Group has been working to introduce a management system for environment, health and safety. The management system is based on the international ISO 14001 standard, but also covers safety and the working environment.

The following companies in the Perstorp Group are certified according to ISO 14001:

#### **Perstorp Coating Intermediates/Perstorp Performance Chemicals**

Perstorp Specialty Chemicals AB, Perstorp, Sweden

Perstorp SpA, Castellanza, Italy

Perstorp Polyols Inc., Toledo, USA

The units in Germany and India have not been awarded ISO 14001 certificates. The unit in Vapi, India, expects to be certified in accordance with ISO 14001 during 2003.

#### **Perstorp Formox**

Perstorp Formox AB, Perstorp, Sweden

#### **Perstorp Oxo Intermediates**

Perstorp Oxo AB, Stenungsund and Nol, Sweden

The unit in Gent, Belgium, does not have an ISO 14001 certificate, but expects to be certified in accordance with ISO 14001 during 2004.

#### **Perstorp Engineering Materials**

Perstorp Compounds AB, Perstorp, Sweden

Perstorp Chemitec SpA, Castellanza, Italy

Vyncolit N.V., Gent, Belgium

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#### **Perstorp Support**

Perstorp Support AB, Perstorp, Sweden



Internal audits of the management system are conducted annually at certified units. In addition to this, external auditors check the system twice a year. Since the start in 1994, the management system has been subject to continuous modification and development. The experience gained in certain parts of the Group benefit the other units.

# MANAGEMENT

## - Research & Development

The Perstorp Group's work on new products is now aimed at developing more environmentally adapted chemical products. Important market segments in which Perstorp is active include new additives to thermoplastics and paint systems, with low or zero content of volatile organic solvents. The development towards more environmentally adapted systems is moving rapidly, demanding considerable R&D input in order to supply new products that both retain the technical properties delivered by the older systems, while complying with stringent environmental requirements.

Examples of areas in which the Perstorp Group is currently developing new products include:

### 1. Additives to the plastic polyvinyl chloride (PVC)

**The use of PVC** has long been discussed, principally because it can contain two different additives that have been criticized from environmental and health perspectives. Lead-based "stabilizers" were used for a long time to counteract the thermal decomposition of plastic during processing to make finished components. These stabilizers remained in the plastic until it was deposited for landfill or incineration, with the risk of the lead escaping into the environment.

**New stabilizer systems** have now been developed that do not contain lead, but are based on other relatively harmless metals such as calcium and zinc. However, these systems cannot in themselves replace the lead-based stabilizers, but in combination with polyalcohols manufactured by Perstorp, these new stabilizers are good alternatives. In order to achieve the same technical performance as lead-based products, it is necessary to choose appropriate organic acids, e.g. the 2-ethyl hexane acid produced by the Perstorp Group, which react with the metals, as well as the right combination of polyalcohols. Various applications for PVC also demand different compositions of the stabilizers, and the Perstorp Group is continuing to work in this area on the development of increasingly competitive products. The new stabilizers are now used to a large extent in the West, but are also rapidly replacing the lead-based products in areas such as East Asia.

**The other much-discussed additives** are phthalate-based plasticizers that allow PVC to be shaped and bent when it is processed or as finished components, and the proportion of plasticizers by weight in the plastic can be significant. The most important traditional plasticizers have been based on phthalic acid esters with various alcohols, known as phthalates. These substances have been questioned as potentially harmful to people and the environment, and the Perstorp Group, as a producer of plasticizers, is therefore working intensively to develop new types. Perstorp is currently launching a series of new products in this field that will correspond to phthalate plasticizers in a range of PVC applications.



*At Business Process New Offerings' plant in the Finnish town of Porvoo, work has been carried out on the development of the new range of plasticizers for PVC.*

# MANAGEMENT

## - Research & Development

### 2. New raw materials for binding agents in paint systems containing little or no organic solvent

**The volatile organic solvents** that have been used for many decades in paint and lacquer systems are now being held responsible for serious harm to people and the environment. The paint industry is therefore working intensively to develop new systems that minimize the use of these solvents. The primary purpose of solvents in paint has been to lower the viscosity (the "thickness") of the paint to make it easier to apply. Once the paint layer has been applied, the solvent has to evaporate in order for the paint to "dry". The inherent high viscosity derives from the "binding agent" in the paint, which provides the dry paint layer's hardness and resistance. If solvents are no longer to be present in the paint, the systems must be radically altered. There are several different ways of achieving this, e.g. by diluting the paint with water, by changing the binding agent so that only a very small addition of solvent is required in order to achieve a sufficiently low viscosity, by diluting the paint with low viscosity components that react chemically with the binding agent rather than evaporating, or by applying the paint as a powder. New paints systems are currently being developed for all of these methods, and the Perstorp Group, as a producer of components in the binding agents, is participating with considerable R&D initiatives. By developing new chemical products and suggesting new paint systems, Perstorp can contribute to the more rapid phasing out of traditional solvent-based paints.

**As the health-impairing properties** of Perstorp's products are usually non-existent or insignificant, a considerable amount of the development work is being focused on improving the products in which Perstorp's products are constituents. This work encompasses both chemical synthesis and evaluation of the chemical systems that are obtained from an environmental and technical viewpoint. This frequently takes place in cooperation with a customer who manufactures the chemical system and who has knowledge about its environmental properties that Perstorp does not have. This work occasionally results in ideas and suggestions for new components from Perstorp that contribute to improved environmental properties in the customer's system, but just as often in proposals for modifications in the customer's system. The development of new products is characterized by a gradual scaling up from work in the laboratory to factory-scale production. Particularly in the early stages of the development process, careful checks are made to ascertain whether the proposed product has any unforeseen, negative environmental properties. This might relate to whether the product is an irritant to the skin or eyes, or whether it is more readily miscible with nonpolar organic substances than with water. The latter determines whether the substance is fat-soluble and hence potentially accumulable in the human body, for example. Other important tests are the flammability and toxicity of the product. In addition to the product's inherent properties, it is tested in the proposed application to ensure that its environmental properties are as intended. By getting rid of environmentally dubious substances at an early stage, the risk of such products reaching the market is reduced and development resources are not wasted on the wrong products. The development work follows established procedures for evaluating new products in accordance with Perstorp's environmental management system.

# MANAGEMENT

## - Training

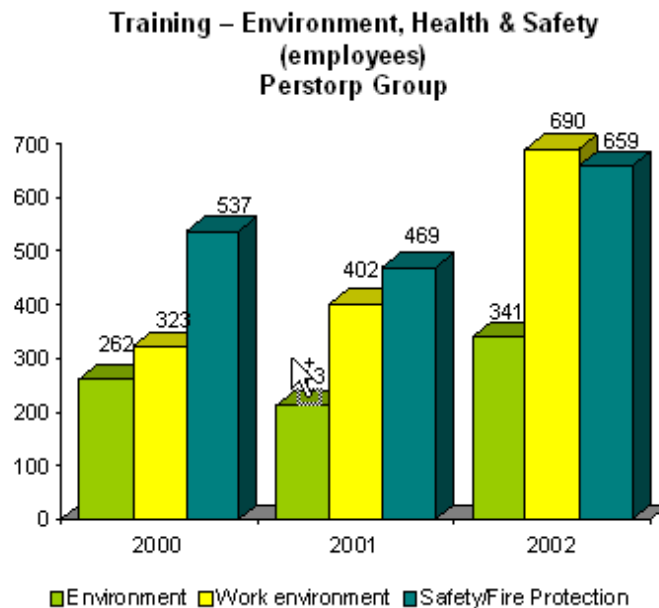
In order to be secure in the work situation and to live up to the requirements for safety, quality and expertise that Perstorp and Perstorp's customers place on the company, all employees within the Perstorp Group must have good knowledge within their respective professional spheres. By constantly building on individual knowledge and experience, and sharing this with each other, Perstorp nurtures one of its most important assets - the company's expertise.

In order to develop expertise and proficiency, managers and employees hold development appraisals during which goals, development and training are planned.

A new function, "Learning and Development", has been established during the year to develop leadership at all levels within the Group and to implement various internal training programs. Via "Learning and Development", the company offers training that is available to all employees. These courses must be adapted to the needs of both the individual and the company. Training is a way of learning. Other ways of developing include study visits, practical work, literature, mentors and networks. Read more about training under the section **Personnel**.

The personnel are informed about environment, health and safety through various training initiatives, internal working material, the Group's intranet, meetings, newsletters and environmental reports.

*The number of employees trained in environment, health and safety increased during 2002.*



# MANAGEMENT

## - Organization for Environment, Health & Safety

Environment, health and safety are **prioritized areas** within Perstorp. The Group strives for continuous improvement towards established goals and views active environmental work as a prerequisite for conducting business responsibly and achieving sustainable growth.

Perstorp has a Group-wide function for environment, health and safety headed by **Jan Petersson**. The function is staffed by personnel from Perstorp Support AB, the service unit for the Group's production units that was formed after the incorporation of the divisions at the end of 1999. Perstorp Support AB includes experts in many fields, e.g. external environment, working environment, water and energy issues, fires safety, etc.

The overall responsibility for EHS issues lies with the board and the president of each company, while the legal and operational responsibilities are largely delegated to the line organization. Each production unit has an EHS coordinator.

If you would like further information about the environmental work of the Perstorp Group, please contact the manager of Environment, Health and Safety [jan.petersson@perstorp.com](mailto:jan.petersson@perstorp.com) or the environmental controller [margareta.midenstam@perstorp.com](mailto:margareta.midenstam@perstorp.com)



Environment, Health & Safety/Perstorp Support AB  
PERSTORP AB  
SE-284 80 Perstorp, Sweden  
Phone: +46 435-380 00  
Fax: +46 435-380 10



*Jan Petersson is based at the Perstorp Group's head office in Perstorp, Sweden.*

# MANAGEMENT

## - Organization for Environment, Health & Safety

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### **Jan Petersson**

President Perstorp Support AB/  
Vice President Corporate Environment, Health & Safety  
Phone: +46 435 38594  
Fax: +46 435 38010  
E-mail: jan.petersson@perstorp



### **Margareta Midenstam**

Environmental Controller  
Phone: +46 435 38292  
Fax: +46 435 38010  
E-mail: margareta.midenstam@perstorp.com



### **Michael Bengtsson**

Certified Environmental Auditor  
Phone: +46 435 38353  
Fax: +46 435 38010  
E-mail: michael.bengtsson@perstorp.com



### **Merja Söderdahl**

Environmental Information Systems Coordinator  
Phone: +46 435 38203  
Tax: +46 435 38010  
E-mail: merja.soederdahl@perstorp.com



### **Contact persons regarding environment, health and safety**

Perstorp Compounds AB,  
Perstorp, Sweden

Monika Karlsson  
Phone: 0435-384 09  
E-mail: monika.g.karlsson@perstorp.com

Perstorp Compounds Inc.,  
Florence, USA

Mark Vasicek  
Phone: +1 413 584 2472  
E-mail: mark.vasicek@perstorp.com

Perstorp Chemitec S.p.A,  
Castellanza, Italy

Antonello Rota  
Phone: +39 0031 1488 311  
E-mail: antonello.rota@perstorp.com

PT Bumi Raya, Indonesien

Meylani Rusmiati  
Tel: +62 215 326163  
E-post: meylany@ptk.centrin.net.id

Vyncolit N.V., Gent, Belgium

Friedel Anno  
Phone: +32 9 265 2731  
E-mail: friedel.anno@perstorp.com

# MANAGEMENT

## - Organization for Environment, Health & Safety

Vyncolit Inc., Manchester, USA	Brian Carra Phone: +1 860 533 6645 E-mail: brian.carra@perstorp.com
YLA Inc., Benicia, USA	Tom Jonas Phone: +1 7077 472 750 E-mail: tom.jonas@perstorp.com
Perstorp Formox, Perstorp, Sweden	Håkan Kihlberg Phone: +46 435 376 51 E-mail: hakan.kihlberg@perstorp.com
Perstorp Specialty Chemicals, Perstorp, Sweden	Anita Sindberg Phone: +46 435 372 85 E-mail: anita.sindberg@perstorp.com
Perstorp Polyolc Inc., Toledo, USA	Tony Sloma Phone: +1 419 729 5448 E-mail: tony.sloma@perstorp.com
Perstorp Aegis, Vapi, India	Gerhard Weber Phone: 0435-374 37 / +9 1260 430988/430 E-mail: gerhard.weber@perstorp.com
Perstorp Chemicals, Bruchhausen, Germany	Ernst Schucht Phone: +49 29 32 498 110 E-mail: ernst.schucht@perstorp.com
Perstorp S.p.A, Castellanza, Italia	Antonello Rota Phone: +39 0331 488 341 E-mail: antonello.rota@perstorp.com
Avloppsreningsverket, Perstorp Support AB, Perstorp, Sweden	Göran Lengdén Phone: +46 435 388 47 E-mail: goeran.lengden@perstorp.com
Ångcentralen, Perstorp Support AB, Perstorp, Sweden	Erik Malmborg Phone: +46 435 374 45 E-mail: erik.malmborg@perstorp.com
Perstorp Oxo, Stenungsund, Sweden	Arne Alexandersson Phone: +46 303 728 734 E-mail: arne.alexandersson@perstorp.com
Perstorp Oxo, Nol, Sweden	Berne Karlsson Phone: +46 303 331 454 E-mail: berne.karlsson@perstorp.com
Perstorp Oxo, Gent, Belgium	Geert Devos Phone: +32 9 257 17 52 E-mail: geert.devos@perstorp.com

# ENVIRONMENT

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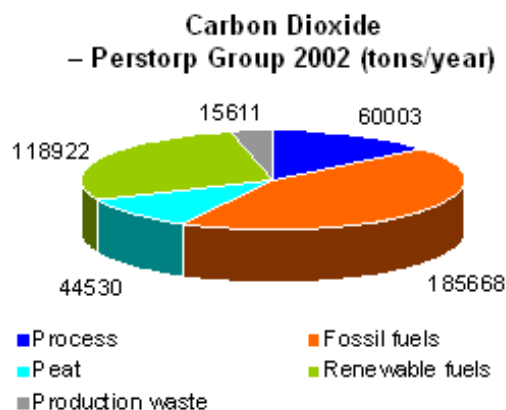
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# ENVIRONMENT

## - Greenhouse effect

The greenhouse effect is considered to be due to the fact while that the earth's atmosphere lets in short-wavelength solar radiation, the so-called greenhouse gases prevent long-wavelength thermal radiation from leaving. This entails a risk that greenhouse gases will disturb the earth's climate system by raising the mean temperature.

The main greenhouse gases are carbon dioxide, methane, di-nitrogen oxide, sulfur-hexafluoride, fluorocarbons and CFC/HCFC/HFC. Carbon dioxide is the chief contributor to the greenhouse effect due to the volume of emissions. Carbon dioxide is formed on combustion or decomposition of organic material. Fossil fuels such as oil, coal and natural gas add "new" carbon dioxide to the atmosphere, i.e. carbon dioxide that was previously trapped in the earth's crust for millions of years. Biofuel, on the other hand, releases carbon dioxide that is already part of the natural cycle, and is thus not regarded as a net contributor.



Total carbon dioxide emissions (tons/year) from the Perstorp Group 2002 - 424,734 tons.



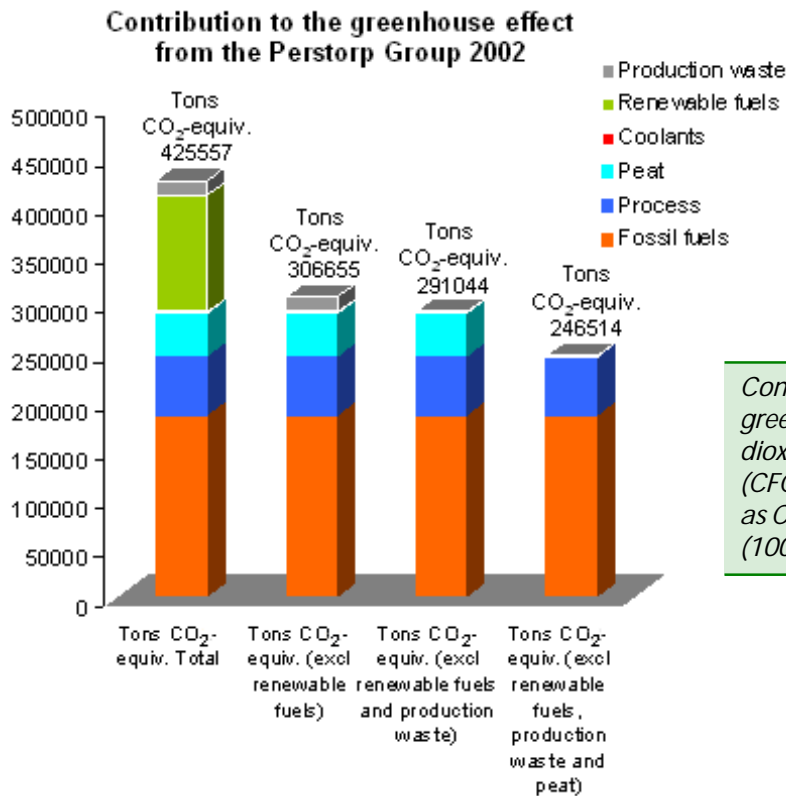
The Perstorp Group began working to reduce the greenhouse effect some years ago. One important measure has been the reduction in the use of fossil fuels. Back in 1991, a biofuel-fired steam boiler was built at the company site in Perstorp, Sweden, replacing the use of coal. Together with oil-fired back-up steam boilers, the biofuel-fired steam boiler supplies steam to some 20 plants in Perstorp and is the unit with the greatest total emission of carbon dioxide.

Back in 1991 the steam power plant at the largest company site in Perstorp, Sweden, was converted to use biofuel.

# ENVIRONMENT

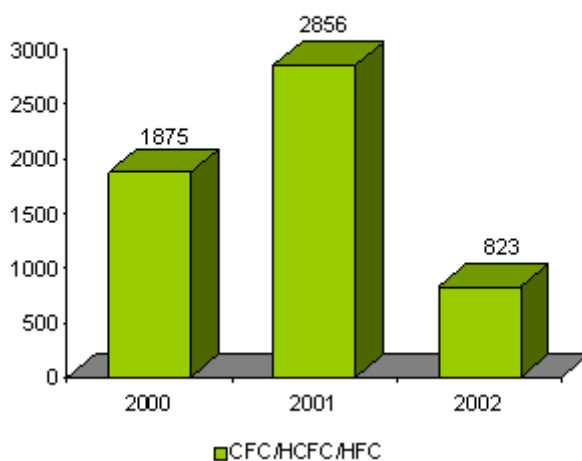
## - Influence on climate

During 2002, Perstorp's total emissions of carbon dioxide decreased to 424 734 tons, compared to 445 785 tons in 2001, mainly thanks to reduced steam production at the largest company site in Perstorp, Sweden. The work to improve energy efficiency continues at several site in the Group. Carbon dioxide from transports is not included in this report.



*Contributions to the greenhouse effect from carbon dioxide and cooling media (CFC/HCFC/HFC), expressed as CO<sub>2</sub>-equivalents using GWP (100) factors.*

**Contribution to the greenhouse effect (GWP/Global Warming Potential) CFC/HCFC/HFC- tons CO<sub>2</sub>-equivalents**



In addition to carbon dioxide, other greenhouse gases are emitted by the Perstorp Group. These include CFC/HCFC/HFC (see also the section entitled "Stratospheric Ozone").

*Contribution to the greenhouse effect (GWP/Global Warming Potential) CFC/HCFC/HFC - tons CO<sub>2</sub>-equivalents.*

# ENVIRONMENT

## - The Ozone Layer

**Stratospheric ozone (O<sub>3</sub>)** is formed when ultraviolet radiation from the sun breaks down free oxygen (O<sub>2</sub>). The stratospheric ozone layer protects us from harmful levels of the sun's ultraviolet radiation.

**Chlorofluorocarbons (CFCs)** and hydrated chlorofluorocarbons (HCFCs) are assumed to operate as catalysts for the degradation of ozone. It is believed that a stratospheric CFC molecule is split under the influence of UV-radiation and emits a free chlorine atom that in turn attacks an ozone molecule. Every chlorine atom can destroy about 10,000 ozone molecules. As a result, the ozone layer is degraded. Moreover, CFCs are stable compounds that can continue to do damage for a long time.

**A thinner ozone layer** can influence the conditions of life on Earth. For humans, this may lead to higher frequencies of skin cancer and cataracts. For animals, plant life and microorganisms, the balance between species may be shifted, favouring the ones more resistant to UV-radiation.



*Within the Perstorp Group, Perstorp Formox has the lowest leakage of cooling media to the atmosphere.*

Within the Perstorp Group, CFCs and HCFCs are used, for example, in air-conditioning and cooling equipment. For the past several years, efforts have been made to find substitutes for CFCs and HCFCs. Today, most Group units are totally CFC-free, e.g. all units in Sweden. Conversion to safer cooling media (e.g. HFC) is underway. At the same time, leak testing, maintenance and training efforts continue to be improved.

Within the Perstorp Group at the end of 2002, about 0.01 tons of CFCs were installed at Group facilities in the USA. During 2002, there was no leakage of CFCs.

The installed amount of HCFC in the Perstorp Group in 2002 was about 3.8 tons and leakage amounted to 0.39 tons, i.e. about 10% of the total installed volume. The corresponding leakage during 2001 was about 38%. Emissions occurred during the year at the units in Toledo, USA (89 kg), Florence, USA (94 kg) and Vyncolit N.V. Gent, Belgium (204 kg), primarily due to leakage and technical breakdown of old cooling equipment. The technical problems were solved through repairs or replacement of the old equipment.

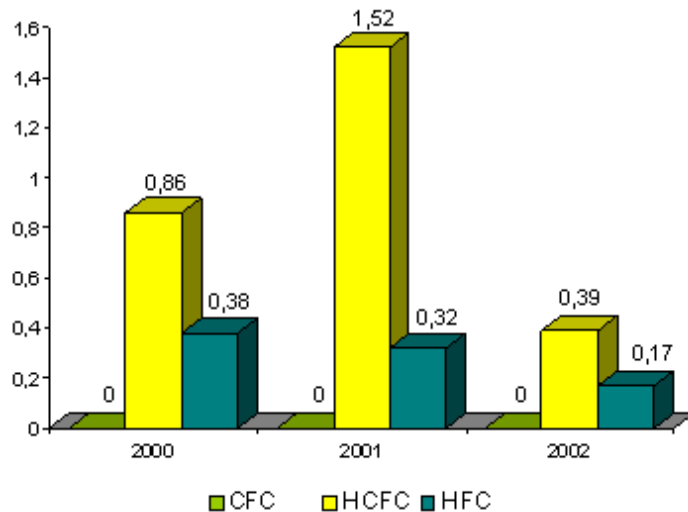
One of the Group's EHS objectives is to reduce the coolant leakage to less than 4% of the installed amount. In order to reach this objective, the company continues to improve the maintenance, the leakage-finding instruments and replace old equipment etc.

The installed amount of HFC within the Perstorp Group during 2002 was about 1.9 tons, with leakage of about 0.17 tons, i.e. about 9% of the installed amount, which is a decrease compared to 2001 when leakage was 20% of the installed amount. HFC is not considered to contribute to the depletion of the ozone layer.

# ENVIRONMENT

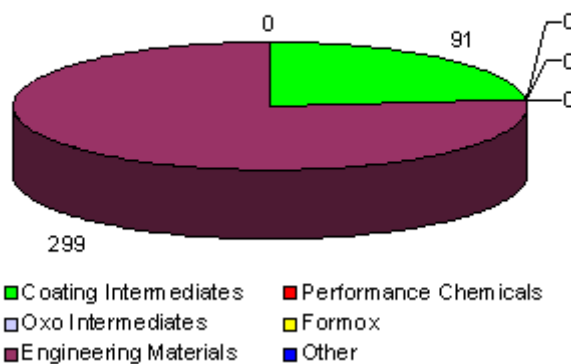
## - The Ozone Layer

Coolant leakage to the air from the Perstorp Group (tons/year)



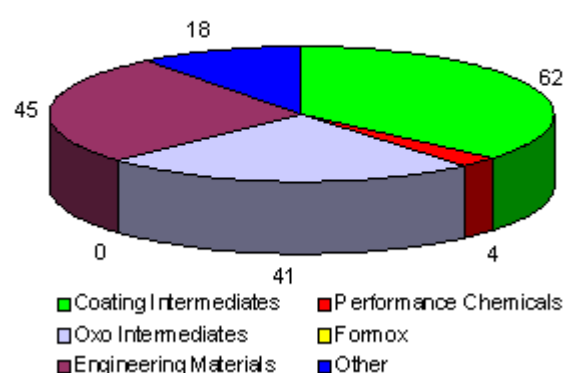
Leakage of CFC/HCFC/HFC to the atmosphere from the Perstorp Group (tons/year) the past three years.

Leakage of HCFC in the Perstorp Group 2002 (kg/year)



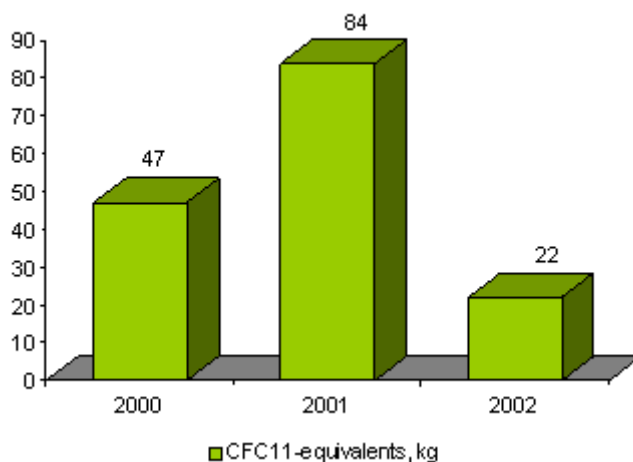
Distribution of HCFC leakage to the atmosphere from the Perstorp Group in 2002 (kg/year). Total 390 kg.

Leakage of HFC in the Perstorp Group 2002 (kg/year)



Distribution of HFC leakage to the atmosphere from the Perstorp Group in 2002 (kg/year). Total 170 kg.

Ozone Depletion Potential, ODP



Contribution to ozone depletion from the Perstorp Group, expressed in kg CFC11-equivalents, according to Best Estimate ODP (WMO/World Meteorological Organization). CFC 11 and 12 = 1. HCFC 22 = 0.055.

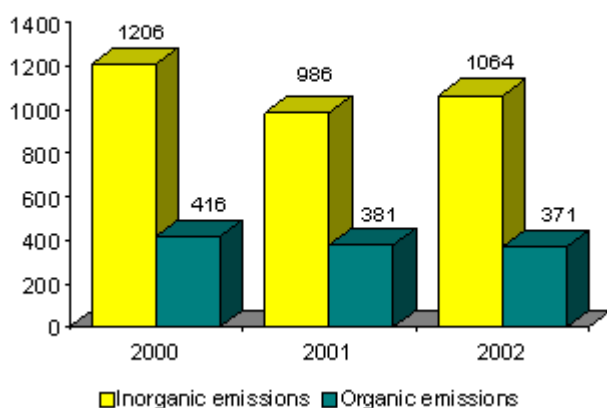
# ENVIRONMENT

## - Formation of photochemical oxidants - Ground-level ozone

**Nitrogen oxides and volatile organic compounds (VOCs)** from vehicular traffic, electricity and heat production, as well as from industrial facilities may under certain meteorological conditions, and under the influence of sunlight, contribute to the formation of photochemical oxidants, among which ozone is the dominating substance. An increased ozone concentration in the troposphere may, for example, damage plant life. The effects are mainly local or regional.

Regarding the emissions of nitrogen oxides from the Perstorp Group, see the section dealing with **Acidification**.

### Emissions to the atmosphere - Perstorp Group (tons/year)



*Perstorp Group emissions to the atmosphere of organic and inorganic substances to the atmosphere (the historical values have been adjusted to match the current organization).*

Emissions of volatile organic compounds (VOCs) from the Perstorp Group mainly come from the production plants. The Perstorp Group began installing facilities for the treatment of emissions to the air in 1970. The first generation of treatment technology consisted of wet scrubbers, in which pollutants were treated in washing columns.



A second generation of treatment technology was introduced in 1975 - thermal incineration using oils or an alternative as support fuel. Due to the widespread demand for more energy-efficient treatment technology, the third generation of treatment technology - catalytic incineration - was introduced in 1985. This is the most commonly used treatment technology in the Perstorp Group. However, several plants still use wet scrubber and thermal incineration technology.

*There are 15 catalytic incineration facilities at different production plants at the site in Perstorp, Sweden. The largest facility comprises three lines - each with a capacity of 25 000 Nm<sup>3</sup>/hour.*

During 2002, the VOC emissions of the Perstorp Group have decreased slightly compared with 2001. No major investments have been made during 2002 relating to purification equipment of emissions to the air. However, improvement projects and optimization of current equipment have been accomplished at several plants of the Group, in order to further reduce the emission.

# ENVIRONMENT

## - Formation of photochemical oxidants - Ground-level ozone

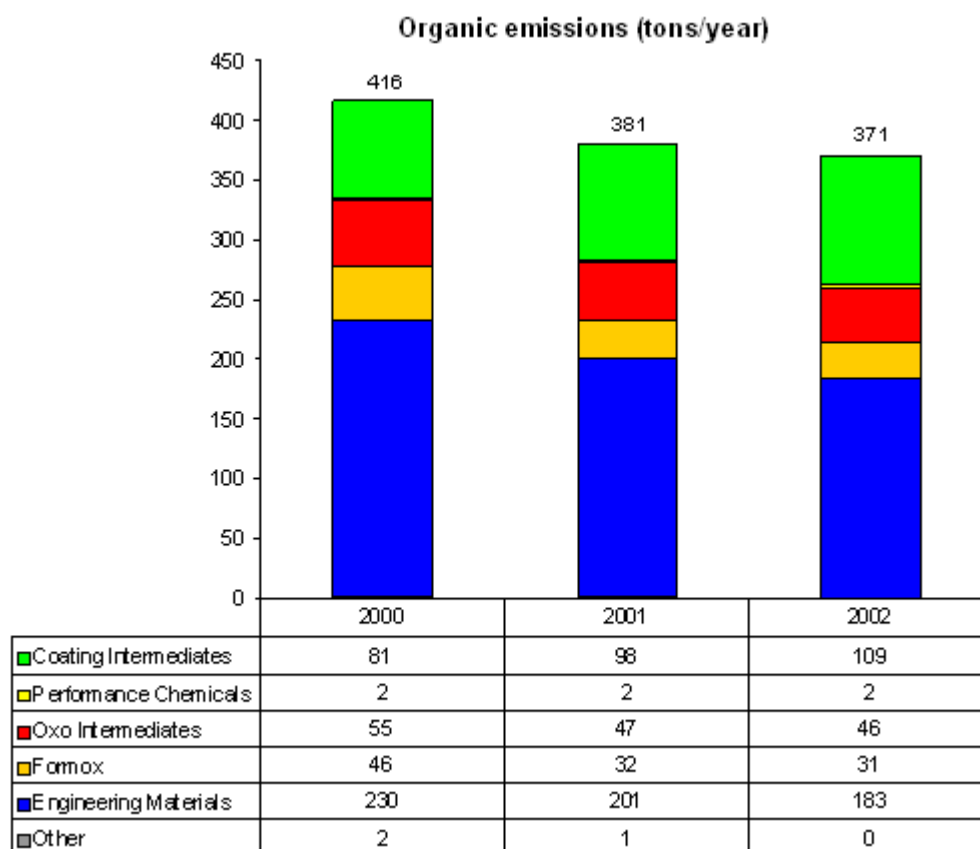
The largest emissions of VOCs from the Perstorp Group are caused by methanol. Emission of methanol occurred at several units within the Group, for example at the site in Pontianak, Indonesia, where the largest amount of emission is found. During 2003 the emission of methanol in Pontianak is expected to decrease by nearly 50%, thanks a change-over to formaldehyde with a lower methanol content. The unit in Vapi, India, which also accounts for a large share of the Group's methanol emissions, is scheduled to install a waste gas incinerator to deal with methanol emissions in 2005.

Isopropanol also accounts for a large share of the Perstorp Group's VOC emissions. Vyncolit N.V. in Gent, Belgium, has succeeded in significantly reducing their isopropanol emissions in recent years by replacing isopropanol with a non-VOC.



*The plant in Vapi, India, has undergone major improvements in recent years. A waste gas incinerator is planned for 2005 for reducing methanol emissions.*

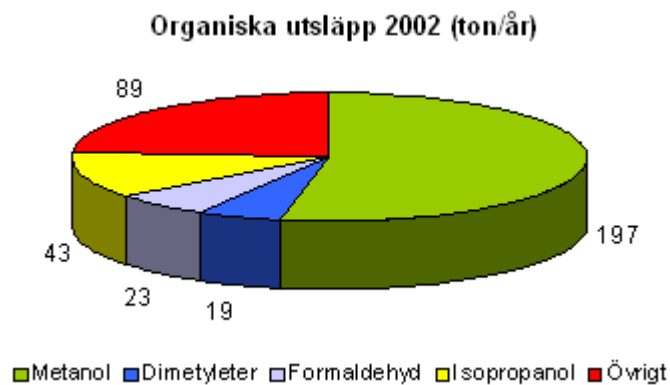
The emission of inorganic substances (mainly sulfur dioxide) has increased during 2002, mainly at the site in Vapi, India. The reason to the increased emissions of sulfur dioxide is increased production. See also the section **Acidification**.



*Organic emissions from the Perstorp Group.*

# ENVIRONMENT

## - Formation of photochemical oxidants - Ground-level ozone



*Methanol and isopropanol were the dominating components in the Perstorp Group's atmospheric VOC emissions in 2002. Total 371 tons.*

# ENVIRONMENT

## - Acidification

**Acidification is caused by** emissions of sulfur dioxide and nitrogen compounds (nitrogen oxides and ammonia), which in turn may cause acid rain.

**Combustion of sulfur-containing fuels** (coal, oil, etc) releases sulfur that can react with oxygen in the air to form sulfur dioxide. This substance reacts further to form the sulfuric acid that dissolves and is spread by rain.

**Nitrogen oxides are emitted from** traffic and from incineration plants via a reaction between nitrogen and oxygen. They react further to nitric acid, which also acts as a nutrient in soil, streams and lakes.



The emissions of sulfur dioxide from the Perstorp Group mainly stem from the combustion of sulfur-containing fuels. Back in 1991, the former coal-fueled boiler at the largest unit in Perstorp, Sweden, was replaced with a new biofuel-fired steam boiler.

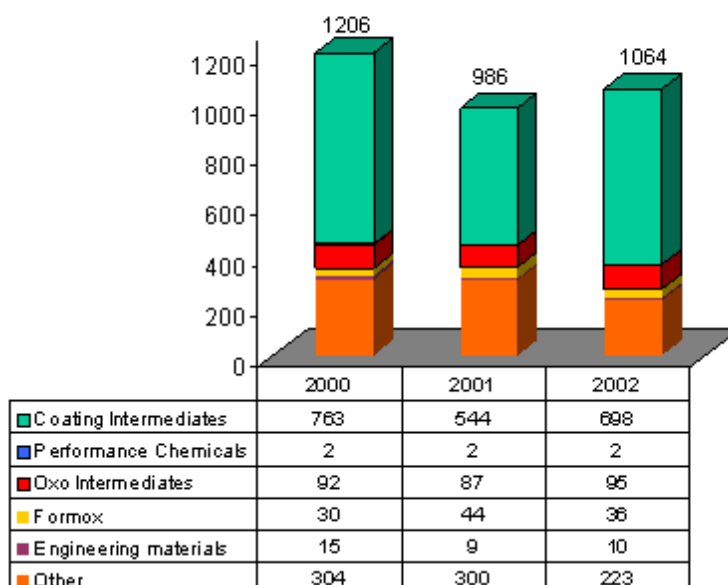
During 2002 the emissions of sulfur dioxide from the Perstorp Group increased, mainly due to increased production at the site in Vapi, India. The Vapi site represents the principle sulfur dioxide emissions of the Group.

*Perstorp installed and began operating a biofuel steam boiler at its site in Perstorp, Sweden in 1991, replacing the use of coal. During 2002 the emissions of nitrogen oxides from the biofuel steam boiler decreased slightly, due to optimized fuel mix and more even operation.*

The Perstorp Group emissions of nitrogen oxides mainly originate from Corporate combustion facilities. During 2002, the emissions of nitrogen oxides decreased slightly, partly thanks to optimized fuel mix and a more even operation of the steam power plant at the site in Perstorp, Sweden.

During 2002, the total Perstorp Group emissions of ammonia amounted to 16 metric tons.

**Inorganic emissions (tons/year)**

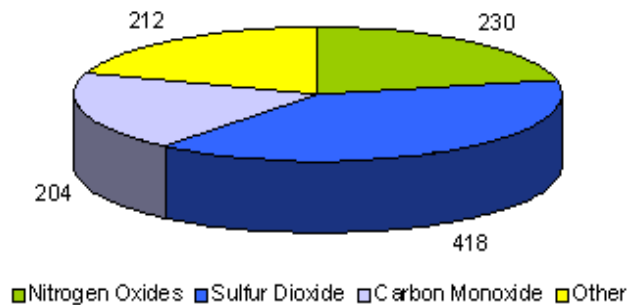


*Inorganic emissions from the Perstorp Group (historical values have been adjusted to match the current organization).*

# ENVIRONMENT

## - Acidification

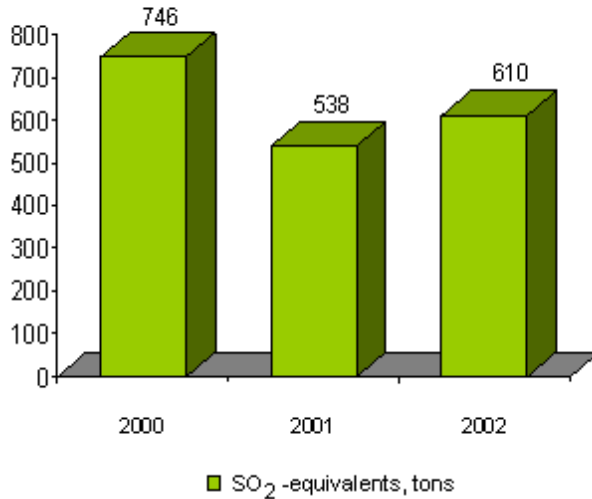
**Inorganic emissions to the atmosphere from the Perstorp Group 2002 (tons/year)**



*The total emissions of inorganic substances in 2002 amounted to 1064 metric tons*

Measures to reduce acidification include using the best available cleaning and combustion technologies, using energy from renewable sources and practicing good housekeeping of energy resources.

**Acidification potential - Perstorp Group**



*Contributions to acidification from the Perstorp Group regarding SO<sub>2</sub>, NO<sub>x</sub>, HCl and NH<sub>3</sub> expressed in SO<sub>2</sub>-equivalents using acidification factors (Nordic Guidelines, Best estimate).*

# ENVIRONMENT

## - Emissions to water

Organic substances emitted to lakes and waterways or leached from the ground consume oxygen during decomposition. The reduced oxygen content may adversely affect aquatic plant and animal life.

Perstorp Coating Intermediates dominates the Group's total waterborne emissions. The primary sources are the Group facilities in Toledo, Ohio, USA; Castellanza, Italy; Bruchhausen, Germany and the site in Perstorp, Sweden.

The plants in Perstorp, Stenungsund, Castellanza and Vapi (India), treat their emissions in their own treatment plants. Most of the other units are connected to municipal treatment plants.

Waterborne emissions of organic substances increased slightly during 2002 compared to 2001 at the Bruchhausen, Toledo, Castellanza and Vapi units, mainly due to increased production. The waterborne emissions were unchanged or less than last year at the rest of the units.

A number of projects are ongoing in the Group in order to reduce the amount of waterborne emissions. At the site in Perstorp, Sweden, a major project is in progress, covering the whole industrial park, for the purpose of reducing the hydraulic load at the wastewater treatment plant and the thermal load to the receiving water.

### Presentation of the wastewater treatment plant in Perstorp



*Waste water treatment plant at the site in Perstorp, Sweden.*



*Equalization tank 1 at the wastewater treatment plant in Perstorp, Sweden.*

The wastewater treatment plant at the Perstorp site handles the wastewater from all plants within the Perstorp Industrial Park. Treatment is biological, using the active sludge method.

# ENVIRONMENT

## - Emissions to water

Pre-treatment consists of grids and sand traps, after which the wastewater is collected in equalization tank 1 (3000 m<sup>3</sup>). The typical retention time in this tank is approximately 24 hours in order to equalize the short-term variations in TOC, pH, temperature, salt and flow.

Equalization tank 2 at the wastewater treatment plant in Perstorp, Sweden.

Equalization tank 2 (2000 m<sup>3</sup>) is also available for pre-treatment. The purpose is to handle peak loads and be able to collect wastewater from possible breakdowns. This tank is "off-line", and any water collected can be dosed into the aeration tanks of the wastewater treatment plant.

Wastewater is pumped on from equalization tank 1 to the aeration tanks of the active sludge unit (two parallel steps). It is here where the actual decomposition takes place. The bottom aerators provide good oxygenation and mixing of the active sludge. The normal retention time is about 48 hours.



*Aeration tank 2 at the wastewater treatment plant in Perstorp.*



*Equalization tank 2 at the wastewater treatment plant in Perstorp, Sweden.*

Sedimentation separates the sludge from the clear phase. In sedimentation tank 2, the sludge is scraped to the inlet side by chain-driven scrapers. The return sludge is then pumped to the aeration tank and excess sludge is pumped to the sludge supply. The treated water (clear phase) goes to flotation to remove any suspended material after sedimentation. After flotation, the water goes via extensive measuring equipment to the receiving water. Excess sludge from the wastewater treatment plant is incinerated in the company's biofuel-fired steam power plant.

The wastewater treatment plant is computer-controlled from a central control room. Information and statistics are continuously generated.



*Sedimentation tank 2.*



*The flotation unit.*

# ENVIRONMENT

## - Emissions to water

### Improvements 2002

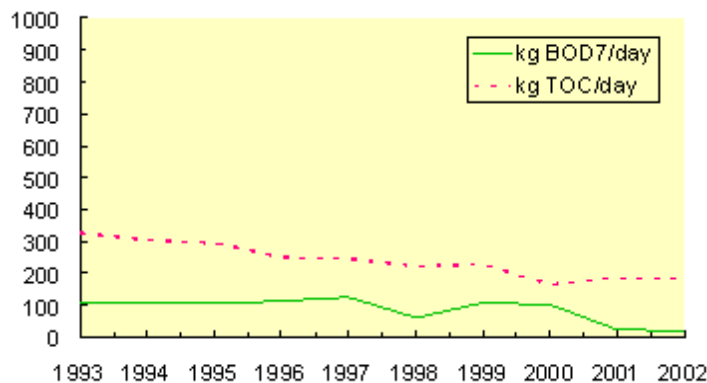
During 2002 the following changes/improvements have been implemented at the wastewater treatment plant:

- A new aeration system has gone on stream in aeration tank 2.
- Incoming wastewater lines have been doubled to increase security and flexibility during maintenance/repair.
- Two more surface aerators have been added (making a total of 5).
- PVC lines in the ground have been replaced with a more suitable material.
- A new, safer dosage point for caustic soda has been made in equalization tank 1.
- A new, improved on-line measuring device for dry matter has been installed for aeration tank 2.
- Ammonium on-line equipment has been installed in the outlet water to check the outlet concentration and thus indirectly the nitrification, which also gives some indication of the microbiological status on the treatment process.

### Emissions from the wastewater treatment plant

During 2002, the values of organic carbon in the outlet water from the wastewater treatment plant to the receiving water (180 kg TOC/day) have met current limits (330 kg TOC/day) by a good margin. As from 2003, this limit has been reduced to 300 kg TOC/day.

**Emissions from Perstorp Support AB's  
Wastewater Treatment Plant**



Phosphorus emissions from the Perstorp Industrial Park to the receiving water increased to 0.23 tons during 2002 (2001: 0.17 tons). The emissions of nitrogen increased to 7.8 tons during 2002 (2001: 6.0 tons). The amounts of phosphorus and nitrogen emissions show minor variations from year to year.

# ENVIRONMENT

## - Emissions to water

### Emergency reservoir

In 1989 Perstorp built an emergency reservoir to prevent contamination of receiving water in the event of a major fire or breakdown resulting in emissions of chemicals. The emergency reservoir is located south of the Perstorp Industrial Park and the water quality is continuously monitored by TOC and pH instruments. As soon as the alarm limits are exceeded, the sluice gate is automatically closed and the contaminated water is collected (up to 18,200 m<sup>3</sup>). The collected water can then be conveyed to the wastewater treatment plant or treated directly in the reservoir. A by-pass line has been built for clean river water once the emission has ceased.

### Receiving water

The receiving water - the Ybbarp River - is monitored by an independent consultant group (Ekologgruppen i Landskrona) at several points downstream from the Perstorp Industrial Park. Samples are tested monthly.



*The Ybbarp River runs through the Perstorp Industrial Park and is the company's receiving water.*



*The emergency reservoir has a capacity of 18,200 m<sup>3</sup>.*

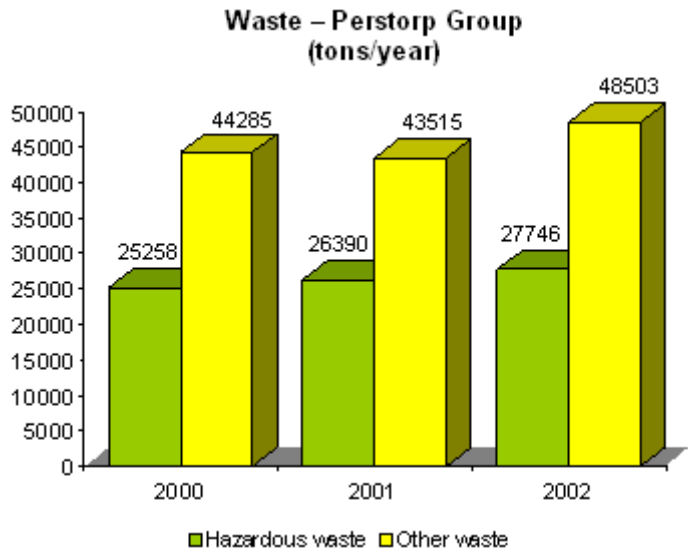
At the first measuring point in the receiving water is Perstorp Support's own continuous sampler that makes analyses three times a week, measuring BOD<sub>7</sub>, TOC and pH. There is also continuous measurement and registration of flow, oxygen content, pH and temperature at this point, as well as measurement of the oxygen content some three kilometers farther downstream. Upstream from the Perstorp Industrial Park there is also a measuring point with continuous sampling and analyses of BOD<sub>7</sub>, TOC and pH three times a week. There is also continuous measurement and registration of the temperature upstream, i.e. before any influence from the Perstorp Industrial Park. In addition to this measuring point, there are six controls each year of the upstream reservoir system.

# ENVIRONMENT

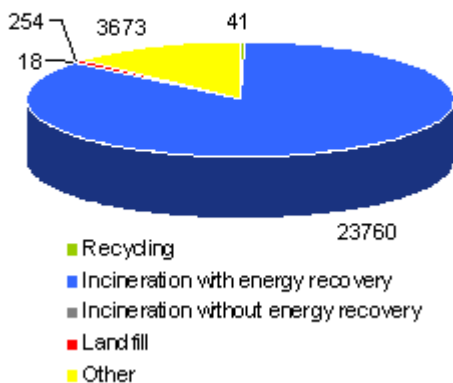
## - Waste



The greater part of the waste increase during 2002 occurred at the site in Perstorp, Sweden, due to increased production. The increased volumes of hazardous waste consist mainly of methanol and ethanol, while the increase in other waste mainly consists of mother lye, ash and sludge.



**Perstorp Group – Hazardous waste 2002 (tons/year)**



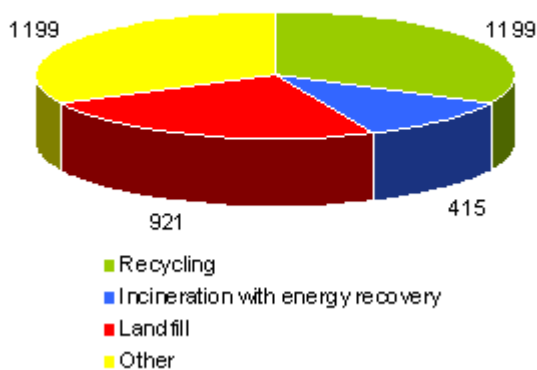
**Hazardous waste** (in accordance with the legal definitions in each country):

Hazardous waste of various kinds occurs within the Perstorp Group. The greater part of this waste consists of distillation residue and methanol, separated during production. Other hazardous waste consists of waste oils, solvents, laboratory waste etc.

During 2002, the amount of hazardous waste rose by 1 300 tons due to increased production, which in turn has meant minor increases in most types of waste.

*Hazardous waste from the Perstorp Group (tons/year) in 2002. Total 27 746 tons.*

**Other plants – Other waste 2002 (tons/year)**



**Other waste** (non-hazardous waste):

Several different types of other waste occur, e.g. mother lye, organic waste, ash, filter cake and sludge.

During 2002 the amount of other waste increased by approximately 5 000 tons, mainly due to increased production, resulting in an increase of several types of waste.

*Other waste from the Perstorp Group (tons/year) in 2002. Total 48 503 tons.*

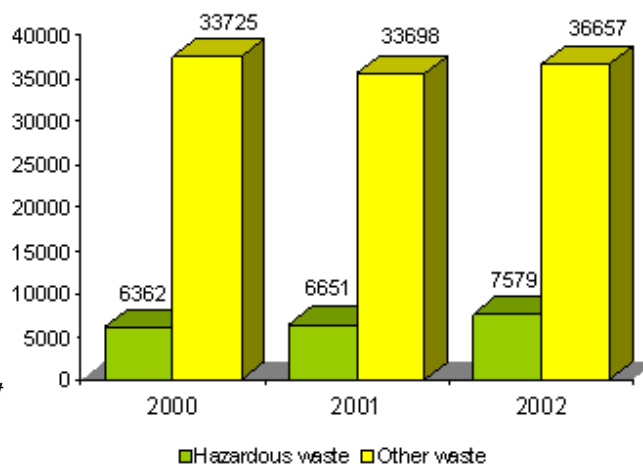
# ENVIRONMENT

## - Waste Perstorp Coating Intermediates



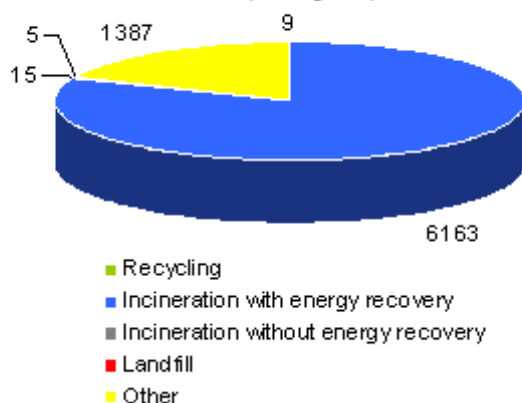
Methanol from the polyol production plant at the unit in Perstorp, Sweden, is conveyed to the formic acid plant for thermal incineration, replacing oil.

Waste - Perstorp Coating Intermediates (tons/year)



Total waste from Perstorp Coating Intermediates (tons/year).

Perstorp Coating Intermediates - Hazardous waste 2002 (tons/year)

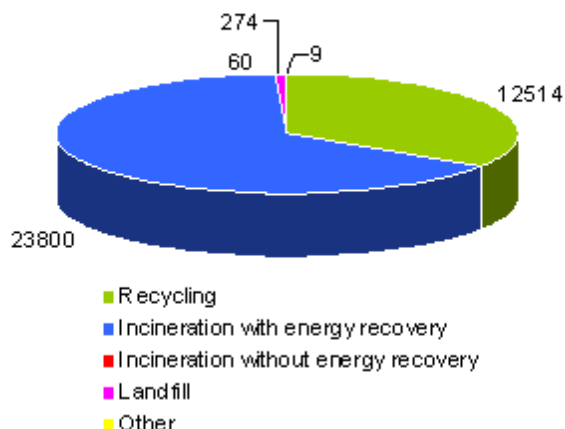


### Hazardous waste

The greater part of hazardous waste from Perstorp Coating Intermediates consists of methanol separated during production. At the unit in Perstorp, Sweden, the methanol obtained is used as a replacement for oil in a thermal incineration, i.e. the energy is recovered. The volume of hazardous waste increased during 2002, mainly due to increased volumes of methanol from the polyol production in Perstorp, Sweden. The volume of ethanol from Perstorp Pharma also increased during the year. The site in Toledo, USA, implemented internal process measures to reduce the methanol volumes by nearly 500 tons, compared to 2001.

Hazardous waste from Perstorp Coating Intermediates (tons/year) in 2002. Total of 7 579 tons.

Perstorp Coating Intermediates - Other waste 2002 (tons/year)



### Other waste (non-hazardous):

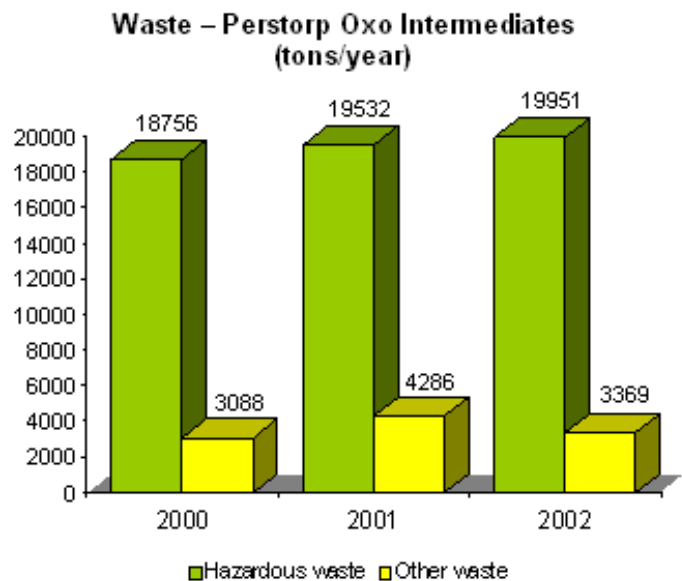
Other waste from Perstorp Coating Intermediates mainly consists of sodium formate solution for recycling, separated during production. The volume increased somewhat during the year. Other types of recycled waste are metal, glass, paper, plastic etc. Waste for incineration consists of active coal, some fluid polyol waste, mother lye etc. Waste for landfill consists of separated solid waste and sludge.

Other waste from Perstorp Coating Intermediates (tons/year) in 2002. Total of 36 657 tons.

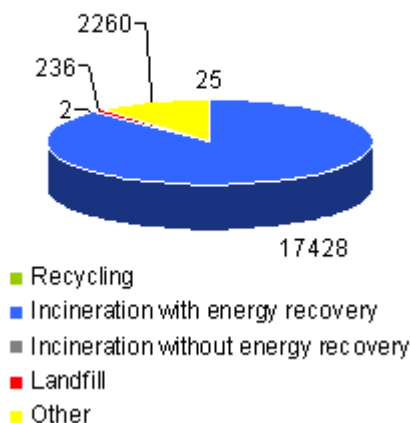
# ENVIRONMENT

## - Waste Perstorp Oxo Intermediates

*Total waste from Perstorp Oxo Intermediates (tons/year).*



### Perstorp Oxo Intermediates – Hazardous waste 2002 (tons/year)

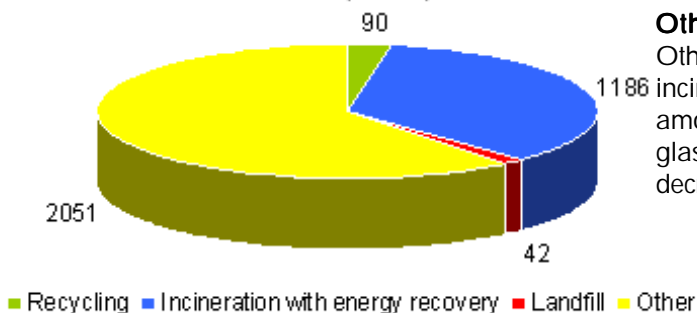


#### Hazardous waste:

Hazardous waste from Perstorp Oxo Intermediates consists of distillation residue, filter cake, waste oils, active coal, sludge, solvents etc. Most of the hazardous waste is distillation residue which mainly goes to energy recovery, replacing fossil fuel. During 2002, the amount of hazardous waste increased somewhat.

*Hazardous waste from Perstorp Oxo Intermediates (tons/year) in 2002. Total of 19 951 tons.*

### Perstorp Oxo Intermediates - Other waste 2002 (ton/år)



#### Other waste (non-hazardous):

Other waste consists of production residues for incineration or other treatment. There are also minor amounts of waste for recycling, such as paper, metals, glass etc. During 2002 the amount of other waste decreased slightly.

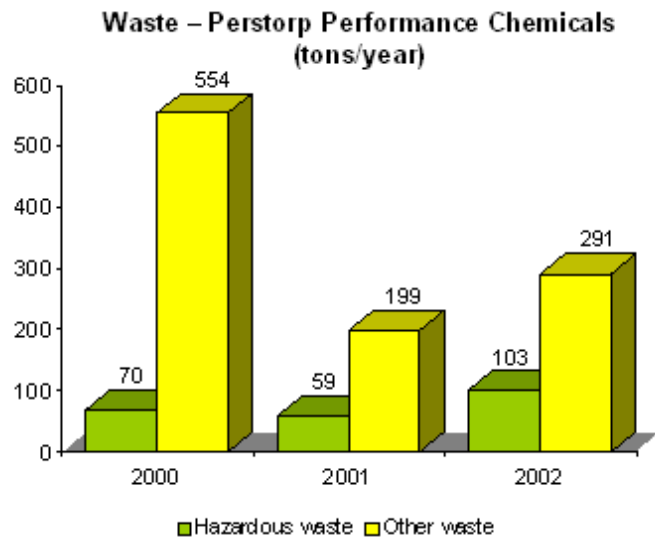
*Other waste from Perstorp Oxo Intermediates (tons/year) in 2002. Total of 3 369 tons.*

# ENVIRONMENT

## - Waste Perstorp Performance Chemicals

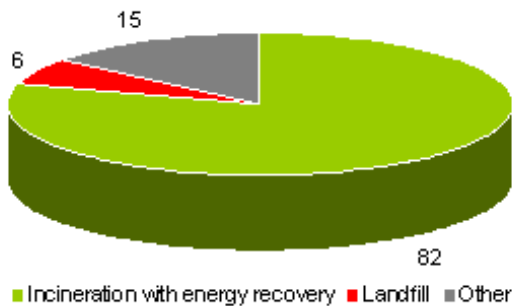


The operation at Perstorp Performance Chemicals causes only minor amounts of waste



Total waste from Perstorp Performance Chemicals (tons/year).

**Perstorp Performance Chemicals – Hazardous waste 2002 (tons/year)**

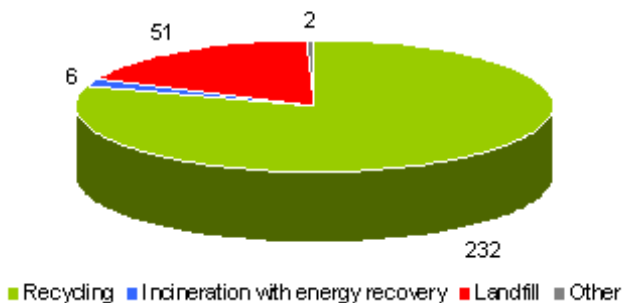


### Hazardous waste:

Hazardous waste within Perstorp Performance Chemicals consists mainly of wood oils, waste oils and solvents. During 2002, the amount of hazardous waste increased somewhat, due to increased volumes of wood oils.

Hazardous waste from Perstorp Performance Chemicals (tons/year) in 2002. Total of 103 tons.

**Perstorp Performance Chemicals – Other waste 2002 (tons/year)**



### Other waste (non-hazardous):

Other waste consists of recycled mother lye, metals, plastic, glass and paper. Waste for incineration consists of separated and combustible waste. Landfill waste is mainly separated solid waste. During 2002, the amount of other waste increased, due to increased volumes of mother lye and a slight increase in landfill waste.

Other waste from Perstorp Performance Chemicals (tons/year) in 2002. Total of 291 tons.

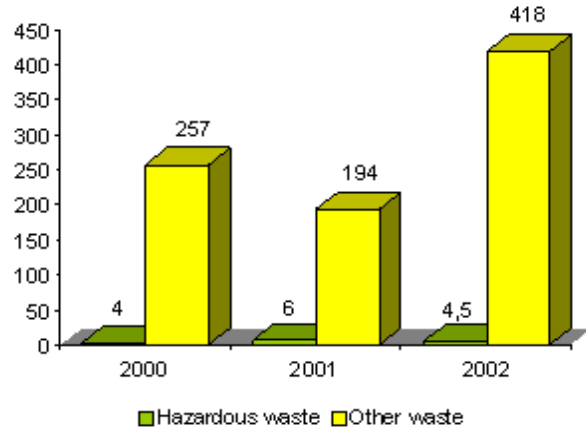
# ENVIRONMENT

## - Waste Perstorp Formox



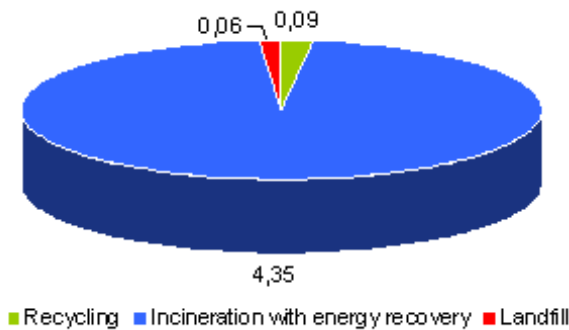
The Perstorp Formox operation is a source of only minor amounts of waste.

Waste - Perstorp Formox (tons/year)



Total waste from Perstorp Formox (tons/year).

Perstorp Formox - Hazardous Waste 2002 (tons/year)

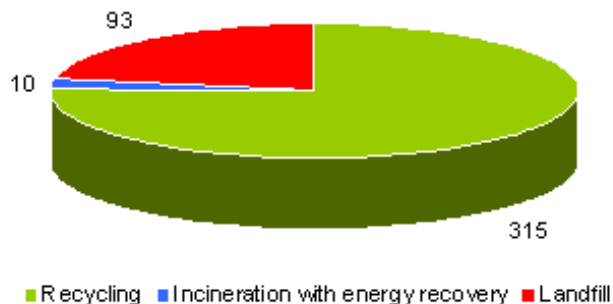


### Hazardous waste:

Hazardous waste from Perstorp Formox consists of small amounts of waste oils, formalin, heat transfer oils and laboratory waste.

Hazardous waste from Perstorp Formox (tons/year) in 2002. Total of 4.5 tons.

Perstorp Formox - Other Waste 2002 (tons/year)



### Other waste (non-hazardous):

Other waste consists of recycled waste such as filter cake/ferric oxide sludge containing molybdenum, metal, paper, plastic, glass etc. Separated and combustible waste goes to incineration and separated solid waste goes to landfill. During 2002, the amount of other waste increased, due to an increased amount of filter cake.

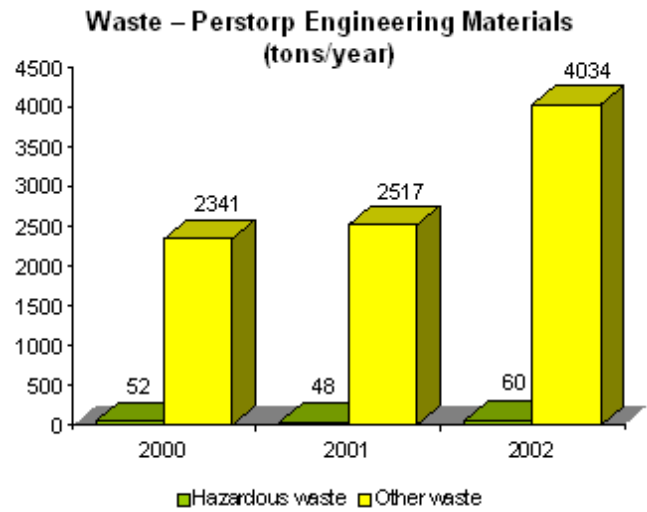
Other waste from Perstorp Formox (tons/year) in 2002. Total of 418 tons.

# MILJÖ

## - Waste Perstorp Engineering Materials

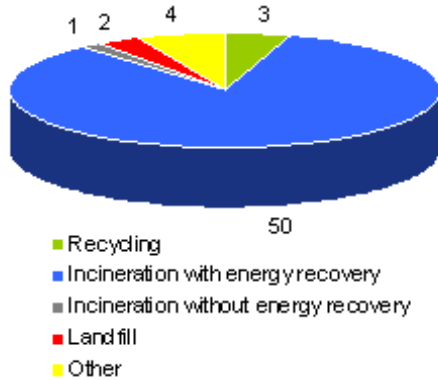


The unit in Florence, USA, has implemented a dust capture project reducing airborne dust and eliminating some materials handling.



Total waste from Perstorp Engineering Materials (tons/year).

**Perstorp Engineering Materials - Hazardous waste 2002 (tons/year)**

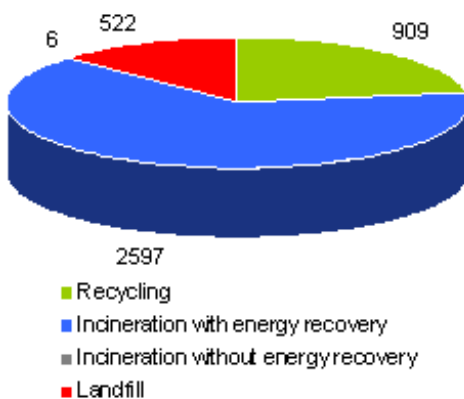


### Hazardous waste:

Hazardous waste within Perstorp Engineering Materials consists of resins, solvents, waste oils, laboratory waste etc. During 2002, the amount of hazardous waste increased somewhat.

Hazardous waste from Perstorp Engineering Materials (tons/year) in 2002. Total of 60 tons.

**Perstorp Engineering Materials - Other waste 2002 (tons/year)**



### Other waste (non-hazardous):

Other waste from Perstorp Engineering Materials consists of solid and combustible waste such as paper, plastic, metals etc. Landfill waste consists of dust and separated solid waste. During 2002, the amount of other waste increased.

Other waste from Perstorp Engineering Materials (tons/year) in 2002. Total of 4 034 tons.

# ENVIRONMENT

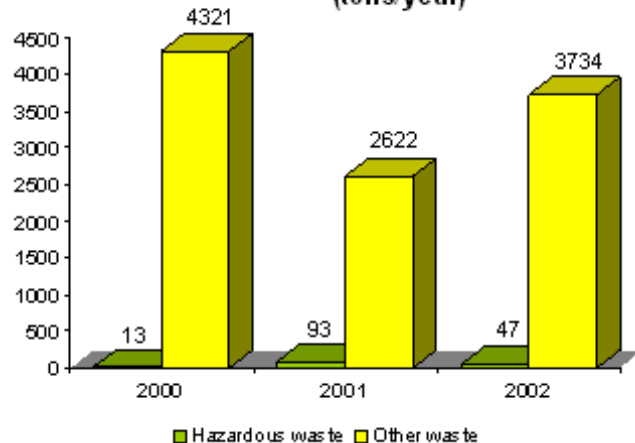
## - Waste Other plants

Other operations within the Perstorp Group are dominated by Perstorp Support AB, which is responsible for the operation of the steam power plant and the waste water treatment plant at the site in Perstorp, Sweden. Additional operations are run by Perstorp Fastighets AB, which is responsible for the real estate at the site in Perstorp, Sweden. The service company Skånsk Industripartner is also included in the report.



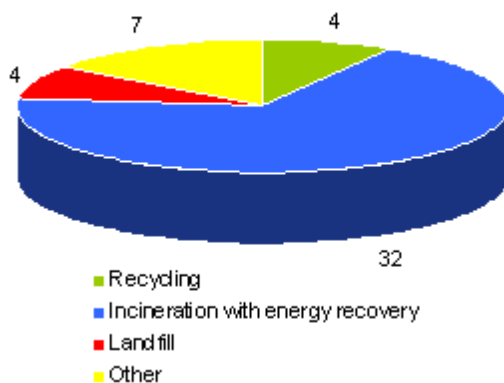
Bottom ash and flyash occur at the steam power plant in Perstorp, Sweden, operated by Perstorp Support AB. Most of the flyash is reused within the concrete industry.

Waste – Other plants (tons/year)



Total waste from other plants in the Perstorp Group (tons/year).

Other plants – Hazardous waste 2002 (tons/year)

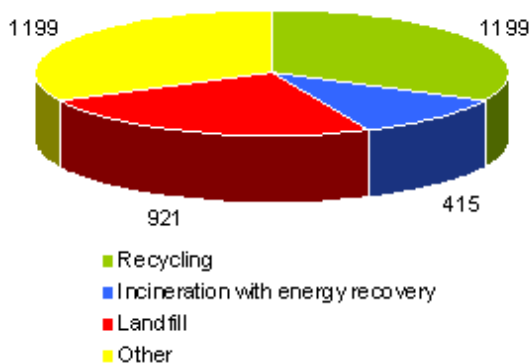


### Hazardous waste:

Hazardous waste from the other plants within the Perstorp Group mainly consists of waste oils, oil-contaminated materials, sludge, filters etc. The amount of hazardous waste decreased slightly during 2002.

Hazardous waste from other plants (tons/year) in 2002. Total of 47 tons.

Other plants – Other waste 2002 (tons/year)



### Other waste:

Other waste consists of recycled waste, mainly flyash and metals, but also of small amounts of paper, glass, plastic etc. Combustible waste such as sludge from Perstorp Support AB's wastewater treatment plant goes to incineration. Landfill waste consists mainly of bottom ash and fly ash from Perstorp Support ABs steam power plant and smaller amounts of sludge and separated solid waste. During 2002, the amount of other waste increased.

Other waste from the Perstorp Group's other plants (tons/year) in 2002. Total of 3 734 tons.

# ENVIRONMENT

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## - Resource management

A number of projects aimed at management of natural resources, e.g. raw materials, fresh water, packaging material and energy have been implemented in the Perstorp Group, mainly within the ongoing productivity program. Some examples are presented below.

The consumption of fresh water has been reduced at the unit in **Bruchhausen, Germany**, thanks to the greater use of condensate. The consumption of water has also decreased at the unit in Vapi, India, thanks to increasing recycling measures. Several plants at the site in Perstorp, Sweden, have made improvements that have resulted in reduced consumption of fresh water, and in some cases, e.g. the polyol plants, increased the recycling of product condensate. Perstorp Formox has reduced the consumption of fresh water by concentrating the supply of formaldehyde. The unit in Florence, USA, has eliminated the use of municipal fresh water.



*The TMP plant in Perstorp, Sweden, is implementing a project to reduce the consumption of fresh water.*

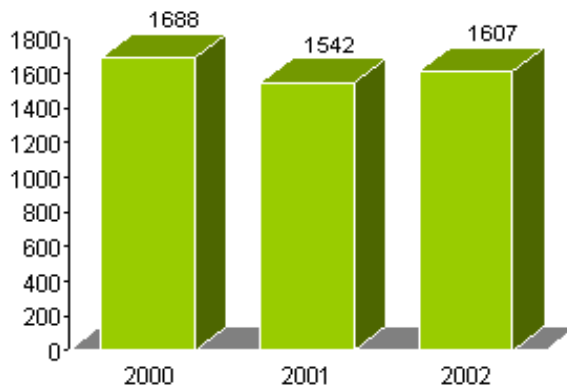
The **Perstorp Compounds** site in Perstorp, Sweden, has reduced the consumption of raw materials through re-use of material that has been scrapped due to processing errors. The formic acid plant in Perstorp has improved the exchange of sodium formate by enhanced internal control. Improved processing at the site in Vapi, India, has reduced the consumption of raw material. The units in Cikarang and Pontianak, Indonesia, have also taken measures to reduce the consumption of raw material.

The unit in Bruchhausen, Germany, has reduced the consumption of packaging material by reconditioning of big-bags and bulk transport supplies. Similar measures have also been taken in Indonesia and at some other Group units.

# ENVIRONMENT

## - Energy

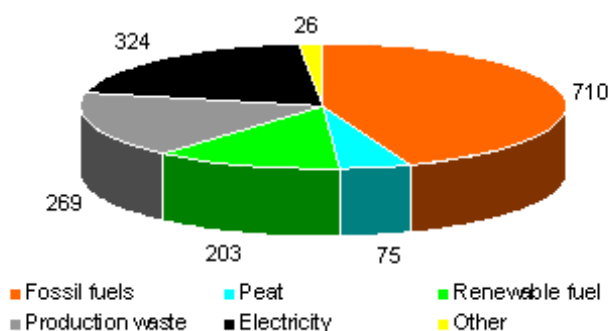
Energy use in the Perstorp Group (GWh)



During 2002, the consumption of energy increased within the Perstorp Group compared to 2001, mainly due to increased production.

*Energy consumption in the Perstorp Group during 2000-2002 (GWh).*

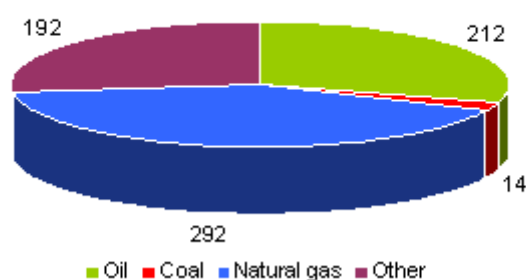
Energy use in the Perstorp Group 2002 - total 1607 GWh



Many different projects to save energy and to improve efficiency are underway within the Perstorp Group, principally within the corporate productivity program. For example the unit in Vapi, India, has an ongoing project for the purpose of saving electrical energy. The unit in Castellanza, Italy, is conducting a project to reduce steam consumption. The polyol plants in Perstorp, Sweden, have several energy-saving projects in progress, as does the unit in Florence, USA.

*Distribution of energy consumption within the Perstorp Group in 2002 (GWh).*

Use of fossil fuel (GWh) in the Perstorp Group 2002 - total 710 GWh



The use of fossil fuels in the Perstorp Group amounted to 710 GWh during 2002, divided into natural gas, oils, methane/propane and coal.

*Use of fossil fuels (GWh) in the Perstorp Group in 2002.*

# ENVIRONMENT

## - Energy

### Natural gas project at the unit in Stenungsund, Sweden

Perstorp Oxo AB intends to replace 60 000 tons of oil (EO 5) annually by natural gas as raw material in their synthesis gas production.

This change of raw materials entails several improvements for the external environment:

- The oil is supplied with bulkships and the natural gas by pipeline. Hence about 30 ship calls per year will be avoided in a sensitive coastal region (Bohus).

- The natural gas contains neither sulfur nor nitrogen, and only small amounts of heavy metals. This will result in reduced emissions of sulfur dioxide to the air and of nitrogen to the water, as well as in improved disposal alternatives of the sludge from the company's wastewater treatment plant, thanks to the near elimination of metal contents.



*Extensive construction work is in progress at the unit in Stenungsund, Sweden, to replace heating oil with natural gas.*

### Presentation of the steam power plant / Perstorp Support AB at the site in Perstorp, Sweden



*The steam power plant of Perstorp Support AB is located in the Perstorp Industrial Park, at the largest unit of the Group. The switch from coal to biofuel (mainly wood chips) took place in 1991. The main fuels are wood chips, returned wood and peat.*

The steam power plant in the Perstorp Industrial Park is an energy-producing unit that supplies steam to the companies in the industrial park as well as district heating to the community of Perstorp. Electrical power is produced in a steam turbine. The steam power plant has a total of five steam boilers (boilers 3, 4, 5, 6 and 7).

The boiler 3 is a water tube boiler manufactured by Svenska Maskinverken AB in 1963. Boiler 3 is an oil-fired auxiliary boiler, but can also be fired with methanol which contains up to 30-40% water. Boilers 4 and 5 are both Eckrohr boilers manufactured by Generator AB in 1970 and 1974. Both are oil-fired and used as auxiliary and peak-load boilers. Boiler 7 is an oil-fired tube boiler manufactured in 1965 and used as an auxiliary boiler.

Boiler 6 is an eckrohr boiler of CFB type, circulating fluidized bed, manufactured by Generator AB in 1991. Boiler 6 is the main boiler and fed with chips, returned wood, peat and production waste. The nominal power is 50 MW.

# ENVIRONMENT

## - Energy

### Purification systems



Boiler 6 is equipped with a NO<sub>x</sub> reduction system via injection of ammonia. A partial flow of flue gases is recycled and heated where ammonia is injected before re-entering the boiler. Spray nozzles inject ammonia which converts the nitrogen oxides into elementary nitrogen (N<sub>2</sub>). The amount of ammonia is controlled through the total amount in the flue gases. The amount injected is also varied due to differences of nitrogenous production waste. This is converted into ammonia in the burning process which lowers the amount injected.

Boiler 6 is also equipped with a sulphur reduction system. Limestone is mixed with incoming fuel just before it enters the boiler. The calcium carbonate (Ca CO<sub>3</sub>) reacts with sulphur oxides in the flue gas and creates gypsum (Ca SO<sub>4</sub>), which is removed together with the ashes.

*Biofuel boiler 6 in the steam power plant is equipped with advanced technology to reduce sulphur and nitrogen oxides.*

After boiler 6 there is a flue gas filter. The filter is divided into a multiclone section and a filter section. The flue gas is separated into two parts in the multiclone section. Each part passes 144 small cyclones. In the filter section the flue gas passes 280 filter tubes in four chambers. The design of the filter allows a 90% load of the boiler with one chamber out of order. A meter monitoring the flue gas density after the filter chambers indicates the condition of the filter.

In the flue gas channel after the filter, there is an instrument for continuous measuring of carbon monoxide, carbon dioxide, water, ammonia, nitrogen oxide, nitrogen dioxide, sulphur dioxide, hydrogen chloride and hydrogen fluoride.



# ENVIRONMENT

## - Soil

### Ground usage

A large number of the plants of the Perstorp Group are located in industrial areas where ground usage is optimized by having several factories in one place so that important and essential equipment can be shared. The largest unit of the Group is a good example, located in the Perstorp Industrial Park in Perstorp, Sweden. The production of chemicals started in 1881. About twenty factories get a share of the steam power plant (biofuel-based energy), wastewater treatment plant, fresh water plant and other essential functions. Several factories that use formalin are also located near their source of raw material, as formalin is produced in five plants in the industrial park.

The Perstorp Industrial park covers about 1,200,000 square meters of fenced territory, which in turn lies within an area of Perstorp-owned land amounting to a total of 2,710,000 square meters. This constitutes

a relatively large "buffer zone" to the nearest residential areas in all directions except north. The land area also provides great potential for long-term expansion in the long run. The industrial park is mostly surrounded by woodland; the beech wood represents a great nature treasure. The Perstorp Group also controls a number of lakes east of the industrial park, most of which are rich in bird life. The abundance of wetlands, reservoirs and small lakes enhances the natural value of the surroundings. Water from the lakes flows through the Perstorp Industrial Park via the Ybbarp River.



*Industry and nature in harmony in the Perstorp Industrial Park in Perstorp, Sweden.  
Photo: Bertil Hagberg*



*The Perstorp Industrial Park is surrounded by beech woods and lakes.*



Considerable efforts have been made to harmonize industrial operations with the surrounding nature. There are green open spaces of varied sizes between the buildings and in some parts the vegetation is like a park. There is a great variety of species of flora as well as of fauna, primarily birds, but also small animals.

*Parts of the industrial park in Perstorp, Sweden, consists of park like green spaces.*

# ENVIRONMENT

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## - Soil

### Land/groundwater contamination

During 2002, an area of land/groundwater contamination was discovered at the neopentylglycol plant at the site in Perstorp, Sweden. Because of leakage in joints and collecting chutes, neopentylglycol had leached into the soil and caused local contamination of groundwater. The environmental authorities were informed and clean-up measures were taken. Regular follow-up reports are sent to the authorities.



The unit in Vapi, India, has implemented thorough clean-up measures regarding contaminated soil. The clean-up covered about 2 000 cubic meters soil and was related to contamination from operations prior to Perstorp's ownership. Control measurements are followed up regularly.

*Contaminated soil was cleaned up in 2002 at the Vapi site, India..*

Gent, Belgium (Vyncolit N.V.) is planning to implement a project to clean up soil that had been contaminated with phenol prior to Perstorp's ownership. The project will be carried out in cooperation with the former owners.

A mapping survey regarding environment, health and safety is always made in connection with acquisitions. One of the most important issues in this survey is the occurrence of any contaminated soil.

The Perstorp Group is involved in discussions regarding contamination of soil at two properties in Bankeryd, Sweden, formerly owned by the company.

# ENVIRONMENT

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## - Soil



### Species diversity in Perstorp Industrial Park

Since 1984, Leif Sigbo has been mapping the flora within the Perstorp Industrial Park, and found no fewer than 486 different species of plants.

The company was originally built (back in the late 1800s) in an area of scenic beauty, surrounded by beech woods and groves. New factories added over the years have been widely scattered, with the exception of the area around the steam power plant. There are still lots of green areas between the buildings. The parks and trees along the Ybbarp River and the woods are valuable "breathing holes" today.

The Perstorp Industrial Park is also home to an interesting animal population. Mooses and roe deer are spotted regularly and one winter the footprints of a lynx were found. There are also small animals such as hares and martens.

Leif Sigbo divided the flora into three groups:

- Naturally occurring plants
- Cultivated plants (some of which have spread on their own)
- Plants unintentionally spread by transports along roadsides, railways and loading areas

For further information, contact Leif Sigbo by e-mail [leif.sigbo@formica-europe.com](mailto:leif.sigbo@formica-europe.com).

# ENVIRONMENT

## - Environmental accidents

### Environmental accidents and fires

During 2002, the number of reported accidents relating to environment and safety in the Perstorp Group decreased compared to 2001.

During the year, 17 minor emissions to the atmosphere occurred, which is somewhat less than 2001. The emissions in some cases caused odors in the immediate surroundings. As an example, a small emission from the Perstorp Specialty Chemicals AB creosan plant at the site in Perstorp caused odoriferous disturbance in the community of Perstorp. Creosan has an odour similar to tar and can be smelled at a very low content in the air.

13 cases of accidental spillage to waterways/wastewater treatment plant were reported during the year, which is somewhat less than in 2001. In Stenungsund, Sweden, one occasion resulted in death of a small amount of fish in November 2002. Water with a low pH value from a scrubber in the sulphur treatment plant was accidentally emitted into the recipient water, killing 30-40 trout fingerlings.

About 8 cases of accidental spillage to the ground were reported during the year, which is less than in 2001. Spillage took place e.g. at Perstorp Support AB/waste water treatment plant and at Perstorp Pharma at the site in Perstorp, Sweden. About 20 cases of spillage inside dikes/bounded areas occurred during the year. The number of fires decreased considerably compared to 2001 and the ones that did



*Fire station at the site in Perstorp, Sweden.*

### Risk assessments/analyses and preventing measures

The units in the Perstorp Group work regularly with safety surveys and risk analyses to identify remaining risks for the environment, health and safety. Extensive safety surveys were conducted in connection with the safety reports which were issued for several of the plants in the Group in 2000, in accordance with the so-called Seveso II-Directive. When there are changes in the operation, new risk analyses are always carried out.



*The formic acid plant in Perstorp, Sweden, implemented several improvements during 2002.*

The risk analyses result in new recommendations for preventive measures which are gradually implemented. A number of preventive measures were carried out during 2002.

The site in Vapi, India, increased and upgraded its fire protection. The Di-Trimethylolpropane-plant in Perstorp, Sweden, rebuilt the insulation around the melting duct of the factory to prevent autoignition. The pentaerythritol plant in Perstorp, Sweden, implemented several safety measures for the acetaldehyde tank and pipe. Perstorp Pharma in Perstorp, Sweden, improved the unloading station for epichlorhydrin. The site in Toledo, USA, upgraded the fire-extinguishing sprinkler systems and installed curbing around the unloading areas. The site in Castellanza, Italy, cooperates with the fire brigade regarding preventing measures at the bis-MPA-plant.

Oxo Intermediates in Gent, Belgium, implemented preventive measures to enable instant stopping of waterborne emissions. Furthermore, a loading station was relocated to improve safety.

# ENVIRONMENT

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## - Environmental accidents

The formic acid plant in Perstorp, Sweden, made improvements in the formic acid tanks, as well as collision prevention equipment in the plant's pipeline roadways. The production tank dikes were also totally renewed. The creosan plant in Perstorp, Sweden, supplemented the alarm functions as well as preventive measures to diminish the risk of violent reactions of formic acid and caustic soda in case of a loss of media.

The wastewater treatment plant in Perstorp, Sweden, doubled the incoming piping for process wastewater to improve control and flexibility during repair and maintenance.



*The wastewater treatment plant in Perstorp, Sweden, implemented several improvements and preventive measures during 2002.*

# ENVIRONMENT

## - Seveso plants

The law aimed at the prevention of major accident hazards involving hazardous chemicals and the limitation of their consequences (based on Seveso II Directive) came into force in Sweden in 1999. This obligation applies to several of the plants of the Perstorp Group, in the town of Perstorp as well as in Stenungsund, Sweden. The Seveso II Directive has been adopted by the Council of the European Union and corresponding demands apply to some other units of the Perstorp Group outside Sweden, e.g. the units in Bruchhausen in Germany, Gent in Belgium and Castellanza in Italy.



*Several plants at the unit in Perstorp, Sweden, are upper-tier plants covered by the Seveso II Directive aimed at the prevention of major accident hazards involving hazardous chemicals and the limitation of their consequences, and are thus obliged to issue a safety report to the authorities and inform the public about the safety measures.*

A major safety information campaign was conducted in recent years to meet legal demands and new legislation regarding the control of major accident hazards involving hazardous chemicals. The demands require safety reports to be submitted to the authorities, and this has been done.

A **safety information brochure** was sent to each household in the village of Perstorp and is available on the Internet. Press conferences were held, resulting in articles in the local press. In direct connection with the publication of the safety information brochure, the Perstorp Unit held an open house (Kemins Dag, Chemistry Day), during which a number of experts were available for questions. The safety information was also on display as an exhibit.

The same information campaign, though less extensive, was conducted in the **village of Höganäs** in cooperation with the Höganäs Rescue Service. Perstorp Formox AB owns a facility in Höganäs harbour for unloading, storage and loading of methanol.



# ENVIRONMENT

## - Seveso plants

The same information campaign was also conducted by **Perstorp Oxo in Stenungsund, Sweden**, in cooperation with other petrochemical industries and the Stenungsund Rescue Service. The safety information brochure was sent to each household in the villaga of Stenungsund as well as to the neighbouring regions, such as Östra Tjörn.



The plant of **Perstorp Chemicals GmbH in Bruchhausen, Germany**, is an upper-tier plant covered by the Seveso II Directive and accordingly, a safety information brochure was sent to households in the neighbourhood. Likewise, a safety report was sent to the authorities.

A safety information brochure was prepared and published by the Belgian "Ministry of Internal Affairs" and was a part of an information campaign. **Perstorp Oxo Belgium AB in Gent, Belgium**, participated in the information campaign. The safety information brochure was sent to the households in the region. The information was also communicated via television and through a joint public event where representatives of all the communities which own Seveso-plants took part. Experts were also available for questions.



# ENVIRONMENT

## - Transports

### Purchase of transports

A potential transport supplier gets a questionnaire from Perstorp covering issues about environment, health and safety (EHS) aspects. The answers of the shipping agent are thoroughly evaluated and graded. When necessary, demands for improvements in regard to environment, health and safety are communicated to the shipping agent. An important document when purchasing transports is the purchase specification where the Perstorp's demands are presented. Perstorp has a transport council, which includes the transport purchasing manager, to develop purchasing activities and evaluate transport companies in terms of EHS.



*Several raw materials are shipped in railway tank cars to Perstorp, Sweden.*

### Improvements during 2002 regarding transports



*Unloading of methanol at the site in Perstorp, Sweden.*

The formalin plants in Perstorp, Sweden, have reduced the internal traffic of methanol tank trucks within the industrial park thanks to new routines.

(I Perstorp har formalinfabrikerna under 2002 minskat interntrafiken av metanolbilar inom fabriksområdet, genom ändrade rutiner.)

When entering a new supply agreement for biofuel for the steam power plant in Perstorp, Sweden, a number of environmental demands are placed on the transport supplier regarding fuel.

The unit in Stenungsund, Sweden, has changed the supply of propionic acid on tank trucks for export to Finland and continental Europe to transport by ship to terminals where the further transport is by rail och tank truck. Increased export volumes enable this sea transport.

Oxo Intermediates in Gent, Belgium, has optimized bulk supplies from factory to the customers, instead of shipment to intermediate storage.

The unit in Toledo, USA, reviewed its transport routes for hazardous materials to evaluate population centers that could be impacted by an incident in transit. The results of the review are used in the emergency response measures of the contingency plans.

To improve safety, the unit in Vapi, India, replaced some internal transportats of hazardous materials with pipelines.

### Transports survey 2002

During 2002, the formaldehyde plants in Perstorp, Sweden, made a survey of transports (tons/kilometers), use of energy, emissions to the atmosphere and risks for accidents related to ship och tank truck transport of methanol.



*Storage of methanol in the Höganäs harbour.*

# ENVIRONMENT

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## - Product stewardship

### Product Stewardship

Product Stewardship is a concept within the Responsible Care program that covers all the knowledge the company should have about the environment, health and safety aspects with which the company's products can be associated. Product Stewardship also means that the customers should be supplied with advice and instructions regarding safe transport, storage and use of the products as well as - if applicable - dealing with the products and their packaging after consumption.



### Product safety

In order to carry out risk assessments, knowledge is required about the products' inherent properties, i.e. what health effects they have or what environmental effects they can cause. However, the risk is also dependent on how the user is exposed to a chemical product. When the risk has been evaluated, it is then possible to specify how the product should ideally be handled in order to minimize the risk as far as possible.

In order to ascertain the properties of products, searches are initially carried out in the literature, in databases and other sources. If details are missing, information is produced by conducting studies according to the "OECD Guidelines for Testing of Chemicals".

### EU's program for existing substances

In parallel with other industries in Europe, Perstorp has participated in the work of developing risk assessments for high-volume chemicals. The risk assessment of diethylhexyl phthalate (DEHP), for example, continued during 2002 and is expected to be completed in 2003.

### Preparations for REACH - future legislation in the field of chemicals

During 2002 the company tried to prepare itself for the ways in which the forthcoming chemical legislation within the EU may affect operations. Basic information was collected during the year.

### Application for approval from the FDA for contact with food

During 2002 the company continued to work on getting BEPD (butyl ethyl propane diol) approved for contact with food by the FDA (Food and Drug Administration) in the USA. The process has been delayed, but a ruling by the authority is anticipated in 2003.

### Collaboration with trade organizations

It is essential for Perstorp to monitor what is happening at both national and international levels in the field of chemical product safety. On the national level, Perstorp is participating in the work of the Association of Swedish Chemical Industries (new name from 2003: Swedish Plastics & Chemicals Federation). On the international level, the company is taking part in various sector groups with the chemical industry's trade organization CEFIC as well as in other collaborative organizations within the industry.

# ENVIRONMENT

## - Site presentations: Perstorp, Sweden



### Perstorp Industrial Park

Perstorp Industrial Park is one of southern Sweden's largest industrial workplaces, employing almost 2,000 people.

The Perstorp Group has its head office in the industrial park and shares the 1,200,000 m<sup>2</sup> site with a number of other production companies, including Celanese Emulsions Norden AB, Metfoils AB, PA Resins AB, Pergo Declam AB, Peran AB and Polyclad Europe AB. There are also a number of service companies based here.



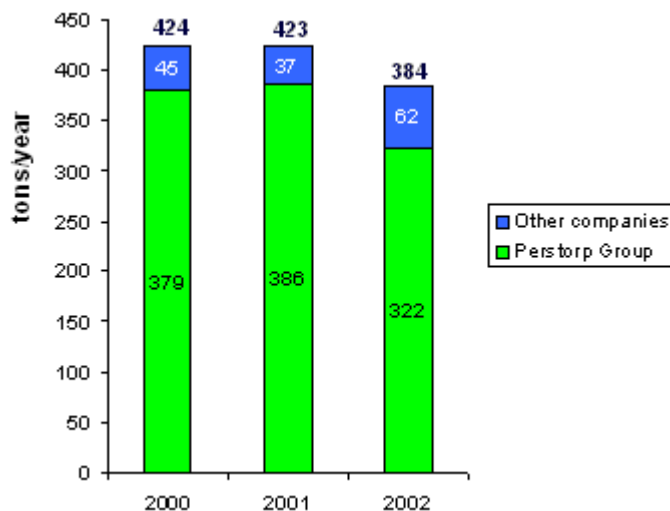
Photo: Bertil Hagberg

### Environment Year 2002

Environment Year 2002 within Perstorp Industrial Park was characterized by continued improvement work.

Emissions into the atmosphere fell during 2002, thanks to lower emissions, e.g. of nitrous oxides from the steam power station. This reduction is thanks in part to an optimized fuel mix and more regular operation. Among the factories in the industrial park, improvements were made in certain incineration and scrubber facilities. There were also improvements in dust cleaning.

The industrial park's wastewater treatment plant functioned well during 2002. Outgoing water satisfied applicable discharge conditions by a clear margin during the year. A number of improvements were introduced, e.g. with regard to instrumentation, aeration systems and safety measures. Of the factories within the industrial park, the majority are attempting to reduce pollution and above all the hydraulic load on the wastewater treatment plant. By increasing the dry content in the processes or by reusing certain process solutions, it is possible to reduce the consumption of clean water. The factories are also heavily involved in resource management as regards energy and raw materials.



Emissions to the air from Perstorp Industrial Park.

Waste volumes increased during 2002 due to increased production in some factories.

During the year, the initiative concerning the management system for environment, health and safety continued at the factories within Perstorp Industrial Park, resulting in the majority now having been awarded ISO 14001 certification.

# ENVIRONMENT

## - Site presentations: Perstorp, Sweden



Emissions into the atmosphere within Perstorp Industrial Park are primarily cleaned through catalytic combustion. There are a total of 15 catalytic combustion units within the industrial park.

### Emissions into the atmosphere

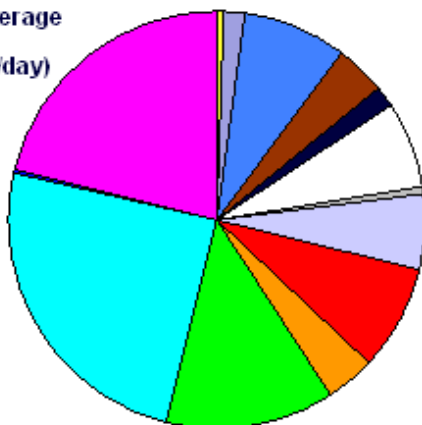
The degree of cleaning is very high, normally around 99%. Other common cleaning techniques are thermal incineration and absorption in wet scrubber systems.

During 2002 emissions to the air from Perstorp Industrial Park fell to 384 tons from 423 tons (2001). The Perstorp Group's proportion fell to 322 tons from 386 tons (2001). This reduction is primarily thanks to reduced emissions of nitrous oxides and carbon monoxide from the steam power station, which in turn is thanks to an optimized fuel mix and more regular operations.

*Part of the catalytic combustion facility is connected to Pergo Declam AB and Polyclad Europe AB. The facility is operated by Perstorp Support AB.*

### Yearly average

TOC (kg/day)



**Incoming: 2310 kg TOC/day**

*Discharges to the wastewater treatment plant from Perstorp Industrial Park.*

### Discharges to water

Waterborne discharges from factories within Perstorp Industrial Park are treated in the company's own wastewater treatment plant, which belongs to Perstorp Support AB. Treatment is biological via the activated sludge method. At the wastewater treatment plant there are two equalization tanks, two lines with aeration and sedimentation tanks, and one flotation facility. The reduction of impurities is normally above 90%.

Outgoing water from the wastewater treatment plant to the Ybbarp River (180 kg TOC/day) satisfied the applicable discharge conditions by a clear margin in 2002 (330 kg TOC/day) as regards total organic carbon. As from 2003, the discharge condition is being tightened up to 300 kg TOC/day.

Phosphorus discharges from Perstorp Industrial Park to the Ybbarp River have increased to 0.23 tons in 2002 (2001: 0.17 tons). Corresponding nitrogen discharges have increased to 7.8 tons in 2002 (2001: 6.0 tons). Minor variations in these discharges are recorded from year to year.

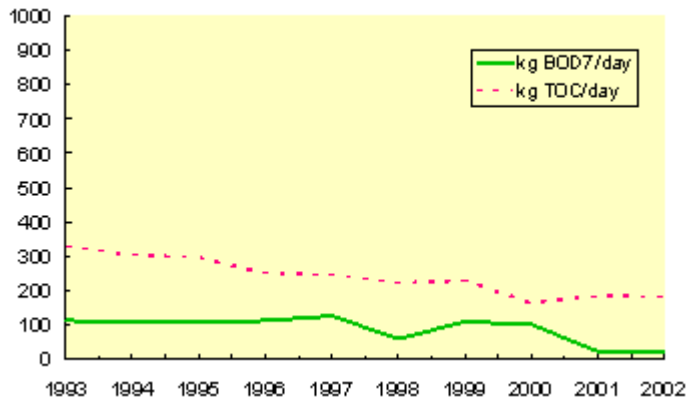
A number of improvements were made in the wastewater treatment plant during 2002, including improved instrumentation, standby lines for incoming water, a new aeration system in one of the aeration tanks and two additional surface purge valves.



*Wastewater treatment plant in Perstorp, Sweden*

# ENVIRONMENT

## - Site presentations: Perstorp, Sweden



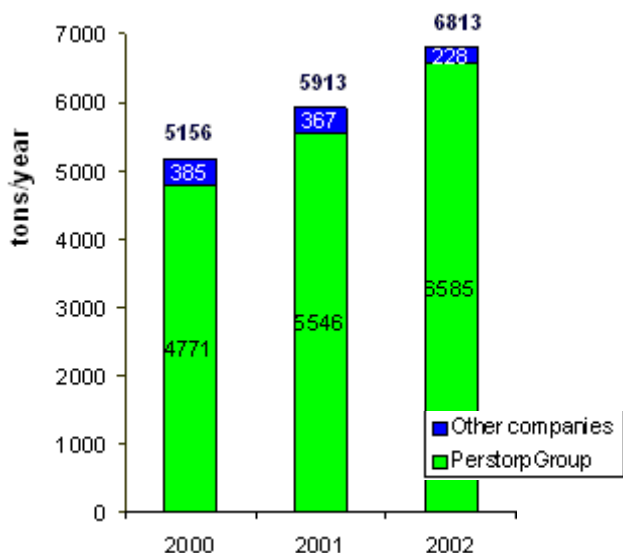
Discharges from Perstorp Support AB's wastewater treatment plant

### Safety reservoir

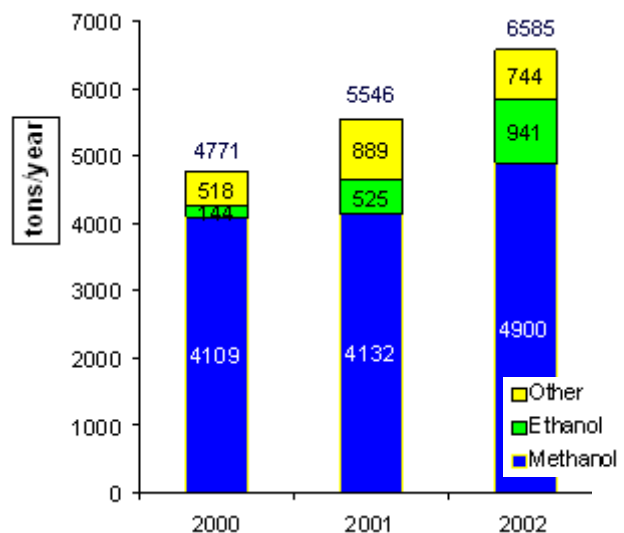
In 1989 Perstorp AB built a safety reservoir in the Ybbarp River. The purpose of the reservoir is to prevent pollution of the water downstream from the factories in the event of a major fire or a discharge caused by a breakdown. Analysis instruments continually measure the level of organic substances and the pH in the river. In the event of deviations from the normal values, a sluice gate is automatically closed and polluted water is collected for further treatment. At the same time an alarm is issued to the guard and to relevant personnel.

### Hazardous waste

The proportion of hazardous waste from Perstorp Industrial Park increased during 2002 to 6,813 tons, of which 6,585 derives from the Perstorp Group. The reason for this is increases of primarily methanol and ethanol. The majority of the hazardous waste is made up of methanol, which arises during production in the polyol plants and which is related to production volumes. Methanol is combusted internally (energy recycling) in the industrial park's steam power station and in the formic acid factory, as a replacement for oil.



Hazardous waste (tons/year) from Perstorp Industrial Park.



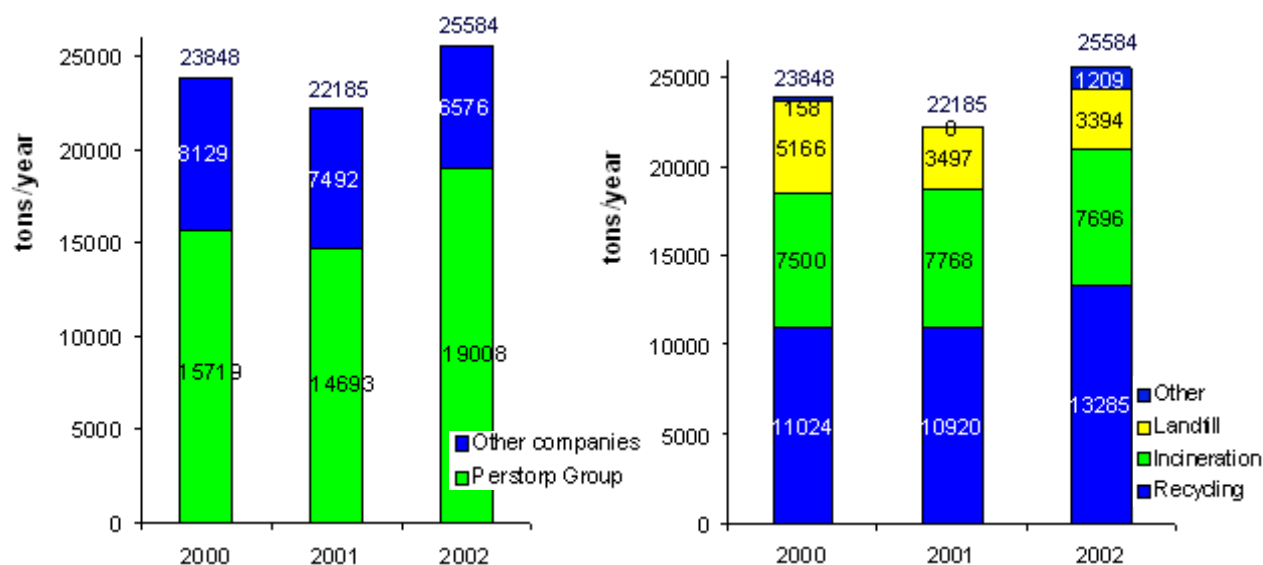
Hazardous waste (tons/year) from Perstorp Industrial Park.

# ENVIRONMENT

## - Site presentations: Perstorp, Sweden

### Other waste

The volume of other waste from Perstorp Industrial Park increased slightly during 2002. Increases have been reported primarily for waste for recycling and decreases for waste for incineration and landfill. Flammable solid waste, activated carbon, sludge from the wastewater treatment plant, laminate, briquettes, some liquid waste and other flammable waste are all sent for incineration. Ash from the steam power station, filter cake and certain waste that has been sorted within the framework of the source separation program is sent for landfill. Mother liquor from polyol production and flyash from the steam power plant are also recycled, in addition to paper, plastic, glass and metal.



*Other waste - non-hazardous (tons/year) from Perstorp Industrial Park.*

*Other waste - non-hazardous (tons/year) from Perstorp Industrial Park.*

### Coolants

The total installed volume of HCFC coolants (partially halogenated chlorofluorocarbons, e.g. Freon) within Perstorp Industrial Park in 2002 was 188 kg. Of this volume, 45 kg is within Perstorp Group companies. There was no leakage to the atmosphere during the year.

1,348 kg of HFC are installed. The majority of this is within Perstorp Group companies (1,025 kg). During the year around 104 kg leaked out to the atmosphere. HFC is not considered harmful to the ozone layer.

The Perstorp unit phased out CFC (fully halogenated chlorofluorocarbons) several years ago. CFC is the type of coolant that causes most damage to the ozone layer. HCFC is currently being phased out and replaced by HFC or other coolants.

### Noise

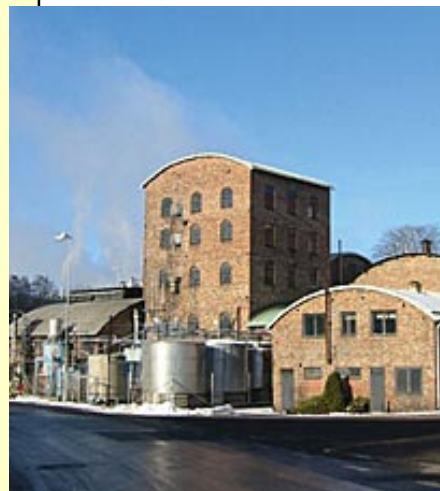
A comprehensive survey of noise has been carried out within Perstorp Industrial Park in recent years, with the aid of external experts. The survey showed that measures were required in several factories in order to satisfy applicable noise guidelines by a good margin. The factory units have subsequently developed action plans and implemented noise dampening measures for those noise sources that have produced most disruption to the surrounding area. A follow-up was conducted in 2001, which showed that the measures had produced good results. In the latter part of 2002, the noise levels were further reduced.

# ENVIRONMENT

## - Site presentations: Perstorp, Sweden

### Environment history

1960 Environment work commences  
1965 Water department  
1970 Wastewater treatment plant  
1970 Wet scrubber technology  
1975 Thermal incineration  
1985 Catalytic combustion  
1985 Environmental policy  
1988 Safety reservoir; Environmental reports  
1989 Environmental audits  
1991 Biofuel boiler; Source separation  
1994 Environmental Report  
1994 Management system for Environment, Health & Safety  
1995 Lifecycle analyses  
1996 ISO 14001 certificate and EMAS registration for one plant  
1997 Own certified environmental auditor  
1998 More factories ISO 14001- certified; Noise survey  
1999 Certified environmental goods declaration  
2000 Safety reports; Safety brochure to the general public  
2001 New equalization tank  
2002 Perstorp Industrial Park established



### Contacts with the environmental authorities

During the year consultation meetings were held with Skåne County Administrative Board and other relevant parties regarding extended production of neopentyl glycol, and an application was submitted to the Environmental Court in Växjö. Principal negotiations have been held with the Environmental Court regarding extended production of formalin and pentaerythritol, and new license judgments have been received for these two matters. A license judgment was also received in 2002 from the Environmental Court in Växjö regarding the expansion of the formic acid factory. It is anticipated that additional applications for increased production will be submitted during 2003 from some of the companies within Perstorp Industrial Park.

Each plant submitted its own annual environmental report during 2002, and the reports have been approved by the supervisory authority.

### Environmental accidents

Some 30 minor environmental accidents and fires occurred within Perstorp Industrial Park in 2002. Some of the environmental accidents during the year were emissions into the atmosphere and discharges into the Ybbarp River and the ground caused by breakdowns. Other incidents included discharges resulting from breakdowns into the industrial park's wastewater treatment plant or within reservoir embankments. Added to this were a number of minor fires and transport accidents. The accidents were of a less serious nature. A decontamination project is in progress at the neopentyl glycol factory in Perstorp, where the ground and groundwater were contaminated by finished product.

### Emergency preparedness

The rescue services moved to a new fire station adjacent to Perstorp Industrial Park in Perstorp a couple of years ago. The rescue services are an important resource for the day-to-day safety work, and work in close collaboration with the companies in Perstorp Industrial Park. Within the industrial park there are also various in-house emergency and call-out resources.

# ENVIRONMENT

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## - Site presentations: Perstorp, Sweden

### Information about risks and safety

The law on preventing and limiting serious chemical accidents (based on the Seveso II directive) came into force in 1999. These requirements affect several factories within Perstorp Industrial Park, which has meant that detailed safety reports were submitted to the authorities in 2000. As the law also entails requirements for information to the general public, a safety brochure was distributed to all residents of the Perstorp Municipality in 2000. The brochure has also been published on the Internet. Inspections by the supervisory authority commenced in 2002 regarding the plants' work on preventing serious chemical accidents.



### **Do you have any questions about Perstorp Industrial Park and the environment?**

Perstorp Support AB  
Environment, Health & Safety  
Margareta Midenstam, Environmental Controller  
Phone: +46 435-382 92  
Fax: +46 435-380 10  
[margareta.midenstam@perstorp.com](mailto:margareta.midenstam@perstorp.com)

### **Has an accident occurred?**

Call the Hotline!  
Phone: +46 435 383 00



Environment Year 2002 at the Perstorp unit is available as pdf at [www.perstorp.com](http://www.perstorp.com)

# ENVIRONMENT

## - Site presentations: Perstorp Oxo, Stenungsund and Nol



Presentation of Perstorp Oxo, Stenungsund and Nol, Sweden  
Perstorp Oxo Intermediates operates two production plants in Sweden.

In **Stenungsund** the plant manufactures aldehydes, alcohols, organic acids and plasticizers for vinyl plastic. The plant was commissioned in 1980 and has around 220 employees. The industrial area covers around 300,000 m<sup>2</sup>. The nearest planned residential area, Ödsmåls old station community, is about 500 meters northwest of the fenced factory area. There are also some spread-out developments to the east and west, around 500 meters from the plant.

*The unit in Stenungsund, Sweden.*

In **Nol**, the plant manufactures phthalic acid anhydride, which is used for example as a raw material in the production of plasticizers. The plant was commissioned in 1967 and has around 40 employees. The industrial area covers around 25,000 m<sup>2</sup> and to the east of the plant there is a development at a distance of just over 100 meters from the industrial area fence.



*The unit in Nol, Sweden.*

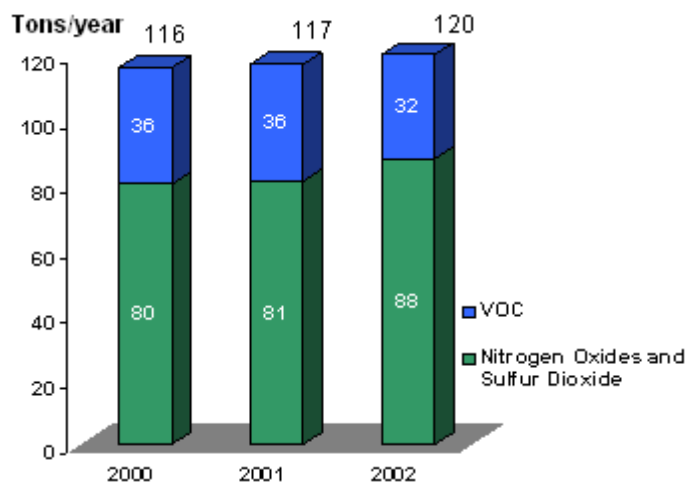
### Environment Year 2002

During 2002 emissions to the air increased marginally in Stenungsund and fell slightly in Nol, while discharges after the in-house wastewater treatment plant fell in Stenungsund. Hazardous waste fell during the year both in Stenungsund and in Nol, while other waste decreased in Stenungsund and increased marginally in Nol.

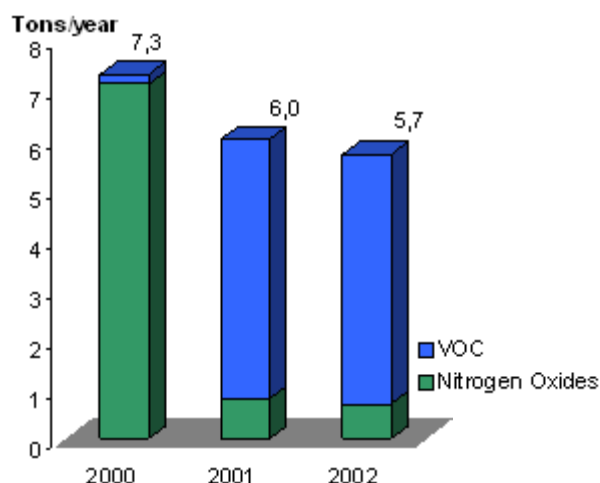
### Emissions to air

Emissions into the atmosphere from the unit in Stenungsund increased marginally during 2002, due to increased emissions of sulfur dioxide. The emissions mainly consist of nitrous oxides, sulfur dioxide and VOC (butyraldehyde, butanol, ethylhexanol, naphtha, etc). During the year, an old thermal incineration plant ("the sandbox") was upgraded.

Emissions into the atmosphere from the unit in Nol consist primarily of VOC and xylene, as well as nitrous



*Emissions to the atmosphere increased marginally at the unit in Stenungsund during 2002.*



*Emissions to the atmosphere fell slightly at the unit in Nol during 2002.*

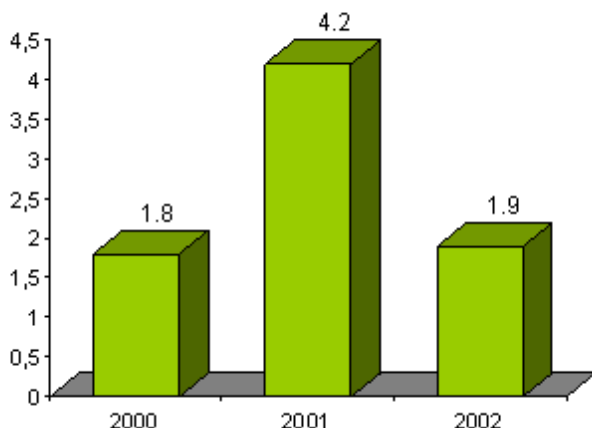
# ENVIRONMENT

## - Site presentations: Perstorp Oxo, Stenungsund and Nol

### Discharges to water

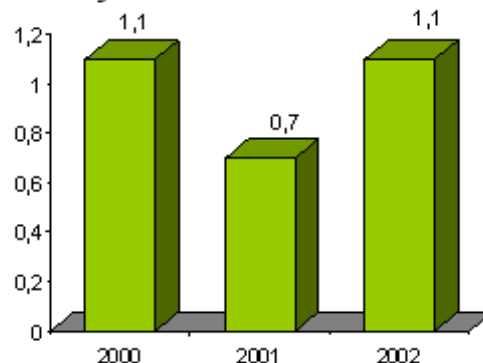
Waterborne discharges from the unit in Stenungsund were routed to the in-house wastewater treatment plant. During 2002, discharges from the wastewater treatment plant fell, thanks in part to optimization of the equipment. Waterborne discharges from the unit in Nol were routed to the receiving water. Discharges increased slightly during 2002.

#### Tons TOC/year



*Waterborne discharges from the in-house wastewater treatment plant fell during 2002 at the unit in Stenungsund.*

#### Tons TOC/year



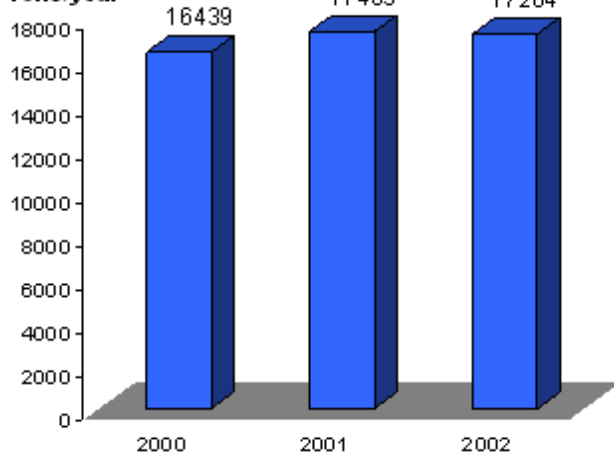
*Waterborne discharges to the receiving water increased slightly during 2002 at the unit in Nol.*

### Hazardous waste

Hazardous waste from the unit in Stenungsund consists primarily of distillation by-products (which are incinerated internally), filter cake, activated carbon, waste oil, sludge, etc. The amount of hazardous waste fell slightly during 2002.

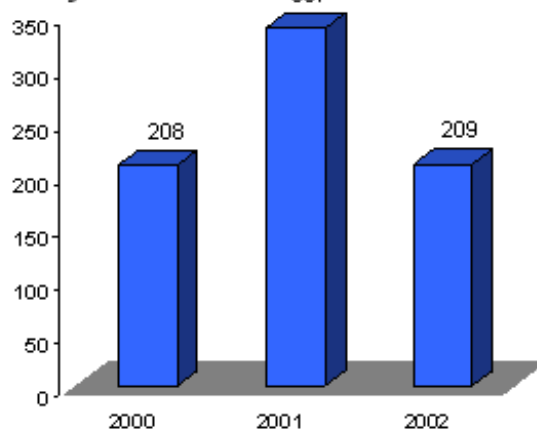
Hazardous waste from the unit in Nol consists primarily of distillation by-products. The amount of hazardous waste fell during 2002 thanks to smaller volumes of waste oil and solvent.

#### Tons/year



*The amount of hazardous waste fell slightly in 2002 at the unit in Stenungsund.*

#### Tons/year



*The amount of hazardous waste fell in 2002 at the unit in Nol.*

# ENVIRONMENT

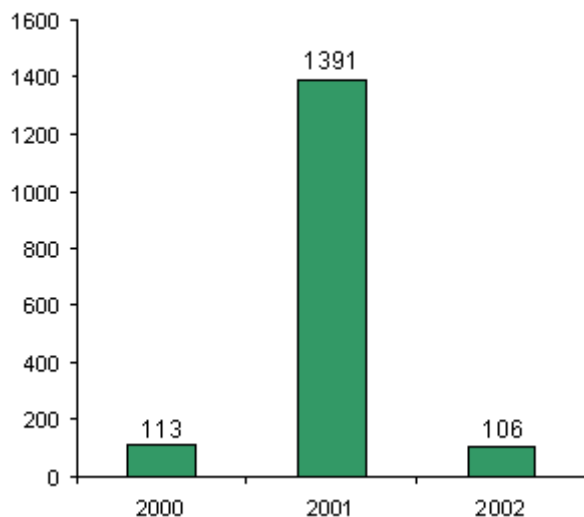
## - Site presentations: Perstorp Oxo, Stenungsund and Nol

### Other waste

Other waste from the unit in Stenungsund consists of waste for recycling, incineration and landfill. During 2001 the proportion for landfill was temporarily high due to the site work being carried out. During 2002 the proportion of other waste fell once again.

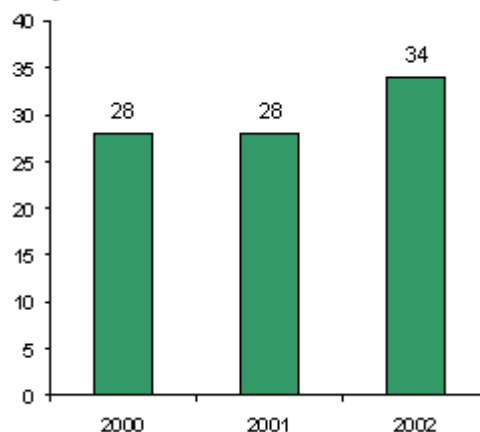
Other waste from the unit in Nol consists of waste for recycling, incineration and landfill. During 2002 the proportion of other waste increased slightly.

Tons/year



The amount of other waste fell in 2002 at the unit in Stenungsund.

Tons/year



The amount of other waste increased slightly in 2002 at the unit in Nol.

### Natural gas project at the unit in Stenungsund



Extensive building work is in progress at the unit in Stenungsund to prepare for the transition to natural gas as a replacement for fuel oil.



New DEA column in progress at the unit in Stenungsund..

The unit in Stenungsund intends to replace 60,000 tons of fuel oil (EO 5) annually with natural gas, as the raw material for synthesis gas production. The change of raw material brings several benefits for the external environment.

- Oil is delivered by oil tanker and natural gas via pipeline. The sensitive Bohuslän coastline will therefore avoid the arrival of 30 ships annually.

- Natural gas contains almost no sulfur or nitrogen, and comparatively small volumes of heavy metals. This means reduced emissions of sulfur dioxide into the air and nitrogen

into the water, as well as improved sedimentation potential for the sludge that arises in the company's wastewater treatment plant thanks to the metal content being more or less eliminated.

#### Contact persons - environment, health and safety

Stenungsund:

Arne Alexandersson,

e-mail

arne.alexandersson@perstorp.com

Nol:

Berne Karlsson,

e-mail berne.karlsson@perstorp.com

# ENVIRONMENT

## - Site presentations: Perstorp Polyols Inc, Toledo, USA



The Toledo site is 32 acres or about 130,000 square meters with, 91 employees.

Operations started with Pentaerythritol (Penta) production in 1977. Trimethylolpropane (TMP) production was added in 1989. A formaldehyde plant was purchased from DuPont in 1991 and a Perstorp Formox plant was built in 1996. Production of concrete-admixtures (SMF) sulfonated melamine formaldehyde (Peramin) was started in 2002.

TMP-plant to the right (in the foreground) and penta plant to the left.

There is a Jeep manufacturing plant east of the site, former landfill sites south and

trucking companies to the west. North of the site is another trucking company and the technical center for an automotive muffler manufacturer.

### Environmental year 2002

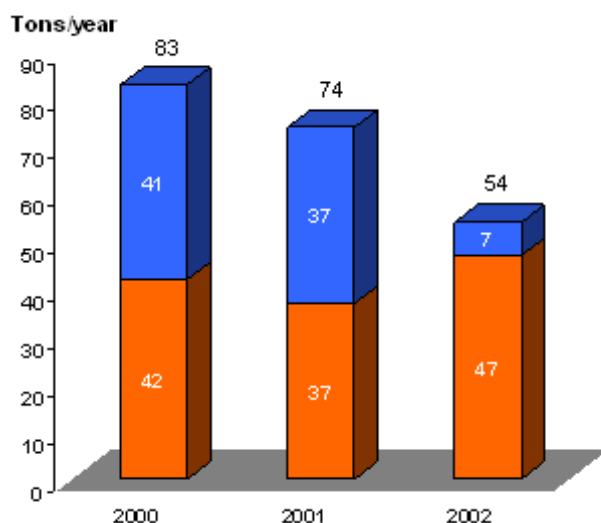
During 2002, emissions to the atmosphere decreased significantly, while waterborne emissions increased. The amount of hazardous waste decreased and the amount of other waste increased.

Perstorp Polyols Inc. received a "Certificate of Achievement" from the American Chemistry Council (ACC) during the year, awarded to those facilities with zero deaths and zero lost workday cases involving days away from work. The company also received a "Performance Improvement Award" for the third consecutive year from the ACC for a 25% improvement in the injury and illness rate over the past 5 years.

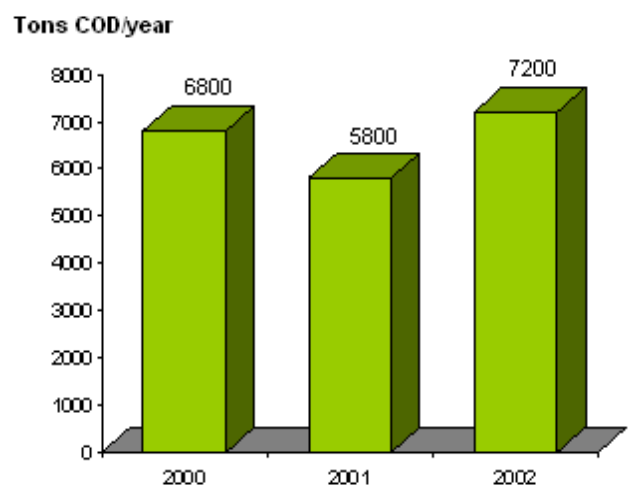
### Emission to the atmosphere

Emissions to the atmosphere from the Toledo site mainly consist of VOC (methanol, aldehydes etc.) and nitrogen oxides and particulates. Emissions of VOC were largely reduced during 2002, mainly because the fact that the older formaldehyde plant was not in operation at all during the year.

### Emission to water



Emissions to the atmosphere from the Toledo site, USA, decreased during 2002.

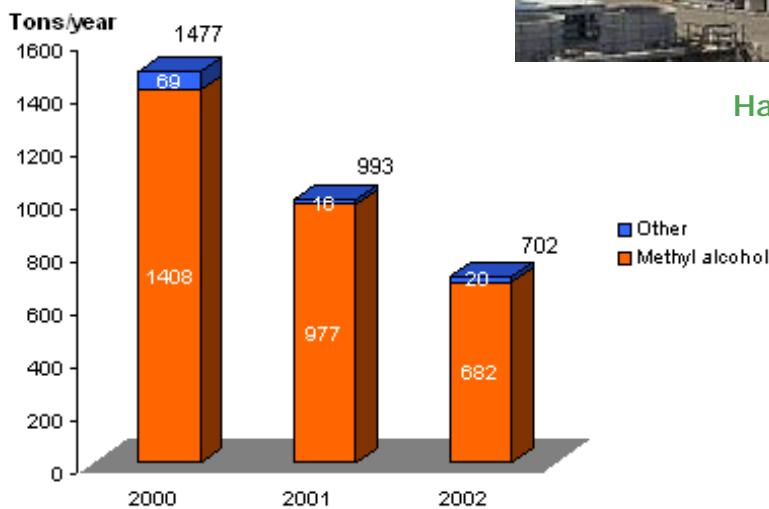


Waterborne emissions from Toledo site to the municipal treatment plant increased during 2002, mainly due to increased production.

# ENVIRONMENT

## - Site presentations: Perstorp Polyols Inc, Toledo, USA

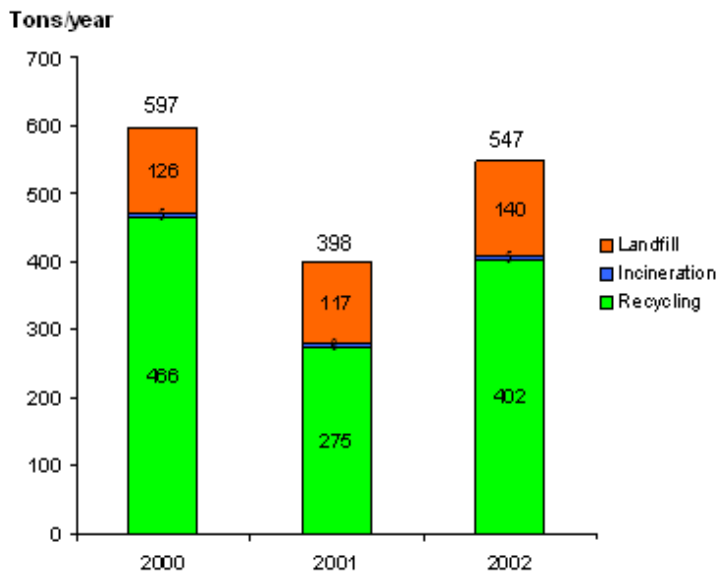
The Perstorp Formox Formaldehyde plant in front, the old formaldehyde plant to the left and the new concrete-admixtures (SMF) plant behind the formaldehyde plant.



### Hazardous waste

Hazardous waste consisted largely of methyl alcohol and small amounts of acids etc. During 2002, the amount of hazardous waste decreased substantially. The main reason is a change in the production process resulting in a reduction in the amount of methanol. Furthermore, Toledo continued to recycle methanol to some extent.

*The amount of hazardous waste from the Toledo site, USA, decreased substantially during 2002.*



### Other waste

Other waste from the Toledo site consisted of recycled and combustible waste and waste to landfill. The volume of other waste increased during 2002. Efforts are being made to find recycling methods for packaging material. Additional information

*The volume of other waste from Toledo, USA, increased during 2002.*

The Toledo site continued giving tours to local schools and other groups, promoting the activities including production and environment, health and safety. Toledo also responded to numerous customer surveys and other requests for information on the environment, health and safety issues.

### Contact person regarding Environment, Health & Safety:

Tony Sloma, e-mail [tony.sloma@perstorp.com](mailto:tony.sloma@perstorp.com)

# ENVIRONMENT

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## - Site presentations: Castellanza, Italy

### Presentation of Perstorp S.p.A and Perstorp Chemitec S.p.A, Castellanza, Italy



Two of the four companies in the industrial complex in Castellanza are Perstorp companies: Perstorp S.p.A. and Perstorp Chemitec S.p.A. Both companies are certified according to ISO 9002 and ISO 14001, and have a total of 110 employees. The other operating companies at the site are Agrolinz and Axaff. The total number of employees at the site is about 500.

*Air photo of the plant in Castellanza, Italy.*

The production of sulphuric acid, muriatic acid and sodium phosphate started in the year 1900. Perstorp acquired the moulding compounds plant in 1982 and the penta, formaldehyde, sodium formate and formic acid plants in 1988.

### Perstorp S.p.A.

Perstorp S.p.A. is part of the business area Perstorp Coating Intermediates and produces polyols. Previously, this plant was dedicated for the production of the polyol Pentarythritol. However, during 2001, the process was redesigned and principally turned in to multi-purpose plant focusing on the production of the special polyol bis-MPA (di-methylolpropionic acid). Investment in further tank storage capacity has taken place to facilitate distribution of different polyol products from the other Perstorp sites.

A biological plant to treat all the wastewater containing formaldehyde and methanol from the site was built by Perstorp S.p.A. in 2000.

### Perstorp Chemitec S.p.A.

Perstorp Chemitec S.p.A. is part of the business area Perstorp Engineering Materials, and produces urea moulding compounds.

### Environmental year 2002

During 2002, the emissions to the atmosphere increased at the Castellanza site, Italy, compared to 2001. The main reason is that the thermal incineration plant of the site has been taken over by Perstorp and the emissions are included in the Perstorp reporting. Emissions to the wastewater treatment plant increased slightly. The amount of non-hazardous waste increased during the year.

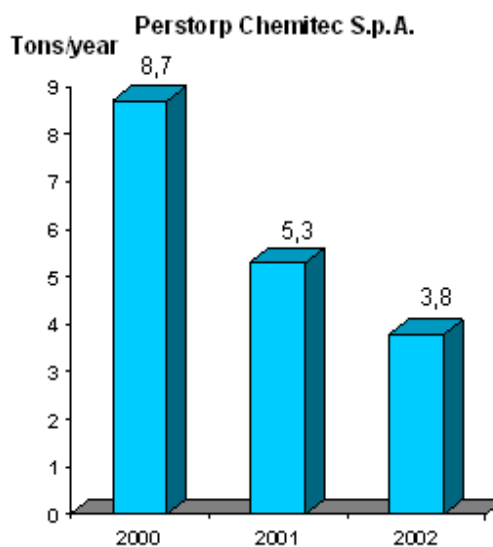
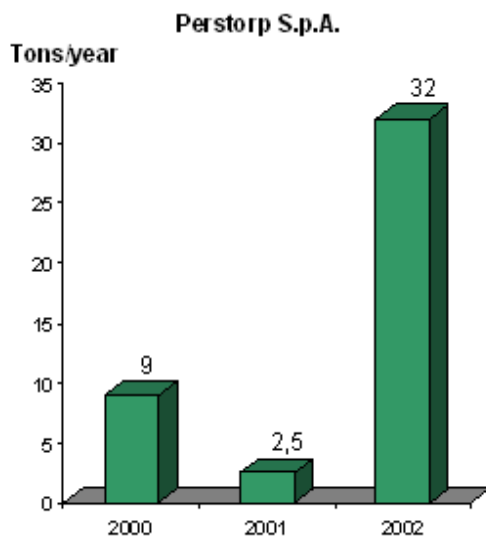
# ENVIRONMENT

## - Site presentations: Castellanza, Italy

### Emission to the atmosphere

The emissions to the atmosphere from the units in Castellanza consist mainly of VOCs (dimehtylether, methyl alcohol, formaldehyde etc) and carbon monoxide. The emissions from Perstorp S.p.A increased during 2002, mainly due to the fact that Perstorp took over the thermal incineration plant of the site and the emissions are included in the Perstorp reporting. The emission from Perstorp Chemitec S.p.A. decreased during 2002.

Several projects were implemented to reduce emissions to the air: a new fan of the scrubber outlet and a new gas analyzer on the catalytic incinerator. A dust filter was also installed.



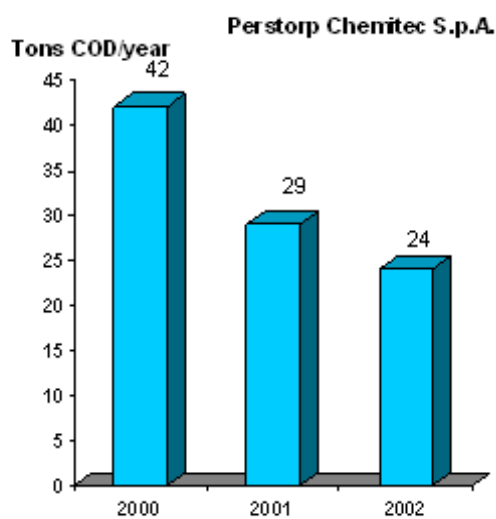
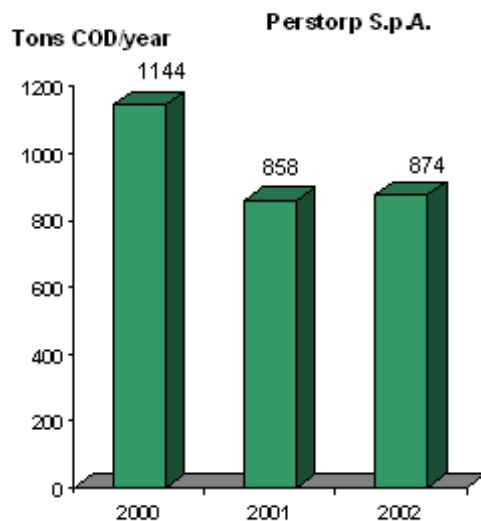
*The emissions to the atmosphere from Perstorp S.p.A. increased during 2002 but decreased from Perstorp Chemitec S.p.A., Castellanza, Italy.*



### Emission to water

Castellanza Site has its own wastewater treatment plant. At Perstorp S.p.A., emissions to water increased slightly during 2002 mainly due to increased production, while at Perstorp Chemitec S.p.A. the emissions decreased.

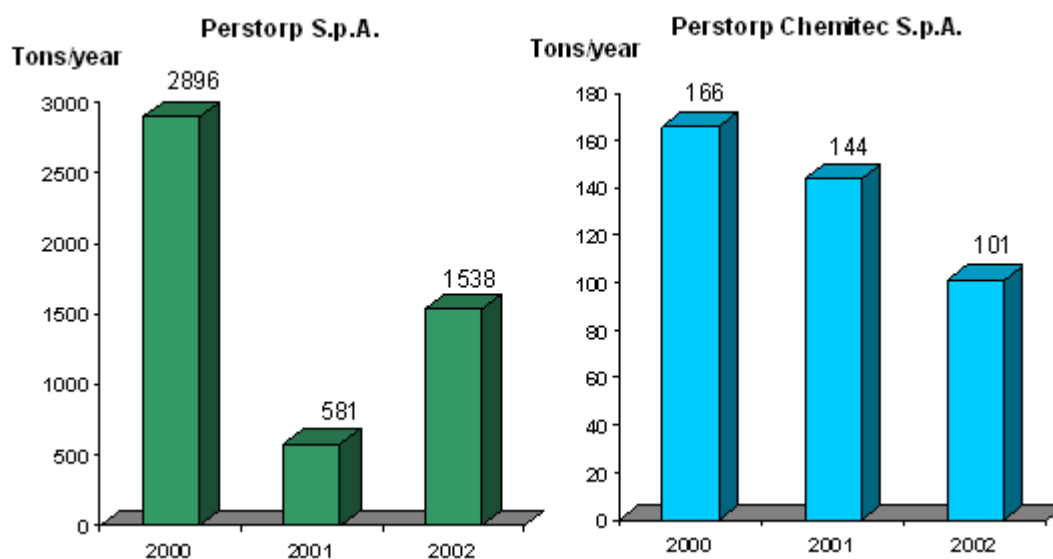
*Biological wastewater treatment plant in Castellanza, Italy.*



*Emissions to water from Perstorp S.p.A. increased during 2002 and decreased from Perstorp Chemitec S.p.A. in Castellanza, Italy.*

# ENVIRONMENT

## - Site presentations: Castellanza, Italy



*The amount of other waste increased at Perstorp S.p.A. during 2002, and decreased at Perstorp Chemitec S.p.A., Castellanza, Italy.*

### Hazardous waste

The Castellanza site reported no hazardous waste during 2002. During 2001, there were 0.66 tons of waste oils from Perstorp Chemitec S.p.A.

### Other waste

Other waste is mostly for recycling, combustion and landfill. The amount of other waste increased during 2002 at Perstorp S.p.A. and decreased at Perstorp Chemitec S.p.A., mainly due to improved recovery of dust coming out from the air filters, reducing the use of raw material and non-hazardous waste.

### Contact person regarding Environment, Health & Safety:

Antonello Rota, e-mail [antonello.rota@perstorp.com](mailto:antonello.rota@perstorp.com)

# ENVIRONMENT

## - Site presentations: Bruchhausen, Germany

### Presentation of Perstorp Chemicals GmbH, Bruchhausen, Tyskland



*Air photo of the Bruchhausen site, Germany.*

The Bruchhausen site is 89 000 square meters and the number of employees is 130.

Production of charcoal, methanol and acetic acid was started in 1876 by "Chemische Fabrike der Hüster Gewerkschaft". The first formaldehyde plant was built in 1948 and the first pentaerythritol plant in 1949. Perstorp acquired the Bruchhausen site from Degussa-Hüls in 2000.

The site is located in an industrial area of the town of Bruchhausen, approximately 60 km east of Dortmund in the state of North Rhine Westphalia. The site is bordered by residential housing approximately 40 metres to the northwest, a commercial area to the north, agricultural land to the east and the river Ruhr to the south.

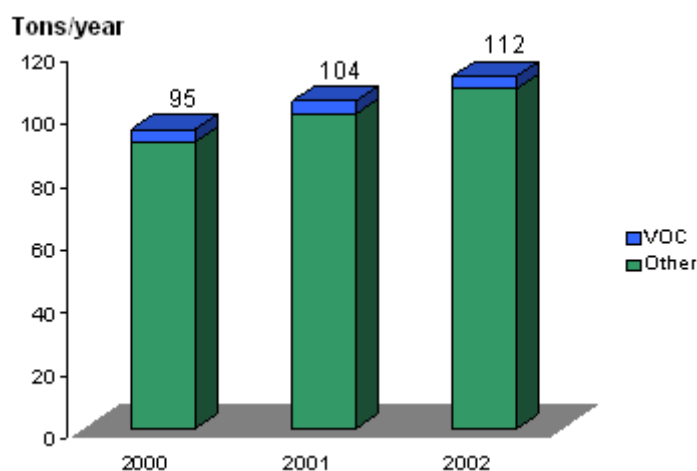
Perstorp Chemicals GmbH, part of Perstorp Coating Intermediates, manufactures formaldehyde, pentaerythritol, dipentarythritol and calcium formate.

### Environmental year 2002

The emissions to the atmosphere and to the publically owned wastewater treatment plant increased slightly during 2002. Hazardous waste as well as other waste decreased during the year.

### Emissions to the atmosphere

Emissions to the atmosphere slightly increased at the Bruchhausen site during 2002, mainly due to increased production at the pentaerythritol plant. The emissions consisted of nitrogen oxides and sulfur dioxide, carbon monoxide and VOC (methanol, aldehydes etc.).



*During 2002, the emissions to the atmosphere slightly increased in Bruchhausen, Germany.*



*Formaldehyde plant in Bruchhausen, Germany.*

# ENVIRONMENT

## - Site presentations: Bruchhausen, Germany

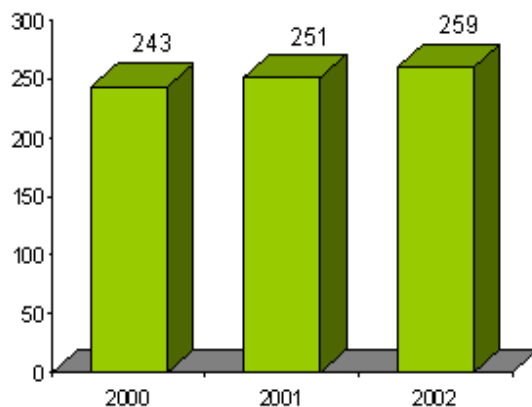
### Emissions to water

The Bruchhausen site is connected to a municipal wastewater treatment plant. During 2002, the emissions increased, mainly due to increased production at the pentaerythritol plant.

### Hazardous waste

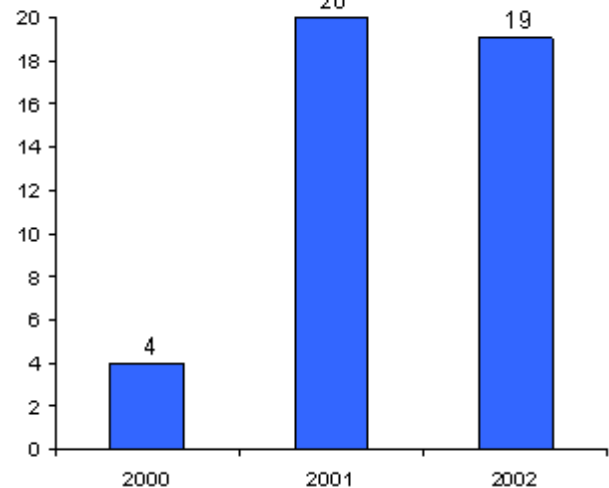
Hazardous waste consists mainly of waste oils and solvents. During 2002 the amount of hazardous waste decreased.

Tons COD/year



*During 2002, the waterborne emissions to the municipal wastewater treatment plant increased at the Bruchhausen site.*

Tons/year



*During 2002, the amount of hazardous waste decreased in Bruchhausen, Germany.*

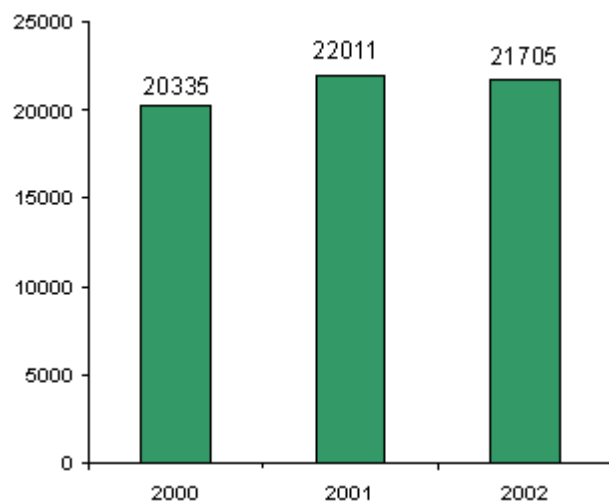
### Other waste

Other waste consists of waste for recycling, combustion and landfill. Most of this is combustible mother lye, which decreased somewhat during 2002.

### Additional information

At the pentaerythritol plant, the use of fresh water has been reduced thanks to increased use of condensed water. One-way packaging is minimized thanks to transport in reusable Big-Bags and hopper trucks.

Tons/year



*During 2002, the amount of other waste decreased somewhat in Bruchhausen.*



*View of the Bruchhausen site, Germany.*

**Contact person regarding Environment, Health & Safety:**

Ernst Schucht, e-post [ernst.schucht@perstorp.com](mailto:ernst.schucht@perstorp.com)

# ENVIRONMENT

## - Site presentations: Vapi, India



*The unit in Vapi, India, with the cooling tower in the middle and the penta factory in the background.*

### Presentation of Perstorp Aegis Chemicals Ltd, Vapi, India

Perstorp Aegis Chemicals Ltd in Vapi, India, is a joint venture with Aegis Logistics Ltd, where Perstorp has operational responsibility. Perstorp owns 70% of the venture. The Perstorp Group took over the almost 40-year-old operation in the autumn of 1998. Production at the unit consists primarily of pentaerythritol (penta), formalin and formic acid. The unit has 230 employees.

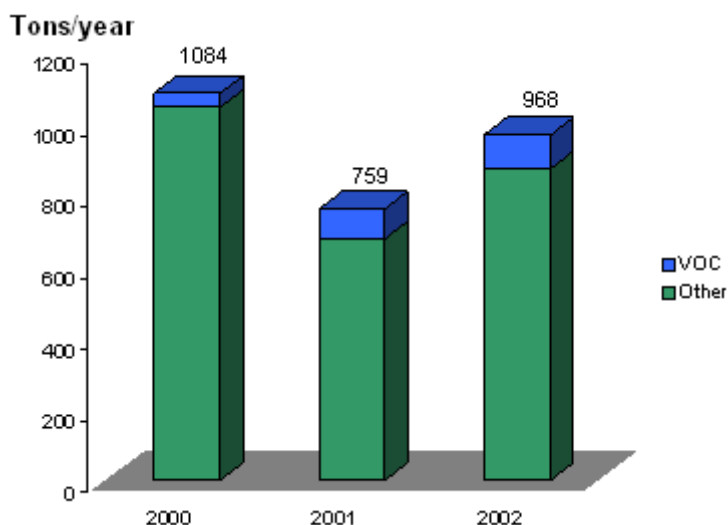
Following the take-over, extremely significant improvements within environment, health and safety have been implemented and the work is continuing. Examples of improvement projects include fixed foundations and dikes for all tank areas, fixed foundations under loading and unloading sites, new instrumentation in the wastewater treatment plant, water sprinklers in methanol tanks, fire hydrants, tree planting, etc.

### Environment Year 2002

During 2002 emissions to the air increased due to increased production. Discharges to the in-house wastewater treatment plant, to which the factories are connected, increased slightly. The same applies to hazardous waste.



*Process operator in front of the formalin factory by the emergency shower wearing workclothes, protective shoes and helmet.*



### Emissions to air

Emissions to the atmosphere from the unit in Vapi, India, increased during 2002 due to increased production. The emissions consist primarily of sulfur dioxide, methanol, carbon monoxide and formaldehyde. The unit in Vapi, India, which is also responsible for a considerable proportion of the Group's methanol emissions, is planning to install a residual gas combustion plant in 2005 for the treatment of methanol emissions.

*Emissions to the atmosphere increased at the unit in Vapi, India, during 2002.*

# ENVIRONMENT

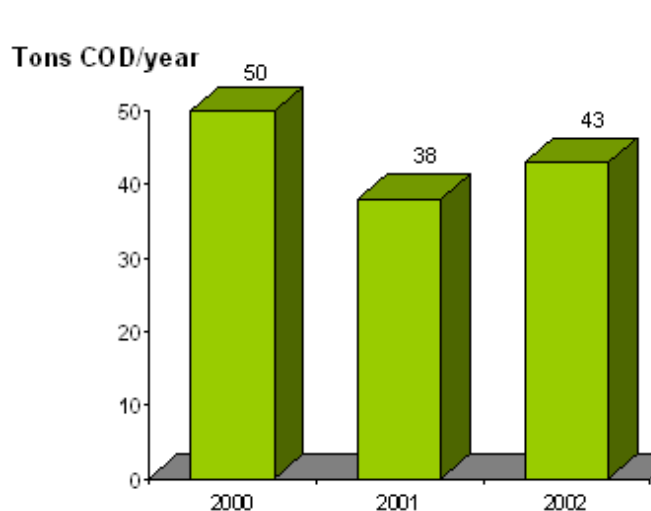
## - Site presentations: Vapi, India

### Discharges to water

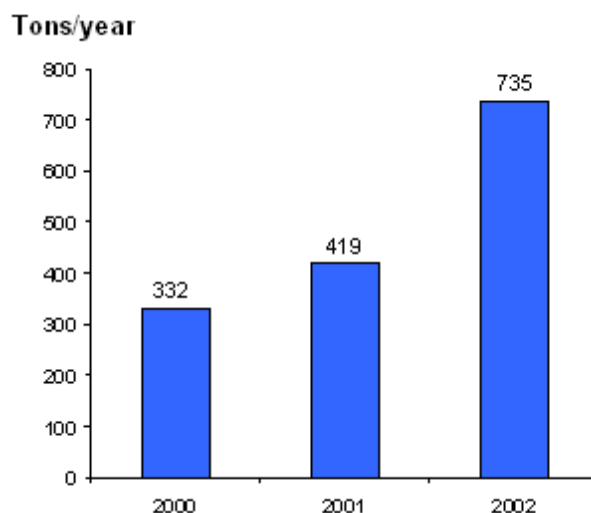
Waterborne discharges from the factories in Vapi were routed to the in-house wastewater treatment plant. During 2002, discharges from the wastewater treatment plant increased, due in part to increased production.

### Hazardous waste

Hazardous waste consists primarily of sludge. The amount of hazardous waste increased during 2002.



*Waterborne discharges from the in-house wastewater treatment plant increased slightly during 2002 at the unit in Vapi.*



*The amount of hazardous waste increased in 2002 at the unit in Vapi.*

### Other information

The unit is engaged in identifying opportunities for recycling water and improved resource management.

#### **Contact person - environment, health and safety:**

Gerhard Weber, e-mail [gerhard.weber@perstorp.com](mailto:gerhard.weber@perstorp.com)

# ENVIRONMENT

## - Site presentations: Belgium

Two companies of the Perstorp Group are located in Gent, Belgium - Perstorp Vyncolit N.V. and Perstorp Oxo Belgium

### Presentation of Perstorp Vyncolit NV, Gent, Belgium

Vyncolit N.V. is situated in an industrial area in the northern part of Gent, Belgium. The industrial area is 120,000 square meters, of which 17,000 square meters belongs to Vyncolit.

Vyncolit N.V. is part of the business area Perstorp Engineering Materials and is a manufacturer of phenolic resins and phenolic moulding compounds with focus on specialty phenolic compounds containing different fillers to improve properties, mainly used in the automotive industry. The number of employees is 168.



Brake components



Fuel system

### Environmental year 2002

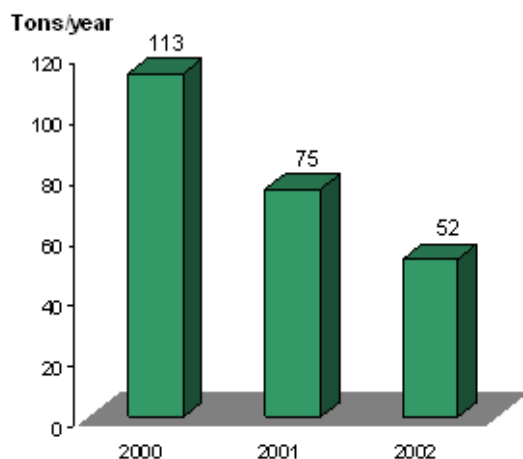
During 2002, emissions to the atmosphere continued to decrease, mainly thanks to replacing isopropylalcohol with a non-volatile compound. Emissions to the waterways increased somewhat during the year. Both hazardous and other waste increased during the year.

### Emissions to the atmosphere

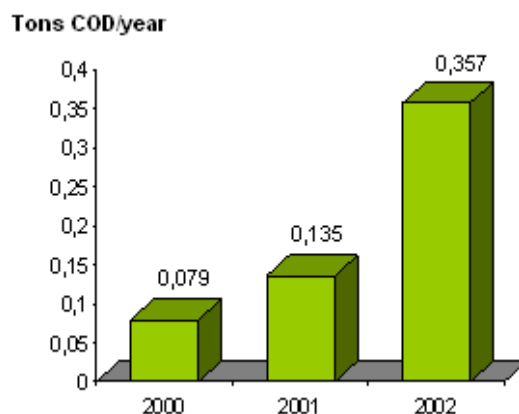
Emissions to the atmosphere from the Vyncolit site in Gent consist mainly of isopropylalcohol and to some extent phenol and ammonia. The emissions have decreased substantially during the past years, mainly thanks to reduced emissions of isopropylalcohol which was gradually replaced by a non-volatile compound. The efforts to substitute isopropylalcohol continue. Efforts are also being made to reduce the emissions of phenol.

### Emission to water

During 2002, waterborne emission from the Vyncolit site in Gent increased slightly. The emissions go partly to a municipal waste water treatment plant, and partly to waterways.



*Utsläppen Emissions to the atmosphere have decreased substantially during the past years at the Vyncolit unit in Gent, Belgium, thanks to reduced emissions of isopropylalcohol.*



*Waterborne emissions increased slightly during 2002 at the Vyncolit unit in Gent.*

# ENVIRONMENT

## - Site presentations: Belgium

Two companies of the Perstorp Group are located in Gent, Belgium - Perstorp Vyncolit N.V. and Perstorp Oxo Belgium

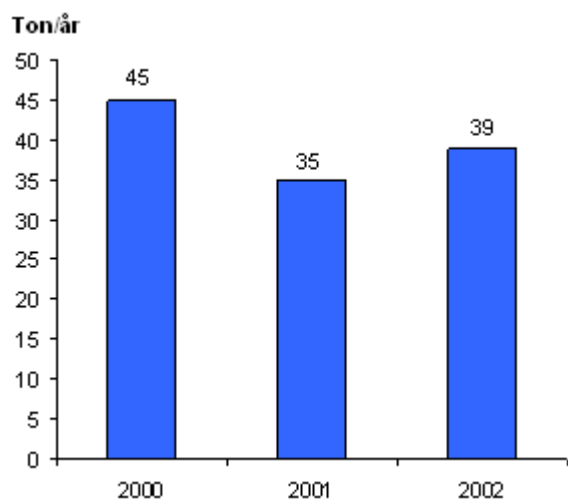
### Hazardous waste

Hazardous waste consists mainly of waste for incineration, e.g. packaging waste, phenolic waste, waste oils, organic waste, resins etc. The amount of hazardous waste increased slightly during 2002. The amount of hazardous waste increased slightly during 2002 at the Vyncolit unit in Gent.

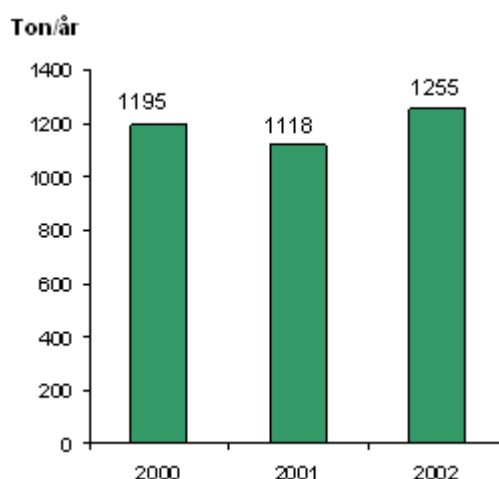
### Other waste

Other waste consists of separated waste for recycling, incineration and landfill. Most other waste consists of phenolic production waste and solid combustible waste, which increased slightly in 2002. Other waste also includes recycled metals and paper, and building materials for landfill.

The amount of other waste increased slightly during 2002 at the Vyncolit unit in Gent.



*Mängden övrigt avfall ökade något under 2002 vid enheten i Gent (Vyncolit NV).*



*Mängden farligt avfall ökade något under 2002 vid enheten i Gent (Vyncolit NV).*

### Contact person Environment, Health & Safety:

Friedel Anno, e-post [friedel.anno@perstorp.com](mailto:friedel.anno@perstorp.com)  
[vyncolit.com](http://vyncolit.com)

# ENVIRONMENT

## - Site presentations: Belgium

Two companies of the Perstorp Group are located in Gent, Belgium - Perstorp Vyncolit N.V. and Perstorp Oxo Belgium

### Presentation of Perstorp Oxo Belgium, Gent



*Distillation plant NX 795 and BEPD.*

Perstorp Oxo Intermediates has a production unit in Gent, Belgium.

The plant was erected in 1990. Initial start-up under Neste Resins was in 1991 (formaldehyde and ureaformaldehyde resins). After converting the equipment in the reactor hall for the production of BEPD, the second start-up took place in 1995 under Neste Oxo.

Perstorp Oxo Belgium plant produces formaldehyde, BEPD, NX 795 and Peraflex P244. The number of employees is 44. The site is 65,000 square meters (6,5 ha) and is situated in the industrial area called "Durmakker", about 8 kilometers from the Vyncolit site

### Environmental year 2002

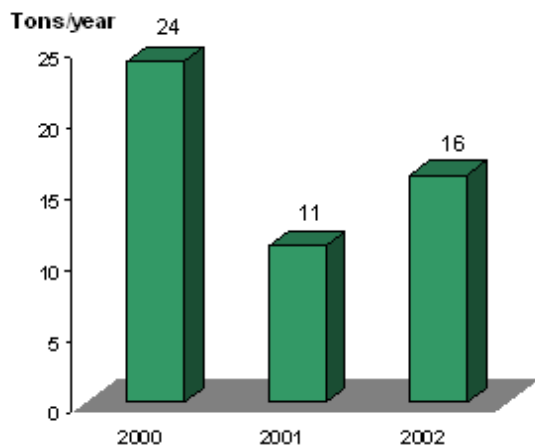
Emissions to the atmosphere increased during 2002, due to increased production. Waterborne emission decreased slightly during the year. The volume of both hazardous and other waste increased, due to increased production.

### Emissions to the atmosphere

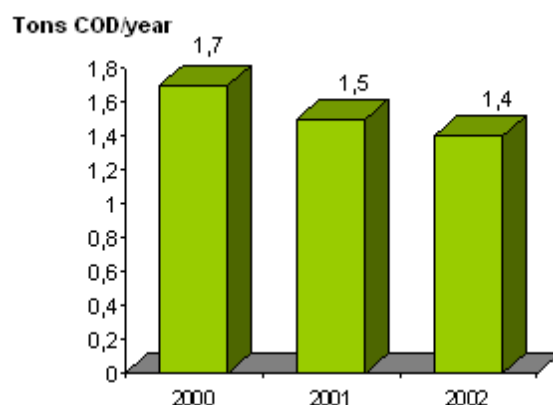
Emissions to the atmosphere from Perstorp Oxo in Gent consist mainly of methanol, other VOC, carbon monoxide and nitrogen oxides. During 2002, emissions increased slightly, due to increased production.

### Emission to water

Waterborne emission from Perstorp Oxo in Gent decreased during 2002. The emissions go to waterways.



*Emissions to the atmosphere increased slightly at Perstorp Oxo, Gent, due to increased production.*



*Emissions to water from Perstorp Oxo in Gent decreased during 2002.*

# ENVIRONMENT

## - Site presentations: Belgium

Two companies of the Perstorp Group are located in Gent, Belgium - Perstorp Vyncolit N.V. and Perstorp Oxo Belgium



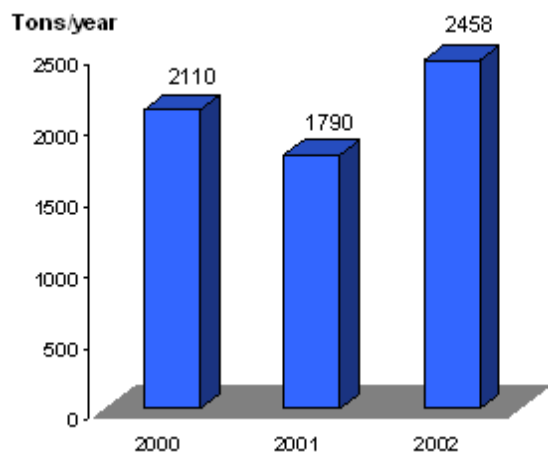
Tank area.

### Hazardous waste

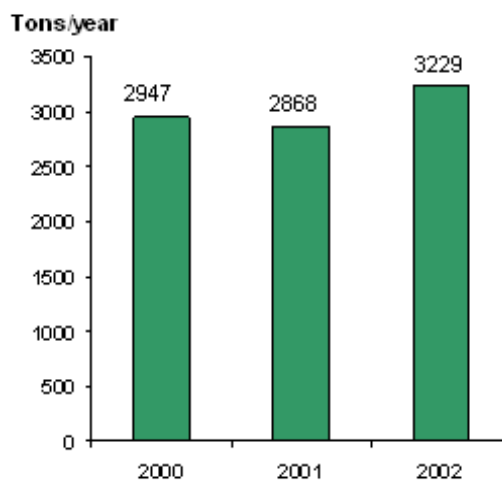
Hazardous waste consist mainly of combustible waste and waste for treatment in a wastewater treatment plant. Distillation residue goes to incineration and other kinds of residue for treatment in a wastewater treatment plant. During 2002, the amount of hazardous waste increased, mainly due to increased production and some changes in the process. Since 1998 the unit is conducting an extensive process optimization project to reduce the volume of hazardous waste and the stream of hazardous components.

### Other waste

Other waste consists of recycled and combustible waste as well as of landfill waste and waste to be treated in a wastewater treatment plant. Most of this is combustible production residues and residues for treatment in a wastewater treatment plant. The volume of other waste increased during 2002, due to increased production volumes. Efforts are being made to adjust some waste volume streams.



*The amount of hazardous waste from Perstorp Oxo, Gent, increased during 2002 due to increased production.*



*The amount of other waste from Perstorp Oxo, Gent, increased during 2002 due to increased production.*

**Contact person regarding Environment, Health & Safety:**  
Geert Devos, e-mail [geert.devos@perstorp.com](mailto:geert.devos@perstorp.com)

# ENVIRONMENT

## - Site presentations: Florence, Massachusetts, USA



*Perstorp Compounds Inc. plant in Florence, Massachusetts, USA.*

Perstorp Compounds, Florence, USA, has about 2,560 square meters (84,000 square feet) of building space. The site is located in about 40,620 square meters (10 acres) of land, about 800 meters (1/2 mile) from the center of Florence, which is a suburb of Northampton, Massachusetts. The site is bordered on the south by the mill river, on the west by a separate factory, on the east by an industrial contractor and homes, and on the north by homes. The plant is land-locked in that there is no adjacent real estate that is undeveloped.



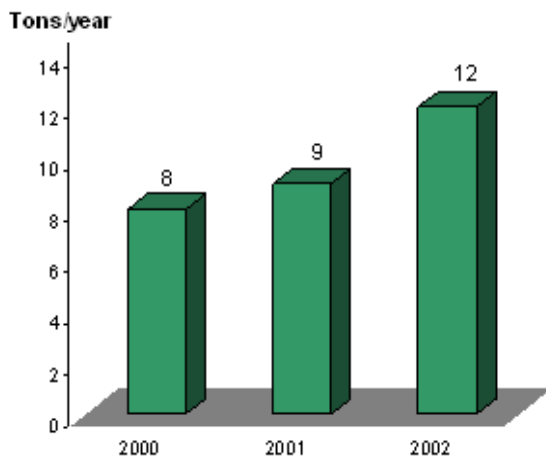
Perstorp Compounds, Inc., is part of Perstorp Engineering Materials and produces melamine formaldehyde and urea formaldehyde moulding compounds. These products are used in the manufacture of buttons, electrical switch covers, bottle caps, desk tops and many other practical applications. The number of employees is 48.

*Urea and melamine thermoset plastic electrical fixtures for home and industry.*

Compounding was developed in Florence in 1964, originally with 3 ball mills. Perstorp acquired the plant in 1974. The plant underwent expansion in the 1980's during which two more ball mills and a Buss extrusion line were added.

### Environmental year 2002

During 2002, emissions to the air have increased slightly, while emissions to the external wastewater treatment plant decreased slightly, compared to 2001. The amount of hazardous waste decreased during the year while the amount of other waste increased.



*Emissions to the atmosphere slightly increased during 2002 at the Florence site, USA.*



*The Florence site, USA, has implemented a dust capture project to reduce airborne dust and eliminate some materials handling.*

# ENVIRONMENT

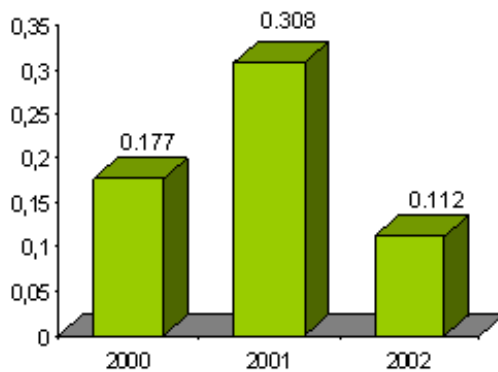
## - Site presentations: Florence, Massachusetts, USA

Emissions to the atmosphere from the site increased slightly during 2002, mainly due to increased production. The emissions consist mainly of VOCs (methyl alcohol, formaldehyde) and particulates.

### Emission to water

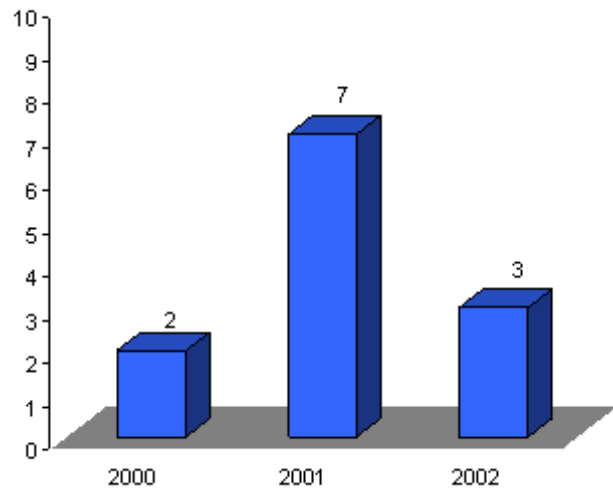
The emissions to water from the Florence site consisted of minor amounts that are discharged to the publically owned wastewater treatment plant. Emissions decreased during 2002.

Tons COD/year



Waterborne emissions to a municipal wastewater treatment plant decreased during 2002 at the Florence site.

Tons/year



The amount of hazardous waste decreased in Florence during 2002.



Perstorp recycles thermoset plastic for dinnerware, electrical components, bathroom accessories etc.

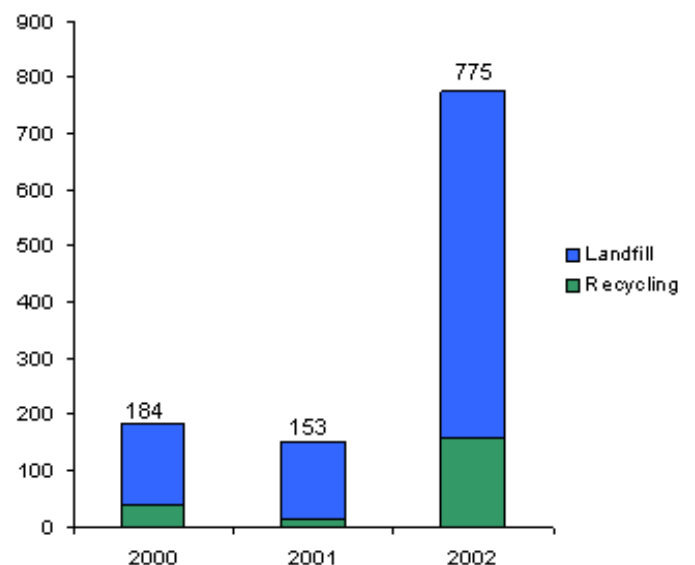
### Other waste

Other waste consists of waste for recycling and landfill. During 2002 the amount of other waste temporarily increased as some materials formerly stored in an offsite warehouse were disposed as non-hazardous waste.

### Hazardous waste

Hazardous waste consisted largely of waste oils, solvents, paraformaldehyde etc. During 2002, the amount of hazardous waste decreased.

Tons/year



The amount of other waste increased in Florence during 2002.

# ENVIRONMENT

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## - Site presentations: Florence, Massachusetts, USA

### Additional information

During the past 5 years the site has added a sixth and seventh ball mill, as well as a laminate grinding operation. During 2002, the site recycled 485 tons (over 1 M lb) of laminate. Laminate comes to the site as raw material, but is actually a waste stream generated by the end-user that would otherwise end up as landfill.

Over the past 5 years the site has taken a proactive stance at environmental issues, such as energy consumption. A few low-cost projects have cut electricity consumption by nearly 50% and water consumption to less than 5% the amount previously used. These projects include air conservation projects, premium efficiency motor upgrade, and lighting upgrade among others.

### **Contact person regarding Environment, Health & Safety:**

Mark Vasicek, e-mail [mark.vasicek@perstorp.com](mailto:mark.vasicek@perstorp.com)

# EMPLOYEES

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# EMPLOYEES

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## - Personnel

### Forward - development towards world class

As an employer, Perstorp has a definite responsibility to live up to as regards its employees, as well as an undertaking to its owners to be a world-class company.

Over the next few years Perstorp will be characterized by one word

- **FORWARD** -

Perstorp's program for world-class performance, which is based on the following values:

- Earn the right to invest and grow
- Decentralized management and initiative
- Good insight into goals and results
- Active collaboration and good team spirit across borders
- Open and direct feedback
- Consideration and support for each other
- Leading change

FORWARD denotes the company's direction and driving force, attitude and motivation, actions.

### Read more about

Opinion poll - People satisfaction

Equality

Competence

The PMD process

Development program with diplomas for managers within Perstorp

Trainee program

Perstorp High School

University contacts and degree work

# EMPLOYEES

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## - Opinion Poll - People Satisfaction

An opinion poll, called **People Satisfaction**, was carried out during the year. Part of this study comprised questions regarding the company's values, and some 1250 employees took part. Some areas within the company produced a longer questionnaire, in which just over 700 employees participated. The purpose of the survey was to produce a picture of how the Group's values are perceived and how they are complied with in the operation. The investigation is intended to identify areas for continued development.

The results of the survey showed that the value considered to be the Group's strongest is "Decentralized management and initiative", while the Group was least successful when it came to "Open and direct feedback". A follow-up has been carried out through presentations in groups, and a number of units have continued the work by forming working groups that have proposed measures for improvements. The work will continue with follow-ups to see how these proposals are implemented.

Surveys of this type will be carried out regularly in the future in order to acquire an understanding of employees' attitudes and how they are changing.

# EMPLOYEES

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## - Equality

The Perstorp Group conducts active equality work aimed at increasing efficiency, competitiveness and profitability by making use of the dynamics that exist in the interaction between men and women, individuals with different backgrounds, experience, knowledge and personal attributes.

A working group comprising employer and employee representatives drew up a new equality policy in 2002. The equality policy contains ten goals and measures that the Group must work on during 2003.

Before the end of each year, every unit within the Group must draft an equality plan for the following year.

A number of units have updated their equality plans and commenced work on activities within them. As a result, equality work has been given a greater focus than before.

Everyone's experiences are taken into account in the equality work in order to develop the operation in a positive manner. As part of this work, the experiences and opportunities of minority groups will also be taken into consideration.

# EMPLOYEES

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## - Competence

**Perstorp Learning and Development** was established during 2002 as the Group's new skills development organization, with the aim of successfully developing the Group's qualified labor force.

Training and skills development are **important issues** for Perstorp. It is not the machinery or equipment that primarily determines how Perstorp will succeed, rather what all the employees are able to achieve. The combined expertise of the employees is an important factor for success. An important tool in this work is the Group's new process for people management and development (the PMD process).



Within the organization there is also the **Perstorp High School**, the Group's own secondary school. Another important area is long-term recruitment, which includes school contacts at all levels, in particular contacts with universities. As part of this, the follow-up of graduates from the high school is a natural element that produces many synergies.

# EMPLOYEES

## - The PMD process

The Group's process for staff management and staff development (**P**ersonnel **M**anagement and **D**evelopment) aims to use the personnel resources that exist within the company in the best possible way and to develop the expertise that is required in order for Perstorp to achieve its vision, increased growth and to become a world-class company within specialty chemicals and materials technology.

Managers and employees share the responsibility for development and further training. Anyone can take the initiative for the activities within the framework of PMD, but it is the manager's responsibility to ensure that the process runs smoothly.

**The various stages of the process, along with a brief description:**

### ***Full-year evaluation and setting new goals***

An appraisal that is conducted every year in December/January with the aim of assessing the past year, and for setting new goals for the upcoming business year.

### ***Personnel and management study***

The purpose of the personnel study is to chart the employees' view of the operation, a survey in which all employees participate.

Within the management study, personnel, colleagues and immediate superiors can give feedback on the manager's performance and behavior.

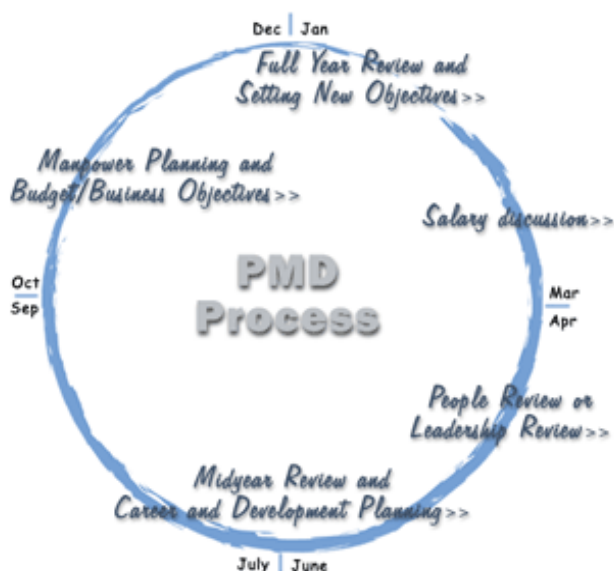
The results help to establish areas for improvement and development.

### ***Half-year evaluation and individual development plan***

A half-yearly follow-up and evaluation is carried out on the basis of the goals for the business year. The main purpose of this discussion is the individual development plan. Such a plan should be drawn up and maintained for all employees in the Group. This includes both an evaluation of the previous year's plan as regards skills development, as well as revision and supplementing for the upcoming business year.

### ***Personnel planning and budget objectives***

Personnel planning deals with converting the strategy into skills requirements. Future needs are assessed based on the results of strategy and budget plans, as well as information about the current workforce. The compilation of the individual development plans is extremely important in this respect.



# EMPLOYEES

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## - Development program resulting in a diploma for manager within Perstorp

Perstorp is working for the successful development of a qualified workforce. In this process, effective management is absolutely essential.

With the aim of ensuring a platform where managers are given the best possible conditions for their work, the Perstorp unit is running a development program resulting in a diploma in which managers at different levels in the organization participate.

The program is conducted as a process lasting approximately 18 months and is built up of various modules with a number of weeks between each one. In addition to training in the fields of collaboration, communication, group development and personal development, the program also includes training in labor law, working environment, finance and strategy matters.



# EMPLOYEES

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## - Trainee program

During 2002 the Perstorp site started a small-scale trainee operation. Two people commenced a trainee program in finance.

One aim of this is to achieve employees with wide-ranging corporate expertise and a high level of flexibility when it comes to future employment.

The program covers work at various financial units, as well as at other departments, for example within production.

The program also includes a period of overseas service at one of Perstorp's non-Swedish units for a period of 3-4 months.

# EMPLOYEES

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## - Perstorp High School

Perstorp High School is an independent school in the Perstorp unit with Perstorp AB as the principal. The course is a three-year, specially designed industrial engineering program with the focus on chemical processes. In order for the students to gain real insight into working life during these three years, the course includes a 10-week practical work placement. This practical work normally takes place at units within Perstorp Industrial Park. During the course, the students are also given the opportunity for two weeks' practical work experience at a non-Swedish unit.



# EMPLOYEES

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## - University contacts and degree work

For Perstorp AB at the Perstorp site, thesis work represents an important recruitment base and contributes to establishing and maintaining contacts with colleges and universities.

Perstorp AB's goal is to have 10 theses completed per year.

Perstorp AB also participates in labor market days at universities in Lund, Kristianstad, Stockholm and Göteborg (Sweden) .

# HEALTH & SAFETY

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# HEALTH & SAFETY

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A good working **environment, health, quality and efficiency** go hand in hand and are the foundation for good profitability. Perstorp views the health of its employees as a central factor for success.

Perstorp is striving to create a healthy, safe working environment where the physical and mental health of the employees is prioritized. Interesting work duties should provide an incentive to personal development and commitment.

Organizational efficiency and good management are viewed as central factors for employees' health and enjoyment.

Read more in:

Occupational health care

Occupational accident statistics

Keep-fit activities

Risk management

# HEALTH & SAFETY

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## - Occupational healthcare

**Good quality occupational health care** at all the Group's facilities is extremely important in ensuring a good working environment and active rehabilitation.

The preventive work carried out by the occupational health care service and local working environment experts includes regular health checks, measurements of chemical and physical working environment factors, inspections on site, risk analyses and training. The occupational health care service is also an expert resource when implementing changes in operations.



Occupational health care at the Perstorp site works with **preventive health care** and is a uniting resource for the working environment work, with wide-ranging expertise regarding the work organization, ergonomics, medicine, toxicology, technology and rehabilitation. As an example of the importance of occupational health care, around SEK 3,200 was invested per employee at the facilities in Perstorp during 2002.

The integral occupational health care service also offers its services to external companies, primarily to companies within Perstorp Industrial Park, but also to other companies outside this area. As a result, the occupational health care service has entered into collaboration with the local municipal authority, giving the authority's employees access to Perstorp's occupational health care resources.

With the aim of creating security and guaranteeing rapid health care, Perstorp AB has taken out health care insurance for all permanent employees in Sweden. The insurance offers the potential for private health care free of charge and covers 10 sessions of psychological treatment and 10 treatments with a physiotherapist, provided these have been referred by a doctor.

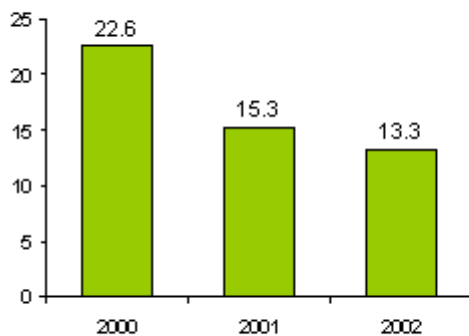
# HEALTH & SAFETY

## - Occupational accidents statistics

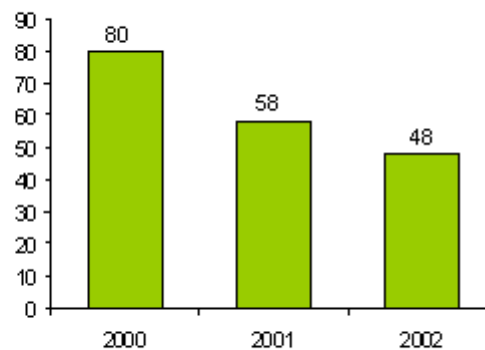
**Perstorp's vision is zero occupational accidents**, and its long-term goal (2006) is an accident rate (LTAR) of 2. At some plants that previously experienced high accident rates, targeted measures have resulted in the accident frequency being reduced and company can discern a positive trend. The plants that have reduced the accident rate most drastically since 2000 are as follows: Perstorp Compounds Inc, Florence, USA, PT Bumi Raya, Pontianak, Indonesia, Vyncolit N.V., Gent, Belgium and Perstorp S.p.A, Castellanza, Italy.

At Vyncolit N.V. in Gent, work has been conducted successfully on reporting near-accidents and risk observations in order to raise risk awareness. The accident rate here has fallen by 73% over two years.

**LTAR**



**LTA**



LTAR = Lost Time Accident Rate, arbetsolycksfallsfrekvens, antal LTAs per en miljon arbetstimmar  
LTA = Lost Time Accident, arbetsolycka med minst en dags frånvaro

# HEALTH & SAFETY

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## - Keep-fit activities

At the Perstorp site, the personnel are offered the opportunity to participate in keep-fit activities at the workplace. During 2002 Perstorp collaborated with Corpus in Klippan (the neighboring municipality) and offered exercise for its employees. The exercise is conducted on our own premises and there is a varied range, including fitness sessions of various types led by training instructors.

These keep-fit activities have recently been further extended through collaboration with the local municipal authority, and the opportunity to exercise at the municipal swimming hall is now also available.



# HEALTH & SAFETY

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## - Risk management

Risk management is part of the responsibility work for each company management. The Group's Risk Management is handled by Corporate Finance and Corporate EHS, where Corporate EHS carries out technical audits and consultancy.

### Objective

The purpose of Risk Management is to work systematically to achieve increased safety and protection against injuries and harm to people, the environment and property, and to limit Perstorp's total risk exposure.

Risk Management is conducted primarily in stages through audits, risk analyses, risk management and risk financing in the form of continuous operations, specific operations and projects.

### Scope

The ongoing work includes dealing with static risks, e.g. through damage prevention and damage limitation work, purchasing global and local insurance policies, and conducting active damage management and follow-up work.

Specific operations encompass reviews and risk analyses for intended corporate acquisitions and sales, as well as following up enquiries during implemented reviews in harmony with the Group's work on the environment, health and safety.

### No fire damage resulting in insurance claims in 2002

There was no fire damage requiring a claim on the insurance during 2002 within the Group.

# HEALTH & SAFETY

## - Improved safety at Perstorp Aegis Chemicals

A clear example of how Perstorp works with damage prevention and damage limitation measures is the program that has been implemented at Perstorp Aegis Chemicals in Vapi, India.

Following an introductory identification of risks, a comprehensive program has been carried out including the following:

- Training personnel with the focus on fire protection, first aid, personal protection
- Introduction of procedures/instructions for safe work
- Introduction of procedures/instructions for the use of personal protection equipment
- Investment in safe chemicals handling during storage, unloading and loading.
- Upgraded electrical safety
- Improved and extended fire safety, e.g. sprinkling storage tanks for flammable goods and extended network of fire hydrants.
- A total of approximately SEK 4 million has been invested in measures aimed at improving safety.



*In front of the formalin plant after implemented measures: An emergency shower has been installed. Personnel have a uniform, protective shoes and a helmet.*



*Western side of the penta factory after decontamination.*



*Eastern side of the penta factory after decontamination with new unloading site for tank trucks and dikes for storage tanks. In the foreground, new coal columns with granulate replacing coal powder.*

# STAKEHOLDERS

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# STAKEHOLDERS

## - Neighbors

Information about the Perstorp Group's environmental work is provided in annual environmental reports, annual reports and various brochures, as well as via the media and the Internet.



Several of the units submit annual public environmental reports to the authorities, including the Perstorp site. In conjunction with the publication of the environmental reports, annual proactive press information is provided in Perstorp, Sweden. The local press is invited to a presentation of the environmental work, and they are also given the opportunity to visit some of the plants within the industrial park.

A major information venture for the general public has been carried out in recent years as a result of legal requirements and the ordering of measures aimed at preventing and limiting the consequences of serious chemical accidents (the Seveso legislation). The law also covers requirements for safety reports, which must be submitted to the authorities. Such reports have been handed in to the authorities. These requirements affect several of Perstorp's production units in Europe.

*The environmental reports, e.g. from the Perstorp site, are public documents.*

A **safety brochure** was distributed in 2000 to all residents of the **Municipality of Perstorp** and the brochure has also been published on the Internet. Press information preceded the distribution of the brochure and resulted in articles in the local press. In direct connection with the distribution of the safety brochure, open days (Chemistry Days) were held at the Perstorp site, where experts were present to answer questions. The information was also available in the form of a screen presentation.

**Corresponding information**, in a more limited scope, has also been passed to the general public in the **Municipality of Höganäs** in collaboration with the rescue services in Höganäs, Sweden. Perstorp Forr AB has a plant in the Höganäs industrial port for unloading, storage and loading of methanol.

A brochure containing corresponding information has also been compiled **Perstorp Oxo in Stenungsund**, along with other petrochemical industry and in collaboration with the rescue services in Stenungsund, Sweden. The brochure has been distributed to all residents in The Municipality of Stenungsund and the neighbors in the region, such as East Tjörn.

The plant in Stenungsund, Perstorp Oxo AB, has two local information channels. Molekylverkstan ("the molecule workshop") is a science center that is run by Storindustrin in Stenungsund. The founders' operations and environmental work are described there. Molekylverkstan was visited by around 50,000 people in 2002. Four to six times a year, Molekylen is issued as an advertising page in a regional newspaper distributed to all residents. Molekylen deals with the petrochemical complex's environmental work in a broad sense.

During the year, the unit in Stenungsund had ongoing contacts with the media regarding environmental work, for example concerning a major project for the transition from fuel oil to natural gas as a raw material in basic production.

Information regarding safety and the environment has also been provided at several of Perstorp's units overseas, including in Gent, Belgium and in Bruchhausen, Germany.



# STAKEHOLDERS

## - Neighbors



Safety brochures have been distributed to the general public by several of the Perstorp Group's units, including the unit in Bruchhausen, Germany.

**Perstorp Chemicals GmbH in Bruchhausen, Germany**, has satisfied the high requirement level stipulated in the Seveso legislation and distributed a safety brochure to the neighbors. A safety report has also been submitted to the authorities.

**Perstorp Oxo Belgium AB in Gent, Belgium**, together with the "Ministry of Internal Affairs", has compiled an information brochure that has been distributed to the households in the region. Information has been provided via features on TV and through a joint event at which representatives from all the municipalities that have Seveso plants participated and at which experts were present who were able to answer questions from the general public.



Questions and complaints from the general public are received and remedied in accordance with procedures set out in the management system (ISO 14001).

There have been a few individual complaints regarding odor and noise at certain units during 2002, including the units in Perstorp (Sweden), Gent (Belgium), Castellanza (Italy) and Florence (USA).



# STAKEHOLDERS

## - Environmental authorities



**During the business year the Group** had production units in 8 countries in Europe, North America and Asia.

In Sweden, the Group has some twenty operations that require a permit, and these have valid permits for the manufacture of substances such as polyalcohols, formic acid, formalin, as well as acids, alcohols, etc., e.g. within Perstorp Specialty Chemicals AB, Perstorp Formox AB and Perstorp Oxo AB. The units requiring permits carry out the majority of the Group's operations in Sweden. Each unit is obliged by law to submit annual environmental reports, which have been approved by the supervisory authority.

*During 2002, the neopentylglycol plant in Perstorp submitted an application to the Environmental Court regarding extended production.*

**In Sweden**, consultation meetings were held during the year with the Skåne County (the county in which the Perstorp site is located) Administrative Board and other relevant parties regarding extended production of neopentyl glycol at the Perstorp site. An application has also been submitted to the Environmental Court in Växjö.

**The primary negotiations** were conducted with the Environmental Court during February 2003 regarding extended production of formalin and pentaerythritol at the Perstorp site. New license rulings have subsequently been obtained. A license judgment was also received in 2002 from the Environmental Court in Växjö regarding the expansion of formic acid production. A license judgment from the Environmental Court in Växjö regarding the establishment of a new factory for Boltorn® at the Perstorp site has been challenged by a private individual and is being referred to the Senior Environmental Court/Svea Court of Appeal for a ruling. The same private individual has complained about the new license judgment for the formic acid factory, and the same applies to formalin and pentaerythritol. The Swedish Environmental Protection Agency has also challenged the last two judgments, although only the part referring to transport conditions. The Perstorp Group has also complained about the transport conditions detailed in these two cases.



*The formalin plants in Perstorp has been given permission during 2003 for extended production.*

**During 2003**, additional applications for extended production are expected to be submitted, including for Perstorp Specialty Chemicals AB and Perstorp Formox B.

# STAKEHOLDERS

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## - Environmental authorities



*The unit in Stenungsund is preparing to change from fuel oil to natural gas as the raw material in the synthesis gas plant.*

**During the early summer 2002**, the unit in Stenungsund conducted early and comprehensive consultations with the authorities and other stakeholders regarding a new application to the Environmental Court. The application covers the switch from fuel oil EO 5 to natural gas as the raw material in the synthesis gas plant, extended aldehyde production, organic acid production, hydrogenated products and new types of ester based on carboxylic acid and other alcohols. A partial ruling regarding consent to commence the building work was obtained in February 2003. The introduction of natural gas will entail several positive environmental effects, as the gas does not contain sulfur, nitrogen or heavy metals.

**This means that existing plants** for sulfur treatment and nitrogen reduction can be shut down. It is also anticipated that biological sludge from the treatment of process waste water will be more or less free of heavy metals, which will result in new offsetting opportunities.

**A number of new permits** have also been issued during the year for various units outside of Sweden. Examples include the units in Germany, Belgium, the USA and India.

**The units in Toledo and Florence in the USA** have received minor fines, due to certain offences, e.g. regarding reporting in accordance with applicable environmental legislation. The Toledo unit has had to pay \$5,775 and the Florence unit \$500.

# STAKEHOLDERS

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## - Customers

The business unit **Environmental Catalysts within Perstorp Formox** focuses on the development, production and marketing of catalysts for reducing emissions of volatile organic compounds (VOC). This part of the company's operations constitutes a unique undertaking towards environmental safety that extends beyond the company's core operations in the formalin sector and facilitates increased environmental safety for a growing number of other industrial processes where VOC emissions cause problems.



**Catalytic systems** for reducing VOC emissions differ from conventional thermal incineration in two ways, both of which are important from an environmental point of view. As catalytic systems reach full effect at significantly lower working temperatures than thermal systems, emissions of carbon dioxide (CO<sub>2</sub>) and nitrous oxides (NO<sub>x</sub>) are lower while the energy consumption is significantly reduced, normally by 65-70%. The difference is greatest when the VOC content in the residual gas is low.

*Perstorp Formox offers a number of VOC catalysts for various needs.*

The business unit Environmental Catalysts within Perstorp Formox focuses on close cooperation with catalytic system suppliers in order to achieve optimum solutions for their industrial customers. Until recently, all catalyst R&D (including formalin catalysts) within Perstorp Formox was organized under Environmental Catalysts. However, a reorganization was implemented in December 2002 whereby a separate unit was established for catalyst R&D. The new organization reflects and promotes the growth within Environmental Catalysts and satisfies the need to refine R&D to meet the market's future needs for both VOC and formalin catalysts.

The **development work** within formalin catalysts aims in part to reduce the amount of unreacted methanol, as well as to reduce the generation of by-products to a minimum. Both of these measures are intended to improve the environment and the economic situation. By increasing productivity in the plant, it is possible to reduce power consumption at the same time as producing more energy in the form of steam.

**Read more about Perstorp's environmental cooperation** with customers in Research and development.

# STAKEHOLDERS

## - Suppliers and contractors

### Suppliers

#### Evaluation of suppliers from an environmental perspective



Within the framework of Perstorp's management system based on ISO 14001, suppliers are also assessed from an environmental perspective.

The first step is to carry out an initial environmental assessment of new suppliers. In cases where Perstorp considers that the relevant raw material/auxiliary chemical is linked to a significant environmental aspect, a more in-depth analysis is carried out.

At the Perstorp site, the environmental unit at Perstorp Support carries out the environmental analysis and make a pronouncement to the purchasing department. During an annual review, the environmental unit at Perstorp Support AB presents the replies received from the suppliers, and the annual review meeting reaches a decision on what environmental requirements are to be stipulated. The requirements are then communicated to the supplier via the purchasing department.

*Several of the most important raw materials are delivered via rail tank car to the Perstorp site.*

During 2002/2003 a more in-depth environmental evaluation of suppliers has been carried out for a number of important raw materials at the Perstorp site. In one of these cases, the evaluation led to an environmental audit being required on site at the supplier. Other suppliers were found to conduct good environmental work.

#### Cooperation with suppliers

Perstorp cooperates to a large extent with its suppliers regarding various environmental and safety issues. Examples of these include the units in Stenungsund (Sweden), Castellanza (Italy) and Vapi (India), which communicate safety issues with their suppliers in order to maintain a high level of safety at every stage. Another example is Oxo Intermediates' unit in Gent (Belgium), which is working to reduce the amount of packaging material along with some of its suppliers. A further example is the formic acid factory at the Perstorp (Sweden) site, which has sent delegates to one of its suppliers. These delegates have provided training in environment, health and safety.

# STAKEHOLDERS

## - Suppliers and contractors

### Contractors



At the Perstorp site, for example, there are carefully drawn up, general provisions for contract and consultancy work, as well as for transport within the industrial park. For details of what these provisions cover, see below.

*Radical improvements are being carried out at the penta plant in Perstorp with the aid of both own personnel and contractors.*

### General provisions for contract and consultancy work

These encompass detailed provisions for contractors and consultants working within Perstorp Industrial Park. The provisions deal with subjects such as flammable goods, substances that are harmful to health and the environment, permits for carrying out work in installations and equipment, training requirements for some jobs such as forklift truck driving and hot-work, requirements for personal protection equipment, excavation, blasting, cleaning and source separation, alarm procedures, as well as rules regarding tidiness and traffic issues.

### General provisions for transport

These regulate such things as requirements for drivers to be able to produce transport documentation, e.g. driver's certificates and vehicle certificates for the transport of hazardous goods. The provisions also deal with requirements regarding personal protection equipment, general protection regulations, alarm procedures, rules regarding tidiness and traffic issues within Perstorp Industrial Park.

# STAKEHOLDERS

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## - Industrial organizations

**Employees at Perstorp participate actively** in various working groups within national and international trade organizations.

Deputy President Inge Petersson is on the board of CEFIC (the European Chemical Industry Council). He is also a board member of the Swedish Plastics & Chemicals Federation (a Swedish trade organization), and is the chairman of the organization's environmental committee.

Perstorp has two other members in this committee, Jan Petersson, President of Perstorp Support, and Arne Alexandersson, manager of EHSQ Perstorp Oxo. Jan Petersson is also the chairman of the sector's safety committee. Arne Alexandersson is a member of the committee that deals with matters relating to hazardous goods.

Anna-Lena Rykfors, product safety manager at Perstorp Oxo, is on the sector's chemicals control committee.

# STAKEHOLDERS

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## - Transfer of technology

Environmental safety has become an integrated part of Perstorp Formox's operations and is founded on the idea that sound environmental practice can be encouraged by making it financially profitable. This also contributes to reducing the environmental effects among customers from countries where the environmental legislation is not particularly stringent. An example of this is the fact that, for the past decade, all formalin factories that Perstorp Formox designs and supplies have an integrated and highly efficient Emission Control System (ECS). Not only does the ECS almost eliminate emissions of volatile organic compounds (VOC), it also generates valuable steam that in turn recovers energy.

Perstorp Formox also shares new knowledge, e.g. regarding the safe handling of methanol and formalin with formalin producers worldwide, both via its customer newsletter informally speaking and via the regular technical meetings that constitute an important part of Perstorp Formox's long-term commitment to its customers.

A third example relates to the company's formalin catalysts. In addition to the fact that production is certified according to ISO 14001, Perstorp Formox offers all its catalyst customers a unique repurchase offer, where Perstorp Formox buys back used catalyst and can thereby ensure maximum recycling of raw materials and safe handling of residual products from every Perstorp Formox customer around the world.

A fourth example is the actual Environmental Catalysts business unit within Perstorp Formox, whose purpose is actively to develop, produce and market highly effective catalytic treatment of VOC. These catalysts can be used in many different industrial processes, i.e. not solely within formalin production. Catalytic VOC treatment leads to reduced emissions of carbon dioxide (CO<sub>2</sub>) and nitrous oxides (NO<sub>x</sub>) compared to thermal incineration, while reducing energy consumption by almost two-thirds.



*Formalin plant 5 at the Perstorp site.*

# STAKEHOLDERS

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## - Competitors

In most countries there are laws and regulations aimed at restricting limitations on free competition. It is of great importance that our actions towards business partners, competitors, the authorities and others are characterized by sound, proper business practices and that we comply with relevant laws and regulations, including those governing competition. This is a demand the Perstorp Group places upon those with whom we deal and which we also place upon ourselves.

# STAKEHOLDERS

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## - Communication / Contact with Perstorp



*Beech forest in the area around the Perstorp site.*

Perstorp looks forward to receiving your opinions about Environmental Report 2002. Everyone is welcome to send their comments and wishes for the future. Perstorp is happy to receive viewpoints regarding improvements to its environmental report and will consider all received suggestions when conducting future work on Environmental Report 2003.

If you would like to submit your opinions or would like further information about the environmental work of the Perstorp Group, please contact the manager of Environment, Health and Safety [jan.petersson@perstorp.com](mailto:jan.petersson@perstorp.com) or the environmental controller [margareta.midenstam@perstorp.com](mailto:margareta.midenstam@perstorp.com)

**Environment, Health & Safety/  
Perstorp Support AB**

PERSTORP AB  
SE-284 80 Perstorp, Sweden  
Phone: + 46 435 380 00  
Fax: 0435-380 10

# ENVIRONMENTAL-RELATED FINANCIAL DATA

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**For the past few years**, Perstorp has been publishing environmental/financial information in an environmental report, covering the external environment, the working environment and safety. The table below in the linked document shows the costs and types of investments by business area for calendar year 2002. In order to facilitate parallels with the ordinary financial reports, the same accounting procedures have been adopted to the greatest possible extent. Divestments during the year are not included in the summary.

**Investments during** calendar year 2002 related to the environment, the working environment and safety, amount to SEK 39.9 million, which is an increase of approximately SEK 13 million compared to last year. The majority of the investments contemplated involves the external environment.

**The environmental/financial data** in the environmental report comprise EHS-related costs as well as EHS-related investments (EHS = environment, health and safety).

**The costs include expenses** for transports/treatment of waste, wastewater, clean-up of land, operation, maintenance and control of purification plants, costs for EHS management system and certification, own EHS personnel and consultants, fees to authorities etc.

**The investments include new investments** in equipment, which are made wholly or partly to reduce impacts on the environment, including peripheral costs for planning, installation and connection fees. Investments for the purpose of expanding, altering, adapting and improving already existing equipment are also included.

# ENVIRONMENTAL-RELATED FINANCIAL DATA

Summary of environment-related financial data by business area for the Perstorp Group during calendar year 2002.

Costs and investments (in SEK millions), excl divested business	Perstorp Coating Intermediates	Perstorp Performance Chemicals	Perstorp Oxo Intermediates	Perstorp Formox	Perstorp Engineering Materials	Other areas	Group total 2002
Costs hazardous waste	2.12	0.11	4.5	0.01	0.53	0.5	7.77
Costs other waste	2.88	0.12	1.9	0.36	3.2	1.5	9.96
Costs wastewater	28.43	0.51	0.7	0.76	2.35	0.2	32.95
Costs clean-up land	0.77	0.01	0	0	0	0	0.78
Costs EHS operation, maintenance, control	1.31	0	6.3	0	2.09	0	9.70
Costs EHS personnel and consultants	7.05	0.13	6	0.46	2.41	6.4	22.45
EHS fees to authorities	0.48	0.02	0.5	0.24	0.7	0.1	2.04
Other EHS costs	0.09	0	1.2	0	0.3	0	1.59
Investments in safety/fire protection	2.75	1.25	0.2	0.26	2.01	0.6	7.07
Investments in working environment	1.07	0.64	1.2	0.26	0.21	0.4	3.78
Investments in the external environment	18.69	0.08	2.70	0.06	0.8	6.75	29.08
<b>Total EHS costs</b>	<b>43.13</b>	<b>0.9</b>	<b>21.1</b>	<b>1.83</b>	<b>11.58</b>	<b>8.7</b>	<b>87.24</b>
<b>Total EHS investments</b>	<b>22.51</b>	<b>1.97</b>	<b>4.10</b>	<b>0.58</b>	<b>3.02</b>	<b>7.75</b>	<b>39.93</b>

# PRESENTATION PRINCIPLES

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## Target group:

The Annual Environmental Report of the Perstorp Group addresses several target groups: among others employees, neighbors, customers, environmental authorities, suppliers, contractors, students, industrial organizations, politicians, the mass media etc.

## The collected data:

Information about the work on environment, health and safety of the production units within the Perstorp Group during the calendar year 2002 was collected through electronic questionnaires (Lotus Notes database) that were sent to EHS coordinators at each production unit, as well as through the data reported directly in the EHS database by the coordinators. The collected data were then sent to be authorized by the managers with legal responsibility. The Group-wide EHS department in Perstorp then compiled the data and issued the reports on which the Annual Environmental Report is based.

The Environmental Report of the Perstorp Group is based on the group standards for environmental reporting and does not follow any individual international guiding principles. However, the Global Reporting Initiative (GRI) and the Deloitte&Touch checklist have served as a source of inspiration to a certain extent.

## Presentation delimitations:

Data on emissions and waste from companies partly owned by the Perstorp Group are adjusted before being presented in the Annual Environmental Report, which includes only the proportion of the emissions and waste corresponding to the share of Perstorp's ownership. Exception is made in the site presentations, which report 100% of the emissions and waste, irrespective of Perstorp's share of ownership.

The environmental report includes units owned by Perstorp during the whole calendar year 2002. Acquisitions and divestments during the year are not included.

The indicators for previous years have been adjusted in order to be compared to the Perstorp Group operations of 2002.

Compared to the environmental reports of the previous years, the environmental report of 2002 is more comprehensive, covering an increased number of issues.



*The Environmental Report is compiled at the head office in Perstorp.*

# GLOSSARY

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<b>AOX</b>	Absorbable Organic Halogens. An umbrella term for chlorine (or other halogens) that is chemically bonded to an organic substance.
<b>Biofuels</b>	Fuels from the vegetable kingdom, e.g. firewood, chips, bark, wooden pellets, energy forest, etc. Renewable fuels.
<b>BOD</b>	Biochemical Oxygen Demand. An indicator of the amount of oxygen consumed in biological decomposition of organic compounds in water (normally measured during 7 days).
<b>Bunded areas (dikes)</b>	A concrete basin or the like, in which a storage tank is placed, enabling the collection of spillage without leeching to the ground and waterways.
<b>Carbon dioxide (CO<sub>2</sub>)</b>	Colorless gas found in natural ecological cycles. It is formed in natural processes as well as in the combustion of various fuels. Carbon dioxide accounts for more than half of the greenhouse effect. Combustion of fossil fuels (but not biofuels) gives a net addition of carbon dioxide to the atmosphere.
<b>Catalytic combustion</b>	Technique for cleaning process exhaust gases with a typical cleaning efficiency of more than 99 %. The cleaning takes place in a catalytic bed at a temperature between 200 and 400 °C.
<b>CFC</b>	Chlorofluorocarbons. Cooling agents contributing to the depletion of the stratospheric ozone layer, and to the greenhouse effect.
<b>CFC 11</b>	The most common CFC compound. It is mainly used in industrial air conditioning and as a blowing agent for flexible foams.
<b>CFC 11-equivalent</b>	The ozone-depleting potential of one kilogram of CFC 11.
<b>CO<sub>2</sub></b>	See carbon dioxide.
<b>CO<sub>2</sub>-equivalent</b>	The contribution to the greenhouse effect equal to one kilogram of CO <sub>2</sub> .
<b>COD</b>	Chemical Oxygen Demand. An indicator of the amount of oxygen needed for complete (chemically induced) decomposition of organic material to carbon dioxide and water.
<b>EHS</b>	Environment, Health & Safety
<b>EMAS</b>	Eco Management and Audit Scheme. An EU ordinance for environmental management and environmental auditing.
<b>Energy recovery</b>	Secondary use of heat emitted from waste incineration, use of heated cooling water for heating purposes, etc.
<b>Environmental management systems (EMS)</b>	A method to integrate environmental work in the overall management system (e.g. ISO 14001 and EMAS).
<b>Eutrophication</b>	The enrichment of bodies of fresh water by inorganic plant nutrients (e.g. nitrate, phosphate).
<b>Fossil fuels</b>	Oil, coal, natural gas. Fuels consisting of organic hydrocarbons from sediments (i.e. remnants of prehistorical animal and plant life). A finite resource.

<b>Gigawatt hour (GWh)</b>	An measurement of energy consumption, mostly used for electrical energy. One GWh equals one million kilowatt hours (kWh).
<b>Greenhouse effect</b>	Gases in the atmosphere that allow thermal radiation from the sun to penetrate the atmosphere but because they tend to absorb such radiation, they are feared to promote global warming. The principal greenhouse gases are carbon dioxide, methane, dinitrogen oxide (N <sub>2</sub> O) and CFC compounds.
<b>GWP</b>	Global Warming Potential. The ability of a substance to contribute to the greenhouse effect. GWP is measured in CO <sub>2</sub> -equivalents, i.e. carbon dioxide has a GWP of 1.
<b>Halogenated hydrocarbons</b>	Hydrocarbons in which one or more hydrogen atoms are substituted for fluorine, chlorine or bromine. These compounds, used in a variety of applications such as cooling agents and aerosols, contribute to the depletion of the stratospheric ozone layer and to the greenhouse effect.
<b>Halon</b>	Brominated fluorocarbons. Used as fire-extinguishing agents, for example. Halons are harmful to the stratospheric ozone layer.
<b>Hazardous waste</b>	Waste that has been classified as a threat to health or the environment. Hazardous waste is handled and disposed of in accordance with specific rules.
<b>HCFC</b>	Hydrochlorofluorocarbons. Chlorofluorocarbons in which the halogenation is incomplete. These compounds are harmful to the stratospheric ozone layer but have less ozone-depleting potential than CFCs.
<b>HFC</b>	Hydrofluorocarbons. Incompletely halogenated fluorocarbons. These compounds have no ozone-depleting potential but they contribute to the greenhouse effect.
<b>Hydraulic load</b>	Flow-related load (e.g. m <sup>3</sup> /day)
<b>Inorganic substances ISO 14000</b>	Substances that do not contain carbon (e.g. salts, metals and minerals). A series of international standards for environmental management systems, life cycle assessments, environmental audits, etc.
<b>Kilowatt hour (kWh)</b>	Energy unit equal to 1000 watts for 1 hour.
<b>Landfill</b>	Isolated area for final disposal of waste. Hazardous waste is not suitable for landfill.
<b>Liquified Petroleum Gas (LPG)</b>	Propane and butane gas compressed into the liquid state.
<b>Life-Cycle Assessment (LCA)</b>	Method estimating the environmental impact of products over their entire life-cycle – from raw material to waste.
<b>LPG</b>	See liquified petroleum gas.
<b>LTA</b>	Lost time Accident
<b>LTAR</b>	Lost Time Accident Rate
<b>Nitrogen (N)</b>	An element. Emissions to air may cause eutrophication, which in turn may lead to oxygen deficiencies as dead plants decompose.

<b>Nitrogen oxides (NOX)</b>	Umbrella term for nitrogen monoxide (NO), nitrogen dioxide (NO <sub>2</sub> ) and some other nitrogen oxides. NOX is formed in combustion, with motor vehicles accounting for a major source of emissions. Among other things, it contributes to acidification, eutrophication and ground-level ozone formation.
<b>NO<sub>x</sub></b>	See nitrogen oxides
<b>ODP</b>	Ozone Depletion Potential. The ability of a substance to deplete the stratospheric ozone layer. ODP is measured in relation to CFC-11, which has an ODP of 1.
<b>Organic compounds</b>	Compounds containing carbon.
<b>Ozone</b>	A gas consisting of three oxygen atoms per molecule (O <sub>3</sub> ). The stratospheric ozone layer protects the earth from harmful levels of ultraviolet radiation from the sun. Ground-level ozone, however, is considered to be a pollutant. Among other things, it can harm plant life.
<b>Phosphorous (P)</b>	An element. Emissions to water may cause eutrophication, which in turn may lead to oxygen deficiencies as dead plants decompose. Phosphorous is widely used in fertilizers.
<b>Recycling</b>	Housekeeping of resources by utilizing leftover or used materials in the manufacturing of new products.
<b>Renewable energy</b>	Energy from solar heat, wind power, hydropower and biofuels. An infinite resource.
<b>Responsible Care</b>	A global program for continuous environmental improvement, initiated by the chemical industry.
<b>S.H.E.</b>	Safety, Health and Environment, now more commonly referred to by the abbreviation EHS.
<b>Sulfur dioxide (SO<sub>2</sub>)</b>	Formed in the combustion of sulfur-containing fuels like coal, oil and peat. SO <sub>2</sub> contributes to acidification.
<b>Sulfur hexafluoride (SF<sub>6</sub>)</b>	Isolating gas in electrical interlocks. One of the most aggressive greenhouse gases (very high GWP).
<b>Suspended solids</b>	Water-borne substances, mainly consisting of particles.
<b>TOC</b>	Total Organic Carbon. The amount of organic, carbon-containing material in water measured as elemental carbon.
<b>Watt (W)</b>	Unit of power, energy per unit time, J/s.
<b>VOC</b>	Volatile Organic Compound.



Sydsvenska Kemi AB  
SE-284 80 Perstorp  
Sweden  
Telephone +46 435 380 00  
Fax +46 435 381 00  
[www.perstorp.com](http://www.perstorp.com)