

1998



Environment, Safety, Health

HENKEL GROUP





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Systematic approach

Management systems are an important tool for the continuing development of safety, health and environmental protection. Their systematic application reveals where improvements can and should be made.



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For mankind and the environment

Henkel consistently applies the concept of product stewardship to the whole life cycle of its products.



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Against noise

Meticulous noise analyses in the production departments help to develop solutions leading to an appreciable reduction in noise generation.

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Environmentally compatible production

Management and employees are resolutely improving environmental protection, health protection and safety at all Henkel Group sites. A wealth of examples demonstrates how problems are being solved through creativity and resourcefulness.

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On a small scale

Henkel-Ecolab has recently developed a compact dispensing system for professional hygiene in small businesses. Concentrated cleansing agents, disinfectant solutions, and sanitation and glass cleansers can thus be precisely diluted with water.



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Environmental documentation

Henkel Chile has recorded and documented all of its Santiago site's activities and precautions relating to environmental protection and safety in a 17-point program.

The balance between economics and ecology

This report, the seventh in annual succession, includes information on selected activities and efforts of the whole Henkel Group during the past year in the fields of environmental protection, health and safety.

Two important international conferences dealt with these subjects in 1997. One of these was the special session of the General Assembly of the United Nations in New York in June. The United Nations took stock of the progress made toward achieving the sustainable development goals stipulated in Agenda 21 at Rio de Janeiro in 1992. The other was the World Climate Summit held at Kyoto in December.

We felt that this was a suitable background for a critical internal analysis of where the Henkel Group now stands, to establish whether and to what degree we have done our homework.

One thing has become very clear in the five years since Rio: There are currently few signs of a globally harmonized approach to concerted action aimed at achieving sustainable development. We should not, however, allow ourselves to be discouraged by this. We endorse the concept of sustainability, and we are pursuing it by setting concrete objectives and implementing programs comprising specific measures.

The integrated management system currently being set up in the Henkel Group is an important aid in this con-

text. It includes Henkel standards, as well as the internationally agreed requirements of the ISO 9000 group of standards for quality management, the ISO 14001 standard, the EU Eco Management and Audit Scheme, and the requirements of the chemical industry's worldwide Responsible Care® initiative.

Pointing the way ahead

The integrated management system – referred to as the SHEQ system (Safety, Health, Environment, Quality) ensures that forward-looking ideas and concepts are developed and implemented in the Henkel Group. It also makes certain that many – at first sight sometimes insignificant, but nevertheless indispensable – concrete, individual steps are coordinated and directed toward achieving sustainability.

The Production chapter in this report was written with this in mind. Individual measures at a large number of sites around the world are described in it. Chinese production sites report for the first time on the progress they have made in environmental protection, safety and health. These site reports also reveal the wide variety of national and regional environmental and safety situations encountered by Henkel when it acquires other companies and participates in joint ventures.

Among other factors, these insights led us to decide, as a preliminary step toward complete implementation of the SHEQ management system, to establish uniform safety standards in the Henkel Group as quickly as possible. In 1997, a start was made on the safety audits that have to be carried out to document the current situation. So far, 23 sites in Europe, America and Asia have been au-

dated with the support of Henkel experts from Düsseldorf. It is expected that a total of approximately 150 sites will have been audited in about two years.

Where potential improvements are identified, they are implemented in the context of a program of measures. The safety audits, which also take environmental aspects into account, are carried out by a team consisting of the technical managers for the sites involved and experienced specialists from headquarters in Düsseldorf. Henkel trains its own specialists for this task and releases them from their other duties to carry out the audits.

Sustainable development also means designing products which can be manufactured with the greatest possible conservation of resources, whose use involves a minimum of risk to the user, and which are as environmentally compatible as possible during and after their service life. Such new developments from our various fields of business are described in the Products chapter.

The Environmental Data section of the report reveals marked changes in almost all environmental parameters of the Henkel Group. This is because our major acquisitions in recent years (Schwarzkopf, Loctite and Novamax), as well as Chinese sites, are included for the first time. Due to these additional companies, and to the commercial successes of the companies which have been part of the Group for some time, production expanded considerably. In the Henkel Group as a whole, output increased by 35 percent in 1997.



Dr. Wilfried Umbach

Growth and more emissions

The number of employees rose from 47,000 at the end of 1996 to 54,000 last year. Sales climbed to more than DM 20 billion in 1997 (previous year: DM 16.3 billion).

As a result of this growth, there was also a change in the environmental impacts associated with the Group's activities. Emissions and consumption of resources increased. The new situation is documented in this report, in the form of the accumulated environmental data for 1997 from 88 sites (previous year: 52).

A comparison of the old and the new data – on the basis of the consumption of resources, for example, or the emissions per metric ton of manufactured product – would not be very revealing, given the widely diversified product range of the Henkel Group. Such specific data can be very meaningful in relation to individual sites, however, and they are therefore included in many of the site reports. In this context they show that, despite the often considerable growth in production, emissions and raw materials per metric ton of product are in fact decreasing. The sites are therefore making an important contribution to sustainable development.

Avoidance of emissions of climate-changing gases

Extensive energy-saving programs have already been carried out by the Company in the past. Achieving further cuts in energy consumption would therefore be a major challenge. In view of this, we welcome the strong interest shown at the Kyoto Climate Summit in finding alternative ways to reduce carbon dioxide concentrations, such as 'carbon sinks,' e.g., by means of reforestation.

Henkel has focused on avoiding emissions of climate-changing gases for many years. For example, our first Group-wide products audit in 1989 revealed that chlorofluorocarbons (CFCs) were no longer being used as propellants even then.

The growth and commercial success of the Henkel Group in 1997 has contributed toward ensuring its continued existence. We are convinced that only economically successful companies can establish the long-term balance between economics and ecology that is essential

to sustainable development, and can contribute toward social progress.

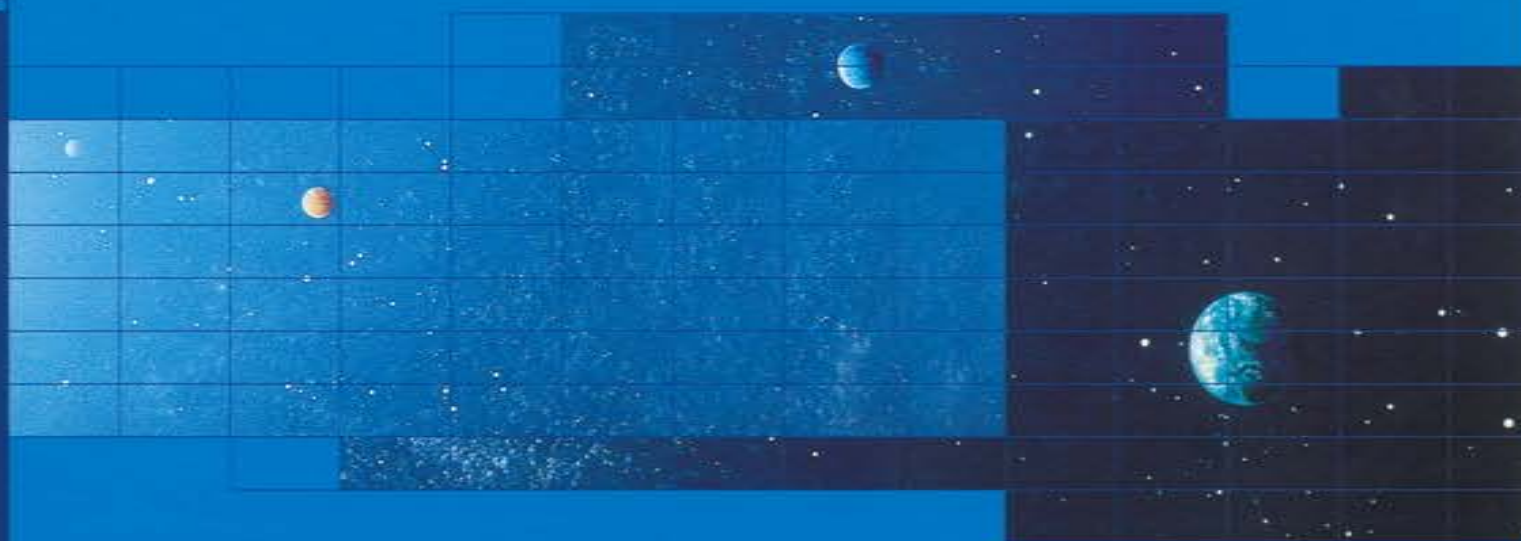
An analysis of the Henkel Group's current situation, almost six years after Agenda 21 was signed in Rio de Janeiro, shows that we have moved in the right direction through implementing concrete measures and programs. It also reveals the major challenges of the future.

We will continue our efforts to make a contribution to sustainable development. Our customers, our partners and the public – but also we ourselves – expect no less.

Dr. Wilfried Umbach

Executive Vice President
Research/Technology

A systematic approach to safety, health and environmental protection



Management systems are an important tool for the continuing development of safety, health and environmental protection. Their systematic application throws a clear light on what has already been achieved and simultaneously reveals where improvements can and should be made. Henkel makes this situation transparent for the outside world.

Integrated management system for safety, health, the environment and quality

Henkel regards an efficient management system as an indispensable tool for giving shape to its intention to achieve sustainable development, and for translating this intention into practice. For this reason, the Manage-

ment Board of the Henkel Group decided, in 1996, to develop and introduce an integrated, process-oriented management system.

The Henkel Group's integrated management system covers all requirements of:

- the chemical industry's worldwide ►Responsible Care** initiative,
- the ►Eco Management and Audit Scheme of the European Union (EU),
- the environmental management standard ►ISO 14001, and
- the quality management standard ►ISO 9001.

The SHEQ management system defines the Henkel standards on Safety, Health, the Environment and Quality for all business sectors and sites. The 1997 Environment Report provided information on this subject.

In the meantime, the 15 standards on safety, health and the environment, which were drafted by an international team, have been approved, as have the guidelines governing their translation into practice. They supplement Henkel's already existing quality management system.

Due to its process-oriented structure, the new integrated system reflects work and busi-

ness processes. This makes its application much easier. The management system is implemented independently by each business sector.

The implementation phase of the SHEQ management system

is currently in progress. Checklists make it easy for the business sectors and each individual site to carry out an inventory and determine the extent to which the requirements of the

management system have already been met.

To implement the management system, the separate business sectors choose procedures that are appropriate to their own structures. SHEQ professionals



Henkel's integrated management system for safety, health, the environment and quality satisfies the demands of sustainable development with regard to economics and ecology.

It also complies with the demands of the chemical industry's Responsible Care initiative and all of the requirements of quality management.

The international ISO 9001 and 14001 standards and the European Union's Eco Management and Audit Scheme are also com-

pletely covered by the SHEQ system. Carrying out safety audits and the Product Stewardship 'practice in place' assessment ensures preferential implementation of all of the significant goals of the SHEQ management system in the fields of occupational safety, plant safety and hazard prevention at all Henkel sites. Although the social aspect of sustainable development is not completely covered by the SHEQ management system, Henkel is committed to progress in this area as well (see page 12).

Safe and environmentally responsible storage. A number of sites have already had their environmental management system certified. The photo shows the Henkel Fragrance Center in Krefeld.



have been appointed and SHEQ promotion teams have been set up at many sites. Other tools include audits, sometimes with the support of experts from Düsseldorf, agreed plans of action, and the communication of objectives, measures and progress.

There are also sites that act as models, implementing the complete management system as a pilot project over a short period of time. The overview drawn up by the business sectors at the end of 1997 indicated that a large number of sites have already largely introduced the SHEQ system.

The introduction of the SHEQ management system was supported by numerous communication and training measures in 1997. These included a national and an international seminar for SHEQ professionals in Düsseldorf.

Henkel has produced an information brochure specifically for its management staff. Entitled "Responsible Care and Quality Management," it describes the new integrated management system in detail. This brochure is distributed to all managers throughout the Henkel Group. All employees are also informed. In Germany this is done through the employee newspaper.

The integrated management system is not static. In 1998, the standards and guidelines will be updated, taking into account the experience gained during their

implementation at the sites and in the strategic business units.

The introduction of the management system simultaneously serves to prepare for certification to the international standards for environmental management systems.

An important follow-up step is the development of quantitative SHEQ performance indicators, as well as their Group-wide harmonization and application. Performance indicators provide management – and employees – with important information. One of their uses is as an aid to controlling improvement processes and monitoring the extent to which the objectives of these processes have been achieved.

The trend continues

Certified environmental management systems

Several business sectors of the Henkel Group aim to have the environmental management system of their sites certified successively, in accordance with internationally recognized standards, by accredited external verifiers. A number of sites have already been certified. The table shows how matters

stood at the end of 1997. The abbreviation EU (European Union) indicates validation in accordance with the requirements of the European Union's ►Eco Management and Audit Scheme. ►ISO 14001 is the international standard for environmental management systems.

Certified sites

		ISO 14001	EU
Belgium	Henkel Belgium, Herent	●	
Denmark	Henkel-Ecolab, Valby	●	
Germany	Grünau Illertissen, Illertissen	●	●
	Henkel Fragrance Center, Krefeld	●	●
	Henkel, Düsseldorf-Holthausen		●
	Henkel Oberflächentechnik (until 1997: Gerhard Collardin GmbH), Herborn-Schönbach	●	●
	Henkel Teroson, Heidelberg	●	●
	Kepec Chemische Fabrik, Siegburg		●
	Thompson-Siegel, Düsseldorf-Flingern	●	
Netherlands	Henkel-Ecolab, Nieuwegein	●	

Sites that aim to achieve certification in 1998

		ISO 14001	EU
Belgium	Henkel-Ecolab, Tessenderlo	●	
Brazil	Indústrias Químicas, Jacarei	●	
Germany	Neynaber Chemie, Loxstedt	●	●
	Henkel-Ecolab	●	
Spain	Henkel Ibérica, Pulcra, Barcelona	●	
Turkey	Türk Henkel, Cayirova	●	

Safety audits

Production site inspections

Implementing the integrated management system for safety, health, the environment and quality in the Henkel Group is labor-intensive. The necessary measures must be put into effect as an addition to the daily routine of each site.

The implementation times within the Group vary. Not all of the 15 SHE standards are equally important. The highest priority is undoubtedly assigned to matters concerning safety and health protection at the sites.

A trial was conducted at 23 Henkel sites in Europe, Asia, North America, and Latin America in 1997. At the end of the year, the Henkel Group Management Board decided that

safety audits should be carried out at all production sites, more or less as a preliminary to the implementation of the SHEQ management system. Because not enough highly qualified people with many years of experience in performing this task are available, the auditing program will stretch into the year 2000.

The safety audits are also designed to be a key step on the way to establishing the SHE management system. Moreover, they support the implementation of the principles of the ►Responsible Care initiative of the respective national organizations of the chemical industry in the various countries, as well as the preparations for the certification

of the environmental management system in accordance with the European Union's ►Eco Management and Audit Scheme or the international environment standard ►ISO 14001.

The audits at the individual sites are based on the standards and guidelines of the Group-wide SHE management system and include the basic demands made on the management system with regard to all 15 standards. Environmental matters are therefore covered in principle. In addition, the following are checked in detail:

- plant safety,
- occupational safety, and
- emergency management.

The strengths and potential improvements of an audited site are documented in an audit report. This is used as a basis for agreeing upon schedules of

measures, priorities and deadlines with the site management. The implementation of the schedule of measures is monitored centrally.

The safety audits are carried out by a team consisting of the site technical coordinators, and experienced auditors from Henkel in Düsseldorf. The auditors bring not only their specialized knowledge to this task, but also the requisite degree of independence.

When the audits have been completed, the participants will not be idle either. There are plans to carry out repeat audits from this point onward. These will take the updated standards and guidelines into account and will facilitate the transfer of experience in safety management from site to site.

Product stewardship in the Henkel Group

'Practice in place' assessment of all strategic business units

Product stewardship is the product-related focus of the chemical industry's worldwide ►Responsible Care® initiative. Responsible care involves not only striving to improve health protection, occupational safety and environmental compatibility, but also taking a realistic look at the current situation.

The Management Board therefore initiated an assessment of the current situation throughout the Henkel Group. The management of every strategic business unit was asked to provide information on the extent to which current management practice conformed to the requirements of product stewardship. These requirements include the following:

- safety, health and environmental protection should be taken into account from the very start of product development;
- SHE aspects should be taken into account over the entire life cycle of a product – from the raw materials stage to disposal;
- a hazard and risk assessment should be carried out for each product;
- customers should be provided with data on the SHE-related aspects of the products;
- risk management should be practiced;
- market observation should also be carried out with reference to SHE aspects.

A checklist was developed on the basis of the product stewardship criteria, with input from the strategic business units. A scale was assigned to each aspect. The participants in this survey had to specify where they stood on this scale – between “zero activity” as the lowest level and “documented and validated” as the highest level of implementation.

All 29 strategic business units filled in the questionnaire and asked themselves, “Which requirements of product stewardship have we already put in place?”

No one at Henkel was surprised by the result of this as-

essment. Many of the principles and procedures of product stewardship are already part of the daily routine of the strategic business units.

Anyone who is familiar with Henkel knows why: Product-

related environmental protection has been part of the Group's corporate philosophy for many years. Health, occupational safety, and environmental compatibility are natural components of management practice at Henkel.



Quantifying SHE performance

Analyzing the lifetime environmental effects of products

The performance of a product can be measured exactly. Many sophisticated test procedures provide information on, for example, how thoroughly and gently a detergent removes soil from textiles, or how strongly an adhesive bonds. The performance of a product is much harder to assess in terms of occupational safety, health protection, and environmental protection, espe-

cially if this assessment has to span the product's entire life cycle.

In 1997, Henkel initiated the “Product Stewardship Indicators of Performance” project. The aim was to develop criteria to enable the SHE performance of a product to be determined and compared with that of other products. Specialists from Corporate SHEQ are working on this project, together with ► ecologists and ► toxicologists of the Biology/Product Safety department and product developers and application engineers

from all operational units. In defining the indicators, the work group has a further aim in view. With the help of the indicators, it should be possible to demonstrate SHE improvements and define new objectives.

The work group looks at the life cycle of the products. It analyzes raw materials, production, packaging, transport, utilization

and disposal, and uses the information gained to define quantifiable assessment parameters. The intention is to create a short list of SHE-related indicators for each product. The assessment parameters should reveal the strengths and optimization potential of each individual product. The long-term objective is to express eco quality in hard figures.



The Responsible Care® program is symbolized by this logo worldwide.

Responsible Care around the world

Henkel Group companies actively participate in national chemical industry associations

Henkel's integrated SHEQ Management System covers all of the requirements resulting from the Group's commitment to the chemical industry's worldwide ►Responsible Care® initiative. Responsible Care is being put into practice in a variety of ways by companies around the world in line with the standards of the various national chemical industry associations. In numerous countries, Henkel companies have become actively involved in their associations' work.

This is illustrated by the contribution of Henkel S.p.A. to the activities of the Italian association, Federchimica. As in many other countries, Italian companies wishing to join the ranks of Responsible Care enterprises must display a high level of commitment. Henkel's Italian subsidiary, for example, had to establish and ►monitor a series of environmental parameters at its individual sites and pledge to disclose these data to the national association and the public at large.

Henkel Zlatorog is a member of the Responsible Care work group of the Slovenian chemical industry and is participating in a project to improve the water quality of the Drau River.

In France, Henkel's affiliate, Sidobre Sinnova, belongs to the "Responsible Care Club" set up by the French Union des Industries Chimiques (UIC), and is a member of a work group that is drafting a guideline for French chemical companies that wish to introduce a SHE management system.

In Germany, Henkel is closely involved in the work of the Verband der Chemischen Industrie (VCI) in this field. At regional VCI workshops, for example, Henkel experts have trained employees of medium and small companies in ►Product Stewardship. Transferring know-how relating to environmental and health protection and safety to other chemical companies – even direct competitors – is an integral part of the Responsible Care philosophy. In Canada, where the Responsible Care idea originated, Henkel sites are jointly audited by the Canadian Chemical Producers Association (CCPA) and independent verifiers, and compliance with the Responsible Care program is formally certified.

In the USA, the Chemical Manufacturers Association (CMA) drew up a detailed requirements profile in consultation with its members as early as 1988. Chemical companies, including Henkel Corporation, have implemented these requirements step by step and have regularly published Responsible Care progress reports. The phase of continuous improvement of safety, health, and environmental protection in the companies has now started.

Workshops organized by the South African Chemical and Allied Industries' Association (CAIA) provide Henkel South Africa with valuable opportunities to exchange ideas on Responsible Care. They also provide new impulses for its implementation in the company.

At a Responsible Care National Workshop held in São Paulo, Brazil, by the Associação Brasileira de Indústria Química e de Produtos Derivados (ABIQUIM) in August 1997, Henkel S.A. Indústrias Químicas presented a "Waste Management" software package, which it had developed in-house. This software helps to monitor the site's entire waste situation and documents all waste-generating processes: temporary waste storage, disposal – and waste costs, which act as a significant control. Many customers, as well as other Brazilian chemical companies, expressed an interest in the software.

The above list is by no means exhaustive. Henkel companies in other countries have also actively embraced the Responsible Care process. Open communication and the sharing of experience within the chemical industry will continue to be a key aspect of its commitment to safety, health, and the environment in the future.



Water sample at Henkel Oberflächentechnik in Herborn-Schönbach.

Emergency drills

Exercises in risk prevention

Emergency drills were held at many Henkel sites around the world in 1997. The objective and scope of these drills varied, ranging from firefighting with hand-held extinguishers to complex emergency staff exercises.

Emergency staff exercises are carried out in line with a "script," designed to test not only the cooperation between various emergency services and the emergency staff, but also communication with the authorities and the public.

The first emergency staff exercise was staged by Henkel in Düsseldorf in 1994. In the meantime, they have become an established part of the annual safety program. Group companies also adopted this type of training in 1995. During 1997, employees at more than ten sites in Europe and the USA held drills in accordance with this system. In some cases, an external advisor and municipal emergency services also participated.

The emergency staff exercises do not cause the Henkel companies to neglect conventional safety training of their employees, however. The nature and scope of the associated drills tend to be very varied, as illus-

trated by the two following examples:

Chinese sites hold competitions in practical firefighting on athletics fields, sometimes in combination with safety quizzes for their employees. These events are very popular with the workforce.

It is not worthwhile for Henkel Corporation's Ambler site, near Philadelphia, to maintain its own fire department. It has therefore joined forces with five other companies in the vicinity to sponsor and equip the municipal fire department. Joint exercises, especially for dealing with the dangers resulting from chemical accidents involving the release of substances, are intended to ensure smooth cooperation between the emergency services if such an incident should occur.

Water as a resource

Careful use of water in the Henkel Group

Water is not only essential for the human race and all living things, but is also an important raw material for industry and agriculture. On a global scale, supplies of water of the necessary quality are becoming increasingly scarce. For this reason, the United Nations' Commission on Sustainable Development (UNCSD) set up a worldwide five-year work program in 1997. The responsible use of water was defined as the main task for 1998.

If water continues to become scarcer, the World Business Council for Sustainable Development (WBCSD) expects governments to take measures to assign priority to the provision of potable water and water for the irrigation of agricultural land over the supply of water for industrial purposes. The WBCSD is an international organization established by industrial companies that wish to set the pace in implementing Agenda 21 – the final document formulated at the Environment Summit at the Brazilian city of Rio de Janeiro in 1992. Henkel is also a member. In consultation with the United Nations Environment Program (UNEP), the WBCSD will formulate guidelines on the efficient use of water in the industrial sector.

It is no wonder, therefore, that Henkel started emphasizing

the sparing use of water a number of years ago. The 1995 Environment Report contained the first articles on water savings at Henkel in Düsseldorf and at its German subsidiary Gerhard Collardin (renamed Henkel Oberflächentechnik as of 1998) in Herborn-Schönbach. Reference was also made to the economic benefits of saving water as a key motivating factor.

Other published examples include the 50-percent reduction in water consumption between 1993 and 1995 at Sidobre Sinova, in Meaux, the French chemical products subsidiary, and a reduction of more than 70 percent in water demand at the Spanish Henkel subsidiary, Pulcra, over a period of four years.

In 1997, projects to cut water consumption were successfully completed at the Lock Haven site in the USA and the Jacarei site in Brazil (see pages 42 and 43). Finally, the current report contains announcements from seven sites on targeted cuts in water consumption (see page 50).



Lower noise emissions from a sulfation plant in Düsseldorf, thanks to noise dampers, which have been fitted to the ventilation gratings of a room that houses large and noisy compressors.

Against noise

Transfer of noise-reduction know-how

Many Henkel Group sites are located in the immediate vicinity of residential areas. The production lines generate noise, which can be heard outside the site and may therefore disrupt good neighborly relations with the people living nearby. Henkel wants to avoid this. On-site, too, all Henkel Group companies strive to minimize the noise to which their employees are exposed in their workplaces.

It is pointless to take a random approach to noise prevention. A thoroughly thought-out plan is needed if the greatest possible efficiency is to be achieved at the lowest possible cost. First of all, the main sources of noise are identified. Their contribution to the total noise level is then assessed. On the basis of this appraisal, a program of measures can be drawn up. This requires special knowledge and a great deal of experience. Thanks to noise analysis, solutions are often found that achieve significantly greater noise reduction at a lower cost.

At Henkel in Düsseldorf, the noise work group has been carrying out such analyses since 1974. This interdisciplinary body is composed of experts in

environmental protection, measurement techniques, occupational safety, as well as the company doctors and members of the Works Council.

Special computer software now supports their efforts. The noise that a plant causes in the surrounding area is plotted in the form of a map. Factors that affect noise are taken into account, such as distance from the source, the prevailing weather, and the reflection and screening effects of buildings. This map then serves as the basis for targeted counter-measures. (An example is described on page 30.)

The computer software and the know-how of the noise work group are accessible to all Group sites.

Shortfall?

Not all site objectives were achieved

Henkel's 1995 Environment Report contained the first published objectives for the improvement of environmental protection, safety and health at a Group site – that of Henkel KGaA in Düsseldorf. In the present report, just three years later, 25 production sites around the world reveal their objectives in the fields of ► emissions and the consumption of resources. The business sectors have also set their own environmental objectives. In the context of product stewardship, for example, they have defined target parameters or assigned goals for the implementation of management systems.

The purpose of publishing this environment program (see pages 48 to 51) is to give the reader an impression of the actual situation with regard to environmental protection and safety. The objectives are therefore not only listed by subject area in the Environment Program pages, but are also explained in more detail in the site reports in the Production chapter.

In 1997, for the first time, a number of site objectives were not achieved. These mainly concerned the conservation of resources and reductions in emissions. An analysis of the reasons for these shortfalls shows that, in almost all cases, there was an unexpectedly large increase in

production volumes, sometimes amounting to more than a third. The measures taken to conserve resources and reduce emissions could not compensate for such growth in production.

If the emissions and consumption of resources are calculated per metric ton of manufactured product, however, it is clear that most of the sites did, in fact, pursue their goals with determination. In almost all cases, there was a decrease in the burden on the environment relative to each metric ton of product. Only when the proposed improvement measures proved technically unsuitable for the increased production volume did objectives have to be redefined, following the development of an appropriate concept.

Naturally, it is disappointing when objectives are not achieved. On the other hand, this demonstrates the fact that the sites have set ambitious targets, which make considerable demands on their employees. This means that the project teams entrusted with carrying out the measures must be highly motivated and able to inspire the other people involved as well.

Spillages caused by external carriers on the roads inside the Henkel site in Düsseldorf



The social project for Philippine coconut farmers is making good progress. Henkel helps to finance the construction of copra dryers.

Training is important

Quantifying changes in awareness

Raising employees' awareness and knowledge of environmental protection, health and safety matters is an important objective and a firmly established element of Henkel's corporate policy. The relevant training programs for employees are carried out in a variety of ways at the sites.

In many cases, the effects of these training measures cannot be directly expressed in figures.

Henkel in Düsseldorf provides an instance where this is possible, however. Hundreds of vehicles belonging to outside transport companies drive over the roads of the one-and-a-half square kilometer site. Carelessness, failure to secure loads properly, and errors of judgment in critical situations regularly result in spillages onto these roads.

In 1992, in an attempt to limit the steadily increasing number of accidents, Henkel started to bill the responsible carriers for the cost of cleaning up the roads. This resulted in an appreciable, but still not satisfactory, reduction in such incidents in 1993 and 1994.

In the second half of 1995, therefore, the Henkel Plant Fire Department and the Transport Safety Department began conducting two-day training seminars for the forwarding agents' drivers and loading personnel. After one day of theoretical in-

struction, the second day of the seminar is devoted to gaining truly practical experience on the training ground of the Plant Fire Department. Realistic accident scenarios are played out to illustrate graphically to the participants what can happen if, for example, they fail to secure a load properly or to distribute it evenly on the vehicle.

These training seminars raise the awareness of the drivers and loaders. This is reflected in the reduced frequency of incidents of load spillages on the site, which was already evident in 1995. The following year, the number of accidents fell still further, and it has since remained at a steady low level.

This example shows that only limited improvements can be achieved by increasing costs. Only when those concerned – in this case, the drivers employed by the transport companies – have been trained to recognize the risks, and therefore change their behavior accordingly, will there be any substantial success.

Help for the weakest

Henkel reinforces its commitment to social issues

Homeless children without a family or a roof over their heads, living on the street, are a major social problem, especially in emerging and newly industrialized countries. This problem also affects Avellaneda, on the outskirts of the Brazilian capital city of Buenos Aires, which is where Henkel Argentina has its head office. The Henkel company is one of the largest enterprises in Avellaneda and is committed to exercising social responsibility within the community where it operates. Henkel Argentina has therefore become a sponsor of the "Hogar José de San Martín" home for street children, which has been established by the city. As a first step, for example, it has donated all of the electrical appliances needed for daily use.

Forty children can be given permanent medical and psychological support at the home. The long-term aim is to reintegrate them into the community. Given the scale of the problem, this initiative may seem to be no more than a drop in the ocean. Nevertheless, every child who is helped to live a normal life through this home must be regarded as a success.

Henkel in Düsseldorf is also a sponsor, supporting a secondary school in the Düsseldorf district of Garath. This was recognized in a ceremony, at which

the school was renamed as the Fritz Henkel School, in honor of the Company's founder. Following various forms of technical and financial aid, a modern PC workstation was also donated in 1997. The school plans to carry out an eco audit. The PC will help to document the collected data and draft the Fritz Henkel School's environmental statement.

Henkel Ireland in Cork, together with neighboring companies, works closely with community groups in the vicinity of the Little Island industrial zone. The companies and the municipality played a major role in the construction of a community center. Henkel Ireland also promotes agricultural measures aimed at preserving recreational parks and supports the local school with educational aids.

The project for Philippine coconut farmers, which was the subject of an article in the 1997 Environment Report, is making good progress. Together with the German Agency for Technical and Economic Cooperation (GTZ) and the Philippine Coconut Authority, Henkel is supporting small farmers' cooperatives in efforts to improve the product quality of the harvested copra – by financing the construction of copra dryers, for example.



Support for homeless children – Henkel Argentina in Avellaneda sponsors a home for street children.

A recent example of social involvement dates from February 1998. To mark its centennial, Henkel Teroson, with its head office in Heidelberg, donated DM 100,000 to the "Kuratorium ZNS für Unfallverletzte mit Schäden des zentralen Nervensystems," a

German organization that helps accident victims who have suffered damage to the central nervous system. This donation went toward acquisitions at three hospitals, which will particularly benefit children and young people with severe brain damage.

Eco sponsoring

Encouraging environmental activities

It started with a problem that could not be ignored. Non-degradable ▶ surfactants, especially in detergents, caused mountains of foam to form on German rivers in the late 1950s. Henkel responded with two initiatives. One was the development and introduction of readily biodegradable surfactants, and the other was the systematic environmental ▶ monitoring of the Rhine and selected tributaries. This was the start of eco sponsorship in the Group.

Since 1958, Henkel has measured the surfactant loads in the Rhine every two weeks. For many years, it has also measured the amounts of boron and phosphate in the Rhine. The results are made available to scientists, official bodies and politicians, and are published each year (see page 58).

At the same time, Henkel sponsored research projects aimed at explaining the mechanism of the biodegradation of ▶ organic substances. In the early 1990s, Henkel went a step

further and began supporting several pilot projects to develop hydrophytic sewage treatment plants for purifying wastewater.

In 1991, Henkel started sponsoring the construction of a hydrophytic sewage treatment plant in Silva Jardim, Brazil, 110 kilometers to the northeast of Rio de Janeiro. The wastewater of a district of the town of Silva Jardim provides the hydrophytes in a number of settling tanks with an abundance of nutrients – and the water is purified in a natural and inexpensive manner.

On the basis of the experience gained in Brazil, Henkel has subsequently sponsored projects with hydrophytic sewage treatment plants in Berlin, in a newly built district of Düsseldorf, and – since 1994 – in Dongguan, China. Since 1993, Henkel has been working with other companies to conserve 180 hectares of rain forest in Santo Amaro, Brazil.

The above mentioned projects that have been sponsored by Henkel are – with the exception

of the last one – strongly oriented toward alternative sewage treatment processes. In the meantime, the Group has developed criteria for evaluating whether projects merit sponsorship. These criteria ensure that the sponsored projects cover a wide spectrum of topics, while avoiding the risk of uncoordinated dissipation of funds.

Sponsored projects are primarily to lead to demonstrable ecological improvements. In addition to this basic requirement, as many of the following conditions as possible should be satisfied:

- The measures should have a model character, linked with an increase in knowledge and experience.
- The projects and results should be tangible.
- Sponsorship should help people to help themselves. It should encourage changes in behavior.
- The content of a project should bear some relationship to Henkel (even if only a regional or local one).

Projects were previously financed from a wide variety of budgets. Since 1997, however, there has been a special budget for ecological sponsorship measures. Henkel has provided financial support for the following projects in Germany from this budget:

- The Fritz Henkel School in Düsseldorf is carrying out an eco audit modeled on the basis of the European Union's ▶ Eco Management and Audit Scheme.

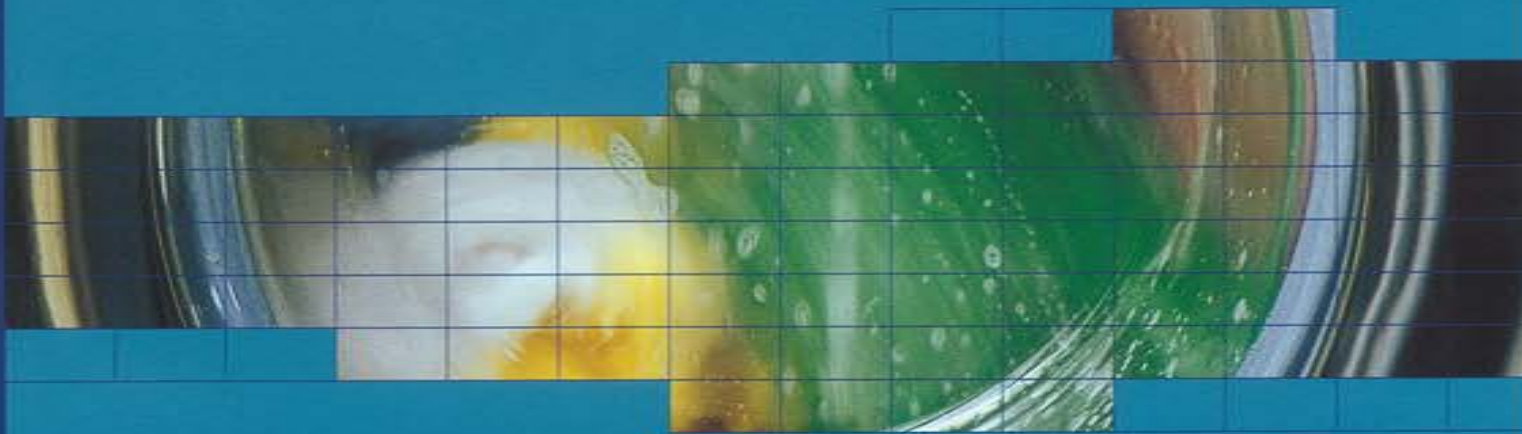
- Henkel financed an urgently needed station wagon for the limnology (biology and ecology of surface waters) department of Münster University in Westphalia to allow it to carry out basic and applied field research on the eco systems of standing waters.

Henkel's support for ecological projects is not restricted to Germany, as the two examples in the following paragraphs make clear:

Henkel Zlatorog of Maribor, Slovenia, is sponsoring a research project on protecting the olm by the University of Ljubljana. This salamander-like vertebrate lives in the underground watercourses of the limestone mountains. It is typical of Slovenia and as it is a part of the country's natural heritage, it is important to safeguard its continued existence (see page 38).

In 1997, Henkel sponsored the project "Environment and Learning" at 17 schools in Vienna, Austria. The youngsters cleared the garbage and trash from certain areas of land. In their classrooms, they constructed boxes for sorting waste. They also organized environmental work days. The children enthusiastically welcomed the active work in and for the world of nature. This is just one reason for continuing the project this year.

Responsibility for mankind and the environment



Henkel will supply only products and systems which are safe for human health and the environment when used as intended. Safety, health and environmental considerations will be an integral part of product and process development. We consistently apply the concept of Product Stewardship to the whole life cycle of our products.

Extending our ecological lead

Two years ago, something extraordinary happened. Henkel's Detergents/Household Cleansers business sector and other detergent producers, which are

usually intense market rivals, got together and developed the A.I.S.E. Code of Good Environmental Practice.

A.I.S.E. stands for the *Association Internationale de la Savonnerie, de la Détérgence et des Produits d'Entretien*, which is the association of the European detergent producers. The companies that belong to this association do not want to restrict their contribution to ecological progress solely to formulations and packing materials. They also want to encourage consumers to support this process by using their products properly.

Concrete objectives

All companies that subscribe to the A.I.S.E. Code of Good Environmental Practice undertake to achieve four concrete objectives that are to be implemented within the European Union within five years:

- Five-percent reduction in energy consumption per wash cycle;
- Ten-percent reduction in the amount of detergent per wash cycle;
- Ten-percent reduction in packaging material;
- Ten-percent reduction in the poorly biodegradable components of detergents.

Eco principles

What is the best way of fulfilling the requirements of the A.I.S.E. code? Henkel's Detergents/Household Cleansers business sector established an Eco Principles work group in 1996. In this work group, the managers of the International and German Detergents divisions, as well as Product Development/Application Technology defined the principles, criteria and procedures for an ecologically oriented and economically successful detergent policy.

The work group has set progressive objectives for the business sector. The most important are:

- minimizing risks;
- pushing forward ecological advances;
- maintaining and extending Henkel's ecological lead in key fields of business.

Binding guidelines

The Eco Principles work group draws up binding guidelines for concrete decision-making during the everyday operation of the detergent business. The members of the group have created a matrix of hazards and risks,



Henkel has developed its gel detergents from ecologically compatible substances. They only need to be added in very small amounts.

which is structured by raw materials and product classes.

All substances and products that are processed or manufactured by the Detergents/Household Cleansers business sector are registered in this matrix and evaluated. The evaluation takes into account the total picture, in which ecological and economic factors interact.

If a "test specimen" does not conform to the Eco Principles, it must be either modified or replaced by ecologically beneficial alternatives.

Conservation of resources

The second point of the A.I.S.E. code calls for a ten-percent reduction in the amount of detergent per wash cycle, to be achieved within five years. This contribution toward the conservation of resources constitutes a challenge that product developers and applications engineers are determined to meet.

In the past ten years, they have already succeeded in reducing the recommended amount of



Washing tests with the new gel detergents. Thanks to their viscous consistency, they are ideal for treating stains.

Technology transfer

Other countries have other customs, and this also applies to doing the laundry. Since 1992, Henkel has held a stake in the Egyptian detergent manufacturing company, Port Said Detergents & Chemical Industries Co. (PDC). PDC manufactures not only its own brands, but also two sorts of Persil. One of these is a strongly foaming formulation for washing laundry by hand or in vat-type washing machines. In view of the limited

income of most Egyptian families, it is sold preferentially in small packets that hold 125 grams. The owners of drum-type washing machines can purchase Persil Automatic in three-kilogram packets.

The formulations of PDC's own brands were checked by Henkel's detergents experts in Düsseldorf. They replaced the ►complexing agent and stabilizer ethylenediamine tetraacetate (EDTA), by the environmentally more compatible ►hydroxyethane diphosphonate.



Technology transfer of environmentally compatible ingredients, in this case to Port Said Detergents & Chemical Industries.

Egypt has not banned the use of EDTA, but for Henkel it was clear that its self-imposed eco principles should take precedence.

Another example of technology transfer led from Düsseldorf to Lebanon. The Henkel company in that country used poorly biodegradable, branched ►alkylbenzene sulfonate in its detergents. In a country such as Lebanon, where water is scarce, the impact of such water-polluting substances can be extremely serious. Since the company became a member of the Henkel Group, therefore, ►linear alkylbenzene sulfonate (LAS) has been its new main surfactant in detergents. It generates no foam in surface waters and undergoes rapid biodegradation.

In early 1996, the Henkel Group established a joint ven-

ture with Shemen Industries in Israel. Here, too, Henkel's detergent developers and application engineers in Düsseldorf recommended a change of formula. Instead of the ecologically and ►toxicologically controversial alkylphenol ethoxylate, Henkel Soad Israel now manufactures its detergents with fatty alcohol ethoxylate, an environmentally compatible, fully biodegradable surfactant based on renewable raw materials.

As these examples show, the application of eco principles throughout the Henkel Group results in a wealth of concrete improvements, going beyond the requirements of national legislation.

Environmental protection, safety and health

Conservation of resources takes priority

After they have carried out their tasks in the home, detergents and household cleansers are discharged with the wastewater. The discharges from individual households add up to hundreds of thousands in every city – from some 600,000 metric tons of product each year in Germany alone. The Detergents/Household Cleansers business sector therefore accords high priority to ecology. The emphasis is on conservation of resources, as well as the behavior and fate of the products in the environment.



The Henkel Group produces about 300 different surfactants. A filling unit in Düsseldorf is shown here.

Renewable raw materials conserve finite resources

The Chemical Products business sector is the world's largest producer of chemical products based on renewable raw materials. Henkel's global raw materials and production network manufactures a wide range of

products that satisfy the individual requirements of its customers. A large proportion of its products are subjected to further industrial processing. Product safety has top priority.

Drilling safely for oil in fishing grounds

The Hibernia is a 1.3 million ton drilling platform located off the coast of Newfoundland, directly above a huge oilfield. A strong steel barrier has been erected around the Hibernia as protection against the drifting icebergs that are common in this region. Protection of the sensitive ecological equilibrium in the drilling zone is in the hands of Henkel Oilfield Chemicals specialists. They have developed a water-based drilling fluid with

►water glass for the Hibernia. The rich fishing grounds off the coast of Newfoundland are a major source of income for the region. Strict legal regulations therefore apply to drilling for oil. For this reason, the Hiber-

nia's operators want to use only water-based drilling fluids for all of their boreholes, of which 80 are currently planned.

Per borehole, 600 to 1,000 metric tons of drill cuttings (sand, clay and rock) are transported from the borehole to the platform. The Hibernia can simply tip it back into the sea with a clear conscience, because it is only burdened with water glass and traces of other harmless

►additives. Sidetracked boreholes make especially high demands on drilling fluids. Such holes do not run vertically downward, but curve and branch through the earth below the platform. They may be up to ten kilometers in length, so that friction inevitably occurs between the drill rods and the walls of the slightly curved borehole. The drilling

fluid therefore also has to function as a lubricant. The water-based water glass drilling fluid does this successfully, with the help of an additive based on natural

Water cycle

►fatty alcohols from Henkel. Many companies are unhappy about the high costs of fresh water and wastewater. A new water recycling system can help both them and the environment. Consumption of fresh water is reduced enormously – and no wastewater is generated.

The system was developed by an interdisciplinary team of Henkel specialists from the

►Ecology and Textile Technology departments. The new treat-

ment method is suitable for all branches in which industrial cleaning and washing are carried out. These include the metal surface treatment and paper manufacturing sectors, as well as stone-washed jeans manufacturers and processors of down for bedding.

The newly developed system, consisting of chemico-physical and biological wastewater purification modules, recycles the water. The used washing and rinsing water is purified so that it can be fed into the next washing cycle. Only evaporation losses have to be made up for with fresh water. Instead of wastewater, solids are left over. These solids are sold to customers in the agricultural sector, who gladly use them as a soil conditioner.

Ecological oil-drilling operations off the coast of Newfoundland. A water-based drilling fluid with water glass makes this possible.



The investment costs for the new system correspond approximately to the water costs that the users save during the first two to five years. Henkel also supplies detergents, additives, and water treatment products – as required by the individual customer.

From residue to raw material: aluminum chloride

Anyone who wants to extract copper needs mining chemicals, such as ▶LIX[®], manufactured by Henkel Ireland. One of the secondary products of ketoxime production is aluminum chloride, which had to be disposed of at great expense as hazardous waste until a short time ago.

An international process optimization team found a better solution. Engineers, chemists, and marketing experts of Henkel Ireland, Henkel Corporation (USA), and Henkel in

Düsseldorf identified applications where aluminum chloride is useful – as a ▶floculant for purifying drinking water and as an odor inhibitor in deodorants.

Since then, Henkel Ireland has carefully purified and filtered the aluminum chloride solution that it generates. This treatment has upgraded the once cost-intensive residue to a lucrative raw material. The sale of the pure aluminum chloride to producers of drinking water and roll-on deodorants is not only a financial success, but also ecologically beneficial. On the one hand, Henkel Ireland now generates much less environmentally burdensome hazardous waste;

on the other hand, resources are conserved. The customers who now buy this byproduct from Henkel Ireland used to buy aluminum chloride solution that was manufactured as a product in its own right, thus using up raw materials and energy.

New vegetable-based surfactant

The Henkel Group produces about 300 surfactants throughout the world. A new addition is cocomonoglyceride sulfate. Like ▶alkyl polyglycosides (APG[®]), cocomonoglyceride sulfate is manufactured from renewable raw materials and therefore contributes to the conservation of finite resources.

A team at Henkel's Oleochemical Research department in Düsseldorf developed the new surfactant to production maturity. In view of its vegetable basis, it has been especially welcomed by manufacturers of ecologically oriented cosmetics.

Ecology need not be expensive. The manufacture of surfactants is usually complex, because it involves a whole series of sequential processes. The produc-

tion of cocomonoglyceride sulfate at Henkel Ibérica in Spain, however, requires only a few steps. That saves time and energy.

Care for the skin and the environment

Skin care creams are a part of many people's bathroom routine each morning. If the skin still feels smooth and supple long after the cream has been applied, this indicates that the oily components of the product are ideally matched. Dicaprylyl ether, in particular, can be recommended, and not just for ecological reasons. This strongly smoothing oily component cares for human skin and replaces the fats it loses during washing.

As an effective component of sun protection preparations, dicaprylyl ether contributes to the ecological equilibrium of lakes for swimming and coastal waters near beaches. Sun protection products usually contain silicone, and in busy bathing spots this may form a non-biodegradable, oily film on the surface of the water. Dicaprylyl ether, on the other hand, is completely biodegradable, and it can replace a large proportion of the silicone in most formulations. Growing numbers of cosmetics manufacturers are taking advantage of this alternative, because in many countries the use of silicone oils is subject to legal restrictions.

Environmental protection, safety and health

Varied focal points

Due to the enormously wide range of products of the Chemical Products business sector, key factors are differently weighted from one product group to another. For example, ▶ecological aspects take priority with regard to chemical products for the manufacture of detergents, whereas ▶toxicological and ▶dermatological properties are the most important aspects of specialty products for the cosmetics and pharmaceutical sectors. Chemical products that undergo further processing in the plastics, paint and coatings industries, or in the manufacture of textiles, leather and paper, must be not only toxicologically, but also ecologically safe to use.



Environmentally compatible corrosion protection – an aluminum wheel rim being treated in a chrome-free dipping bath.

A depth of surface know-how

The Surface Technologies business sector is the Henkel Group's specialist in industrial surface treatments. It is the world's leading supplier of surface treatment

Metal pretreatment for long-term use

To enable metal surfaces to remain in good condition for as long as possible, they are pretreated to provide them with an anticorrosive coating. This applies to refrigerators and bicycles, as well as cars. A car body, for example, must be capable of withstanding heat, cold, and other potentially harmful influences for many years. Each car body therefore goes through a pretreatment process before it is painted. This pretreatment ensures optimal paint adhesion and provides long-term protection against corrosion.

Henkel Surface Technologies has succeeded in developing a low-nickel ▶phosphating

process. This is just as effective as the ▶tri-cation systems that have mainly been used until now, but is more advantageous from the point of view of occupational safety and environmental compatibility.

Thanks to an improved ▶passivating process, the nickel content of the phosphating bath and the wastewater is 95 percent lower than with the conventional tri-cation system. The low-nickel system, which is already being used by a number of automobile manufacturers to pretreat spare parts, frees users from most of their disposal problems. Much less milk of lime is needed for the ▶precipitation of the far smaller amounts of ▶heavy metals than when the tri-cation system is used, which produces wastewater with a high nickel content. One-third less sludge is generated.

systems for metals. The business sector aims to develop ecologically oriented processes and systems to meet the needs of its mainly industrial customers.

Another new process even allows nickel to be dispensed with completely. Instead, copper is used for phosphating. One gram of copper replaces 100 grams of nickel in the bath. Thanks to this quantitative reduction, the heavy-metal content of automobile manufacturers' wastewater is below the statutory limiting value. Here, too, the amount of sludge that has to be disposed of is one-third less.

A major, internationally renowned automobile manufacturer already uses Henkel Surface Technologies' nickel-free process to phosphate one of its vehicle series.

Refrigerators and other household appliances can be pretreated with the nickel- and copper-free phosphating system developed by the specialists at Henkel Surface Technologies. This provides optimal pretreatment not only for small items such as screws, nuts and hooks, but also for tractors and harvesters.

The wastewater from the nickel- and copper-free phosphating process also has to pass through a precipitation stage, because it contains zinc and manganese. However, there is no need for the disposal of hazardous waste which is obligatory for most other systems. The substances present in the sludge generated by nickel-free and copper-free phosphating are ▶ecologically harmless. The sludge, which is again one-third



World premiere at Henkel in Düsseldorf – the first building with façade and windows made from chrome-free pretreated and coated aluminum.

less than the amount generated by the tri-cation process, can thus be disposed of in a landfill for ordinary household waste.

Some modern phosphating processes are even more ecologically oriented. In terms of their corrosion protection, they resemble zinc phosphating, but these systems use no heavy metals at all. Henkel Surface Technologies has developed a new, additional accelerator for ▶alkaline phosphating, which considerably increases the efficiency of this robust process.

A chrome-free passivating process completes the new system. Not only does this yield ecological benefits, but it also cuts the amount of work in the plants. In comparison with conventional zinc phosphating, fewer active baths and smaller amounts of process chemicals are needed. There is a further cost-saving and ecological benefit in the associated wastewater treatment. The heavy-metal-free pretreatment products usually require less milk of lime. As a result, much less sludge is generated than during phosphating processes that make use of heavy metals.

Chrome-free coating

Aluminum is a very useful substance, due to its low weight and its formability. It is used for a wide range of applications, including shower cabinet frames, door handles, window frames, façades and aircraft. Aluminum also has to be protected against corrosion.

For this purpose, Henkel Surface Technologies recently introduced a process based on titanium and zirconium compounds and ▶polymers. By contrast, the currently most frequently used pretreatment solution consists of chromic acid and an accelerator.

The transport, industrial use and disposal of chromic acid all require the most stringent safety measures for mankind and the environment. All sectors that work with chromic acid are, therefore, seeking alternatives.

The corrosion protection that can be achieved with the new chrome-free technique is comparable with the best chromating systems. At the same time, the new process yields considerable benefits in terms of transport, occupational safety, disposal, and environmental compatibility. For example, the sludges left over after the coating plant has treated its wastewater no longer contain any heavy metals that are subject to a wastewater threshold. This is a major ecological and economic advantage.

Qualicoat and GSB International, the two most important

quality associations of the European aluminum coating industry, have already approved the new process for use by its members. This is simultaneously a confirmation that the process also satisfies the strict quality standards for architectural aluminum.

Cooling and lubricating

Automobile manufacturers and their subcontractors profit from the know-how of Henkel Surface Technologies in more ways than in the pretreatment of car bodies. The business sector's experts are also familiar with what is needed for items under the car body, such as the machining of engine parts, gear wheels and transmissions.

Henkel Surface Technologies has developed a high-quality cooling lubricant system based on a combination of vegetable cutting oil and an ▶emulsion that contains mineral oil. It satisfies the most exacting demands. The manufacture of drive shafts for deep drilling is a case in point. Previously many different cooling lubricants were

needed, but two now suffice.

The system components can be used individually or in combination, and can therefore be flexibly adjusted to the requirements of the manufacturing process. Logistics, care and maintenance are all considerably simplified. Process safety is improved.

The new system is so efficient that there is no longer any need to resort to extreme-pressure ▶additives, some of which are still chlorine-based. This and the comparatively small amounts needed benefit the environment, as does the two- to three-fold extension of the service life of the application baths. This new cooling lubricant system also yields considerable benefits in the field of industrial hygiene. The ▶native oil component provides very good lubrication and thus reduces the heat of friction. Oil odors and the formation of ▶aerosols are suppressed. Finally, the ▶dispersed oil droplets ensure excellent skin compatibility. They reinforce the protective barrier of the skin and reduce the defatting action of the alkaline system.

Environmental protection, safety and health

Extended service life conserves resources

The products of Henkel Surface Technologies make a major contribution to the conservation of resources, because they extend the service life of the treated objects. The business sector operates a policy of continuous improvement with regard to both the occupational safety aspects of its products and their ecological compatibility.



Twice as good: The proportion of renewable raw materials in the glue stick formulation is far higher, and the adhesive strength has also been increased.

Adhesion in all its varieties

A four-year-old child who uses a glue stick to make a window decoration from colored paper. A large company that uses laminating adhesives to make food packaging materials. Both of them belong to the target group

Solvent-free has priority

For many years, the product developers and application engineers of the Adhesives business sector have focused on developing ►solvent-free adhesives that satisfy the highest demands. Solvent-free products are now available for many fields of application. Most of them have to be applied in a slightly different way from solvent-based formulations. A large proportion of the solvent-free, ►ecologically superior and healthier alternatives is proving to be a market success. However, customers are sometimes reluctant to abandon a tried and proven product in favor of something new.

A breakthrough was achieved with solvent-free laminating adhesives. Customers –

mostly manufacturers of multi-layer film and foil for food packaging – initially showed little interest, because the new product had to be processed at slightly higher temperatures. Sales figures now show, however, that Henkel has been able to convince many customers of the advantages of solvent-free laminating adhesives. Far fewer safety measures have to be taken in connection with their storage and processing. Moreover, there are no longer any solvent residues that need to be filtered out of the air with considerable technical effort.

A great deal of persuasion was also needed before automobile manufacturers and suppliers to the automobile industry were won over. Increasingly, however, these customers are using aqueous, solvent-free systems for

of the Adhesives business sector, with its more than 3,000 products – as do countless DIY enthusiasts, professional craft workshops, and companies in almost every branch of industry.

rubber-to-metal bonds – for engine suspension, for example. Customers are also showing more faith in ►polyurethane ►hotmelts, which the Adhesives business sector developed as an alternative to solvent-based structural adhesives.

Solvent-free products help to secure jobs, not only for manufacturers but also for their customers. In Germany, for example, the ►emission thresholds for solvents have been shifted downward several times during recent years. This put small companies, in particular, at risk. Very few of them can afford the sophisticated equipment needed to comply with the specified thresholds. In many cases,

Henkel's innovative, solvent-free products provide a solution to this dilemma. If no solvents are used, these exhaust-air problems cannot arise.

The replacement of solvents in a wide range of bonding processes is a good example of the application of ►product stewardship to reduce risks at all stages of the life cycle of a product. If adhesives contain no solvents, emissions simply cannot occur when they are used.

The "green shoe"

The "green shoe" is the name of a campaign by a renowned American manufacturer of sports goods. Henkel experts are involved. The objective of the campaign is to significantly im-



Solvent-free laminating adhesives. Henkel tests the adhesion of multi-layer films and foils in its Düsseldorf pilot plant.

prove the working conditions in the Asian shoe industry. One of the "green shoe" measures is to glue the soles solvent-free.

Henkel's adhesives specialists are supplying water-based polyurethane ► dispersions or polyurethane hotmelts specifically for this application. This example of technology transfer is working. The Asian toll manufacturers can use the new product with their existing equipment. Enormous improvements in health and environmental protection are thus being achieved in return for modest investment costs.

Environmental protection, safety and health

Protection of health and the environment

Health protection plays a large role in the handling of adhesives. There is always a possibility that the adhesive will come into contact with the skin, or that volatile components will be inhaled. The problems of working with adhesives can be considerably reduced by dispensing with solvents.

Processed, hardened adhesives are not ► bioavailable. Undesirable impacts on the environment are therefore not to be expected. The use of renewable raw materials for manufacturing adhesives contributes to the conservation of finite resources.

Low-emission floor covering adhesives

In 1997, Henkel Bautechnik, together with other manufacturers of laying systems for floor coverings, founded the Gemeinschaft emissionskontrollierter Verlegewerkstoffe e.V. (GEV) in Germany. Twelve companies, representing 90 percent of the branch in Germany, now belong to the GEV. The new organization adopted the objective of specially labeling, and thereby promoting, low-emission products for interiors. This will minimize odors and emanations from ► organic substances. The recently introduced EMICODE, a registered quality symbol of the GEV, informs users about just how low the level of emissions from a product is. It is only awarded to products that can be proven to satisfy the GEV classification criteria.

Floor covering adhesives were the first group of products to be tested and classified by the GEV members. For almost every type of covering, Henkel Bautechnik can now supply its customers with an adhesive that has been awarded the best possible EMICODE grade. Now that the GEV has also developed suitable test methods for primers and fillers, "very low-emission" laying systems will also be available in the future.

Eco stick

Solid-adhesive sticks are now a familiar item almost everywhere – in the office, at home, in kindergartens, etc. This is a highly successful product, one which is manufactured in very large quantities, and Henkel obviously places particularly high priority on its ecological compatibility and, especially, conservation of resources. A team of product developers and application engineers worked for three and a half years to achieve a significant increase in the proportion of renewable raw materials used to make the glue stick. Not only is the new formulation ecologically beneficial, but the glue stick has even better adhesive properties than before.

Special adhesive for surgeons

The cell tissue adhesives of Loctite's Biomedical division form a small range of products that help people to regain their health. Surgeons use them to close operation incisions externally. This is considerably faster and more precise than using staples or stitches. The time savings are important as well, because a smaller dose of anesthetic puts less strain on the patient. The infection risk associated with any operation is also lower, because, unlike conventional techniques, the adhesive system closes the wound completely.

Staples and stitches have to be removed some time after the operation, and this can be a disagreeable procedure for the patient. The adhesive, on the other hand, combines with the tissue fluid to form a scab, which falls off the healed skin of its own accord after about ten days – completely painlessly.

Repair instead of a new part

The people involved in most automobile accidents usually suffer little more than a scare. The bumper, on the other hand, is almost always damaged. This is logical, because it is there to cushion the force of any impact. Nowadays, however, a damaged bumper no longer has to be thrown away. Henkel Teroson has developed a "bumper repair set" for auto repair shops. After all, a repair is much cheaper than a new bumper. The repair set also makes a contribution to protecting the environment. Damaged bumpers no longer have to be disposed of as waste, and resources are conserved, because fewer new bumpers have to be produced. This is yet another aspect of eco leadership.



After bathing, showering or washing – the raw materials in cosmetic products all show excellent biodegradability in wastewater.

Feeling good from top to toe

Shining hair, clearer skin, fewer wrinkles – advertising messages for cosmetic products contain promises galore. Products from Henkel's Cosmetics/Toiletries business sector keep their promises. All advertising

All of Henkel's cosmetics products are subjected to exhaustive ▶ dermatological and ▶ toxicological assessment. The individual ingredients and the entire formulations have been subjected to stringent series of tests.

The Cosmetics product developers and application engi-

neers also know exactly how their products, which are largely manufactured using renewable resources, will react in wastewater after they have been used for bathing, showering or washing. The substances all exhibit good biodegradability and are environmentally compatible.

messages are based on the results of scientific testing. Not only can consumers have confidence in the care and cosmetic effects of the products, but their safety is also guaranteed to the highest extent.

Cosmetics by Henkel therefore also provide pleasure without pain from an ▶ ecological point of view.

The hotline to the experts

In Germany, consumers seeking advice receive capable help from experts at Schwarzkopf & Henkel Cosmetics under a toll-free number: 01 30/63 00. From Monday to Saturday, the consumer hotline handles a huge range of questions. Many callers need help in choosing the right kinds of products for their type. Others want to know which shop near them sells a specific product. Environmentally conscious consumers also ask specific questions about the ecological compatibility of individual products and their packag-

ing. Sometimes a caller wants to be sure that the products constitute no hazard to health. Specific questions are passed on to the toxicologists, ecologists and physicians who work in Henkel's Biology/Product Safety department.

However, the hotline is not just there to help the consumer. It is also a useful source of information for Schwarzkopf & Henkel Cosmetics. Questions raised by consumers are systematically evaluated. Information gathered via the hotline is used in practice – for example, when formulations are revamped.



Telephone service. Ecologically conscious consumers ask specific questions about the environmental compatibility of cosmetic products and their packaging.

Coming to grips with dust

Home users appreciate bleaching products from Schwarzkopf & Henkel Cosmetics. Hairdressers throughout the world put their trust in Schwarzkopf Professional bleaching preparations. These products make it quick and safe to add pep to natural hair color. Recently, users performing their 'magic' with powder bleach and developing solution found that mixing the components had become even easier. The wettability of the powder component has been improved, and the powder now generates virtually no dust. This is a big benefit for hairdressers, who often have to work with the product several times a day.

The Berufsgenossenschaftliche Institut für Arbeitsmedizin of the German Berufsgenossenschaft für Gesundheitsdienst und Wohlfahrtspflege (BGW)*, with its headquarters in Hannover, investigated the new bleaching agents with regard to dust generation. The institute confirmed the distinct reduction in dust formation, welcoming this, especially with regard to hairdressers.



Beneficial for hairdressers. New bleaching powders have better wetting properties and no longer generate dust.

Environmental protection for China's future

Wherever it is found in the world, the Henkel logo is a guarantee of quality and high standards of environmental protection. This also applies in China.

Products with a western image are extremely popular with Chinese consumers. Henkel is now a partner in 17 Chinese joint ventures, three of which manufacture cosmetic products. There is a huge demand, despite the fact that brand-name products are expensive in terms of the average income of a Chinese family.

For example, the quality of the shower gel produced for Henkel Cosmetic China in Zhaoqing is outstanding. It contains ▶alkyl polyglycosides (APG), the mildest ▶surfactants produced by Henkel, which are new on the Chinese market.



The healthier the lock of hair, the greater its resistance to tearing. The results of the stress-strain measurements are shown on the computer screen, allowing conclusions to be drawn about the quality of hair treatment products.

Not only the Chinese consumers benefit. Thanks to APG, they can enjoy an especially mild and skin-compatible shower. Also thanks to APG, the burden on the environment is reduced as well. Alkyl polyglycosides are manufactured solely from renewable raw materials.

In contrast to synthetic surfactants, the production of APG does not require any finite resources, such as petroleum. All of the completely biodegradable alkyl polyglycosides are characterized by a very favorable life

cycle assessment. These ecological advantages are especially significant in China. According to economic forecasts, the standard of living of the Chinese will increase in the coming years. The use of shower gels by the population of more than one billion people might reach undreamed-of dimensions.

In view of these future developments, as well as the associated burden on the environment, Henkel is already using its products to set new ecological standards – and not only in China.

Environmental protection, safety and health

Health protection and ecology

Health protection is the number one priority with regard to brand-name cosmetics, because all such products are intended to be used directly on the skin or hair. The cleansing and care action of the products is ensured by formulations that are simultaneously effective and mild. Many ingredients are discharged with the wastewater after washing, showering or bathing. Considerable attention must therefore be devoted to their behavior in the environment.

* Institute for industrial medicine of the German social insurance for occupational health and welfare



Clean cutlery after it has passed through an institutional multi-station dishwashing machine. Highly concentrated detergents and dispensing systems ensure efficient cleansing.

Hygiene and ecology are not a contradiction

Clean is good; hygienic is better. Good hygiene is essential in the food industry, in restaurants and canteens, in hotels and hospitals, and in public sanitation facilities.

Disinfectants and numerous other products from Henkel-Ecolab serve to safeguard health, especially where lots of people congregate. But even bactericides can be gentle. Henkel-Ecolab's product policy incorporates similar objectives to those set out in the Code of Good Environmen-

tal Practice of the European detergent producers association, A.I.S.E. It therefore uses environmentally compatible raw materials in its formulations whenever possible.

At the same time, Henkel-Ecolab's sophisticated dispensing and mixing systems ensure that

The Henkel Group's hygiene specialist is the European joint venture, Henkel-Ecolab, which provides products for industrial and institutional customers.

industrial and institutional customers use its products safely and in the correct amounts.

Enzyme cleanser for dairies

Perfect hygiene is also an absolute must in dairies. A European Union regulation stipulates, for example, that all tanks, containers and equipment used to transport, store or process milk and milk products must be thoroughly cleaned and disinfected at least once each day.

Henkel-Ecolab has developed an enzyme-based system specifically for cleaning operations in dairies. It offers a number of advantages over conventional alkaline cleansers. The new two-component system works at much lower temperatures, requires fewer rinsing stages, and has an almost neu-

tral pH. The resulting wastewater is thus less heavily loaded. The substances that are discharged with the wastewater from this innovative system are readily biodegradable.

The new cleansing system achieves better results with a dosage concentration of less than 0.1 percent than conventional cleansing agents, which are used in concentrations of 0.8 to 1.5 percent. Thanks to this extremely low application concentration and the neutral pH, long rinses with water are no longer necessary. The excellent performance of the new system, which benefits the quality of the milk, is attributable to a "specialist team" of enzymes, surfactants and complexing agents. They remove fat, protein and calcium deposits, thus en-

Life cycle assessment: Dairy cleansing hygiene



Percent 0 25 50 75 100 125

■ Enzymatic single-phase cleanser (P3-paradigm) ■ Conventional single-phase cleanser ■ Conventional two-phase cleanser

* Average (depends on the wastewater charges)

Professional hygiene for small-scale applications: Henkel-Ecolab has developed a compact dispensing system to precisely dilute concentrates with water.



New enzymatic cleanser for dairies. Its effectiveness in cleaning the pipes and containers is tested in a laboratory.

ensuring that surfaces remain free of any residues. Henkel-Ecolab also supplies a highly effective product for the subsequent disinfection.

Excellent cleaning results, using less energy and water, and no wastewater problems: These claims are attracting attention in the dairy industry. The new system also saves money, a decisive plus for companies that have to optimize their operating costs.

On a small scale

Cleansing agents, disinfectant solutions, and sanitation and glass cleansers are supplied in concentrate canisters, which can be connected to mixing containers with automatic water intake and dispensing taps. Stationary multiple dispensing units of this type are ideal for big hotels, hospitals, etc. However, they are a little on the large side for many thousands of smaller operators. Henkel-Ecolab has recently developed a compact dispensing system to meet their needs. After all, adding the correct amount of product saves money and lessens the burden on the environment – on a large as well as a small scale.

Blocks for dishes

In large canteens and dining halls, plates, cups, glasses and cutlery are not cleaned in conventional household dishwashers, but in multi-station dishwashing machines. Up to nine

meters long, one such machine can clean 8,400 plates per hour. A dishwashing detergent that does its job perfectly well in the home has no chance of satisfying the stringent legal requirements that apply to industrial and institutional kitchens and call for other kinds of products. For such large-scale operations, Henkel-Ecolab has developed highly concentrated detergents in block form, referred to as solids, as well as the necessary dispensing systems.

The developers gave special priority to simple and safe use. The four-kilogram solids are supplied in plastic containers, which are inserted directly into the dispensing unit. This totally enclosed system is provided with an electronic controller, which recognizes when the dishwashing machine needs cleansing agent. Only then is the dispensing process started, during which the cleansing block is gradually dissolved by spraying it with water. On average, one solid block usually suffices for one day's work.

The dispensing units can be programmed at the touch of a button, so that less cleansing agent is flushed in for slightly soiled breakfast dishes than during the afternoon, when the more heavily soiled dishes from the main meal have to be washed.

The developers of the solid system recently succeeded in making two major improvements. Firstly, the cleansing efficiency was increased still further, resulting in more sparing use of the solid. Secondly, the weight of the plastic container, in which each solid is safely held, was reduced by 35 percent to about 100 grams. This reduction in the amount of plastic benefits the environment in particular. When the container is empty, it is flattened and can be recycled.

This innovation from Henkel-Ecolab is more expensive than other products for multi-station dishwashing machines. Nevertheless, sales are good, because many kitchen managers have done their arithmetic. The solid system helps to ensure that the washed dishes are not only visibly, but also hygienically clean. It also embodies the smallest conceivable level of risk to the safety and health of employees.

"Green" service

The objective of a certain major Scandinavian hotel chain is to run the "greenest" hotels in the world. Henkel-Ecolab is helping it to realize this objective. The Henkel specialists not only provide the Scandinavian hotel chain with customized products and technical equipment, but have also drawn up an environmental review. This involves

Environmental protection, safety and health

Product and application safety

Health protection and occupational safety are the concerns of the Industrial and Institutional Hygiene business sector. The products ensure cleanliness and hygiene – the basic requisites for a "healthy" atmosphere for living and working. Henkel-Ecolab facilitates product and application safety, above all through carefully designed packaging, dispensing and mixing systems. They prevent any direct skin contact with the often highly concentrated products.

monitoring the consumption of water, energy and chemical products over a long period of time. The review also covers the transport flow of the chain's individual hotels, as well as the amount of packaging waste.

On the basis of the collected data, the Henkel-Ecolab eco manager identifies where the Hotel group can improve its ecological management. An enormous amount of work is involved in an environmental review, but Henkel-Ecolab has already performed this special service for several customers – also in the interests of the environment.

Environmentally compatible and safe production



Management and employees are resolutely improving environmental protection, health protection and safety at all Henkel Group sites. A wealth of examples demonstrates what is being done in these areas in production, and how problems are being solved through creativity and resourcefulness. The improvements achieved have been organized by region and country.



Henkel in Düsseldorf-Holthausen has considerably reduced its wastewater volume and AOX load. The central wastewater monitoring plant is shown here.

B Belgium

Henkel Belgium, Herent

Location: 30 kilometers east of Brussels

Employees: 300

Product groups: Detergents and household cleansers; products for the surface treatment of metals and other materials

Certified environmental management system

In the fall of 1996, the management of Henkel Belgium decided to have the environmental management system at the Herent site certified, extending the audit to cover the storage facilities in nearby Kampenhout as well. As early as March 1997, a three-man team of accredited external verifiers from Lloyd's Register Quality Assurance carried out the approval audit in accordance with the international ►ISO 14001 standard. The examination was successful, and the certificate was awarded – a fitting reward for the exceptionally high level of commitment of the staff and management.

The result of the audit is not only a formal confirmation of the efficiency of the environmental management system. The internal operational audits which preceded it also identified potential improvements and defined plans for appropriate measures:

By the end of 1998 the cooling water from production will

no longer be discharged, but recycled. This will result in annual savings of more than 10,000 cubic meters of fresh water.

The installation of new measuring instruments during the first half of 1998 will ensure that dust ►emissions from operational malfunctions will be immediately detected and quantified. The experience gained in this way will also help to reduce future emissions.

An in-house officer has been appointed to be in charge of the reorganization of waste management. He is responsible for the collection of sorted waste in the various production units and for the central processing of the collected waste.

D Germany

Henkel Genthin, Genthin

Location: About 80 kilometers west of Berlin

Employees: 330

Product groups: Liquid and powdered detergents

Modernized tank farm and filling stations

The most extensive project in 1997 at the detergent plant in Genthin was the modernization of the tank farm and the powdered detergent filling stations. A whole package of improve-

ment measures was implemented, including new pipelines, heating systems, and level indicators. A particularly costly building project was the complete renewal of the catch pots, whose chemical impermeability serves to protect the soil and groundwater. The associated wastewater system also had to be relaid.

This modernization facilitated an increase in the degree of automation of the tank farm. As a result, the operation of the farm is now even safer and the control options are even more reliable.

Occupational safety was also improved in Genthin. Anti-fall devices were installed at the tank car discharge sites – an important contribution to accident protection.

Henkel, Düsseldorf

Location: In Düsseldorf-Holthausen, the largest Henkel Group site

Employees: 8,500

Product groups: Chemical products; adhesives; detergents and household cleansers

Important environmental objectives achieved

Two of the three environmental objectives of Henkel KGaA in Düsseldorf-Holthausen in 1997 concerned wastewater. Both of them were not only achieved,

but surpassed. The ►AOX load of wastewater was decreased considerably below the target value of 3.5 kilograms per day. The measured daily values were consistently below 2 kilograms, with some of them just above 1 kilogram. In addition, the amount of wastewater discharged into the municipal sewage treatment plant each day is now below 11,000 cubic meters.

The third objective was to minimize the amounts of substances that can escape during operational malfunctions. More than 130 pressure-relief devices (for example, valves that open automatically when the permissible pressure in the plant is exceeded) were carefully examined. In a few isolated cases, the investigation team recommended taking specific measures. These were quickly implemented, so that, all in all, no more unacceptable substance emissions are to be expected.

A new filter unit was installed in the detergent plant to clean the waste air. The experts resorted to the jet filter technique, which has proved itself in the neighboring plants over a period of years. The detergent



Noise prevention in Düsseldorf – drip impact attenuators reduce water noise in a cooling tower.

dust collected in the filter is not wasted, but is fed back into the production process. The safety of the 250 cubic meter tank in which sodium hydroxide solution is kept in the zeolite plant was also improved. It now stands in a new, leakproof concrete basin.

Another environmental safety measure that was implemented at Düsseldorf-Holthausen in 1997 was the reduction in noise emissions of a sulfation plant. An investigation revealed the main sources of the noise.

Abatement measures were subsequently targeted at the

units in question. One of the measures was the installation of drip impact attenuators to reduce water noise in a cooling tower. Noise dampers have now been fitted to the ventilation gratings of the room that houses the large compressors, which operate very loudly.

These measures have resulted in a decrease of about 3 decibels (A) in emitted sound, thus halving the previous noise emissions. If a noise-absorbing wall had been built instead of taking these targeted measures, the investment costs would have been about four times as high.

Kepec Chemische Fabrik, Siegburg

Location: About 12 kilometers northeast of Bonn

Employees: 80

Product groups: Specialty chemicals for the manufacture of paint, leather, textiles, cosmetics, as well as for detergents and household cleansers; aroma chemicals

reutilized percentage of its total waste from 40 to 50 percent. It succeeded.

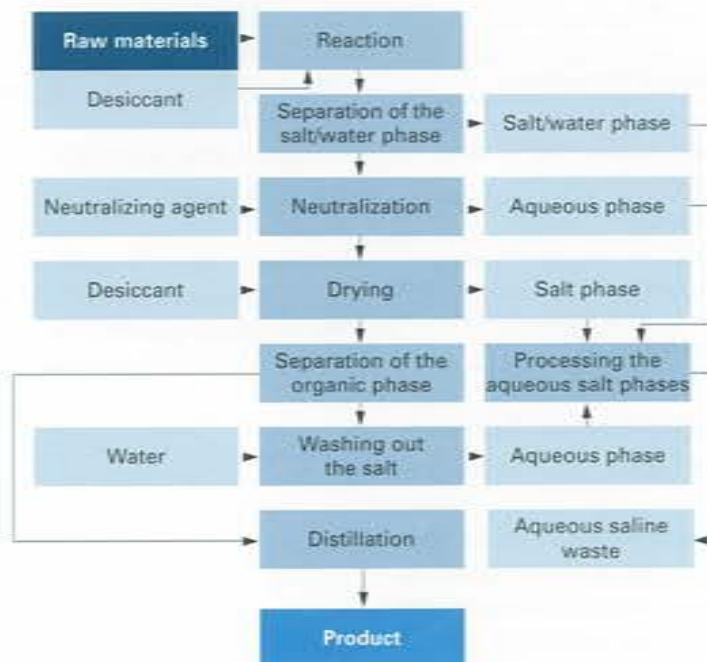
The waste generated by the production of aroma chemicals was reduced by 12 percent. This was due to a membrane process, which was used for the first time with reaction mixtures. The vapor phase over a hot reaction mixture, in which the water vapor accumulates, is passed through a membrane module, which filters out the water molecules. The previously necessary waste treatment has been eliminated by the use of this method, which was devel-

Membrane process reduces waste

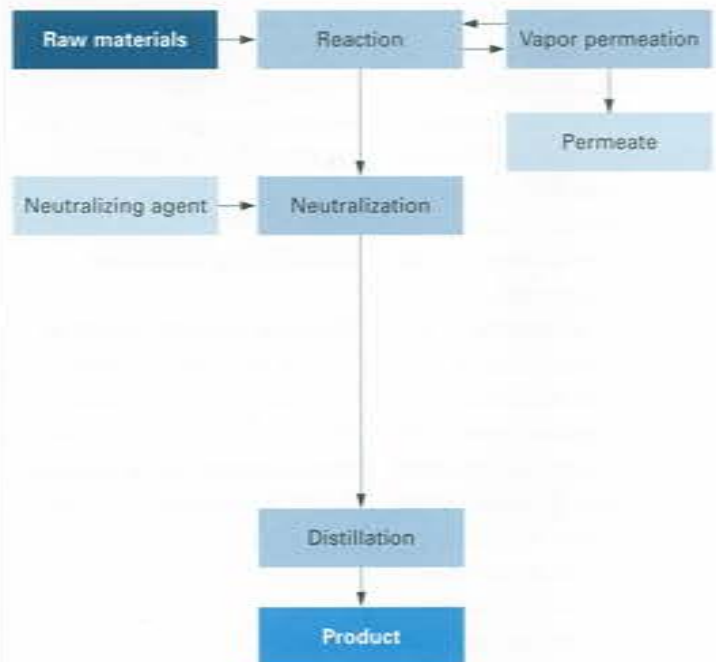
Kepec Chemische Fabrik's objective in 1997 was to increase the

Kepec Chemische Fabrik: Process comparison

Conventional process



New membrane process





Preventive measure by Henkel Oberflächentechnik in Herborn-Schönbach: An automatic measuring station monitors the rainwater drain.

oped by Henkel. Because desiccants no longer have to be used, the membrane process contributes to the conservation of resources as well. The new method is also beneficial with regard to occupational safety, because it operates within a completely closed system.

As part of another project to reduce the burden on the environment, a new facility was put into operation for cleaning the 1000-liter stainless steel and plastic containers that are used for in-house purposes. A special feature is that precleaning is accomplished using water only, without any cleansing agents.

Almost 2000 container cleaning operations are carried out each year. The optimal amount of water is used each time – only a third of the volume needed with previous methods. The automatic facility cleans the containers in two stages. During precleaning, about 25 to 30 liters of water absorb most of the product residues still clinging to the container walls.

This highly polluted rinse water is disposed of. If this is done in a digester, it may even generate energy, as was demonstrated successfully during trials. The main cleaning operation is carried out with steam, resulting in the formation of some 50 to 60 liters of condensate. The level of pollution of this water is so

low that it can be fed directly into the site's own wastewater treatment system.

Due to the use of returnable stainless steel containers, which can be prepared for refilling in the new cleaning facility, it has been possible to dispense with the plastic containers on which the company used to rely exclusively. These plastic containers had to be disposed of after no more than three trips. The new container cleaning facility thus also helps to avoid wastes.

Henkel Oberflächentechnik, Herborn-Schönbach

Location: About 60 kilometers northwest of Frankfurt-on-Main

Employees: 90

Product groups: Specialty chemicals for treating surfaces (metal, plastic, etc.)

Automatic rainwater control

The Herborn-Schönbach site of Henkel Oberflächentechnik (known until the end of 1997 as Gerhard Collardin GmbH) has two separate wastewater networks. One is for wastewater from the production lines and office buildings, and the other for rainwater. The production wastewater is subjected to chemicophysical treatment before being discharged, together with wastewater from sanitation facilities, into the urban sewage network, which channels it into

the municipal sewage treatment plant. The rainwater is discharged directly into a stream that runs past the site. The company has taken preventive measures to ensure that the stream cannot be harmed by polluted rainwater.

An automatic measuring station has been set up at the outflow of the rainwater drain. It continuously measures typical parameters, such as the pH and conductivity of the water. The measured values provide information about possible contamination of the rainwater with acids, lyes and salts, which are the main substances used on the site. If the defined threshold values are exceeded, a shutoff valve is immediately activated. The water is then collected in an underground storage tank and is not discharged into the stream via the rainwater settling tank. An automatic alarm is sounded in the control room to alert the responsible employees.

Since early 1998, the automatic measuring station has also monitored the rainwater for possible contamination with foam-generating surfactants – another major group of substances in Herborn-Schönbach. Appropriate separate measurement and control systems have been put into operation.

Sichel-Werke, Hannover

Location: Industrial zone in the south of Hannover

Employees: 245

Product groups: Sealants; wall covering adhesives; reactive adhesives

Less water, less energy

Savings in water consumption head the list of environmental objectives of Sichel-Werke. By the year 2000, the 1996 level of consumption is to be cut by 50 percent. Various measures will contribute to this, including the closing of cooling circuits, the installation of more cooling towers, and improvements in vacuum generation. The project already produced tangible successes in 1997. Despite increased production, water consumption at the site was down by 120,000 cubic meters, a reduction of 7 percent on 1996.

Optimizing vacuum generation saves not only water, but also steam and energy. Steam consumption was 118,000 metric tons lower in 1997 (equivalent to 68 percent of the previous annual requirement).

The employees in Hannover also made progress in waste management. The use of returnable drums began to pay off – literally – in 1997. The amount of iron drums that were scrapped decreased by 80 metric

tons, resulting in both economic and ecological benefits. Further savings were achieved by sorting the different types of paper waste. 20 metric tons were collected for recycling in 1997.

The next objective has already been set. The manufacture of sealants generates waste that requires special monitoring. Changes in the production process should result in a 5-percent decrease in the amount of this waste by 1999.

Henkel Teroson, Heidelberg

Location: Industrial zone on the outskirts of Heidelberg

Employees: 750

Product groups: Adhesives and sealants; surface coating materials

Successful eco audit at Heidelberg site

The outstanding environmental event of 1997 at Henkel Teroson in Heidelberg was the successful certification of its environmental management system, not only in line with the international ►ISO 14001 standard but also under the ►Eco Management and Audit Scheme of the European Union (EU). The various production lines and storage facilities were closely inspected during systematic in-house audits,

which were carried out with the support of a team of experts from Henkel in Düsseldorf.

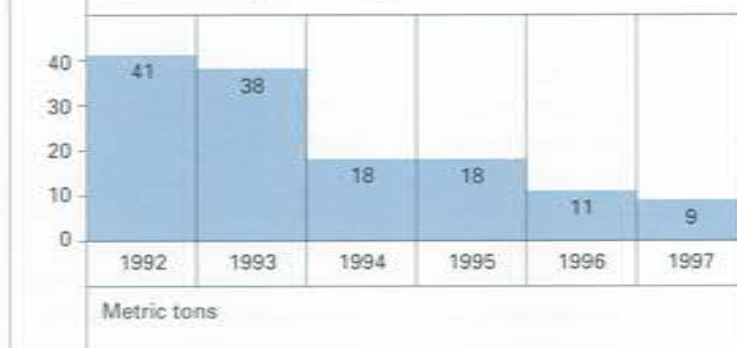
These showed clearly that the basic principle of the management and audit scheme – the continuous improvement of environmental protection – is firmly anchored in the consciousness of the employees and management team at Henkel Teroson. This can be deduced, for example, from the continuous reduction in ►emissions of volatile ►organic compounds. These emissions have been cut by about 80 percent during the last 6 years.

However, the in-house environmental audits also revealed potential for improvement in some areas. Henkel Teroson has therefore drawn up and published a ten-point environmental program, which is to be implemented before the next eco audit is carried out in the year 2000. The focal points of this program are waste avoidance, savings in packaging material, training concepts, and further improvements in occupational safety.

The final audit and certification of the site by the accredited external verifiers from Lloyd's Register Quality Assurance took place in August 1997. A special aspect of this audit was that Henkel Teroson had invited two highly placed officials of the responsible regulatory body, the environment office of the city of Heidelberg, to spend an entire day accompanying the verifiers as they carried out their work.

Emissions of volatile organic compounds

Henkel Teroson, Heidelberg



The officials welcomed this opportunity of gaining direct insight into the actual certification procedures and their quality.

In the context of the EU Eco Management and Audit Scheme, Henkel Teroson produced an Environmental Statement describing the activities and environmental impacts of the Heidelberg site. In response to the publication of this statement, the Mayor of Heidelberg acknowledged the exemplary environmental activities of Henkel Teroson. During a visit to the site, she praised the open, constructive cooperation between Henkel Teroson and the environmental authorities.

The local and regional press reported on the statement at length, enabling Henkel Teroson to underline and enhance its positive public image as a chemical company which practices responsible care.

Thompson-Siegel, Düsseldorf

Location: Düsseldorf-Flingern

Employees: 400

Product groups: Household cleansers; building auxiliaries; plant care products

Eco certificate and ambitious environmental objectives

The central environmental topic at Thompson-Siegel was the certification of the environmental management system at the Düsseldorf-Flingern site. The objective was to achieve certification to the international ►ISO 14001 standard. Thanks to the high level of commitment of employees and executives, it was possible to carry out the final audit in December 1997. The accredited external verifiers from Lloyd's Register Quality Assurance certified the system's conformity to the ISO standard.

Thompson-Siegel had done a great deal of work during the lead-up to the audit. This included staff training. Each year a Quality and Environment Day is



Environmental protection is also a top priority at Thompson-Siegel in Düsseldorf. The tank farm can be seen in the foreground.

held, during which the production lines are idle. Employees from all of the company's organizational units attend workshops that deal with subjects related to environmental protection and safety, as well as quality management. Special departmental interests are also covered. During the workshops, the employees formulate ideas and suggestions for improvements.

The importance of good relations with the site's neighbors is demonstrated by the measures taken to reduce perfume odors. Although the regulatory body found that there was no need to take action in response to a complaint from a neighbor, Thompson-Siegel nevertheless improved the odor situation in the vicinity of the site by installing active carbon filters. This measure reduced the odor ►emissions to just 17 percent of the previous level.

Despite the very low level of dust emissions, the company plans to completely replace an ageing filter unit with a modern system in 1998.

In recent years, considerable successes have been achieved in reducing wastewater levels. Thompson-Siegel now intends to reduce wastewater loads still further. The first measures have been introduced – for example, the use of intermediate storage tanks that can be drained especially efficiently, so that only very small amounts of product

residues find their way into the wastewater during rinsing. Pipelines that can be cleaned with ►pig systems are to be installed for the purpose of reducing the number of rinsing operations in the production units still further.

E Spain

Henkel Ibérica, Pulcra, Barcelona

Location: Zona Franca industrial zone, south of Barcelona

Employees: 140

Product groups: Oleochemical base materials, such as fatty acid derivatives and surfactants

Focus on water consumption and wastewater load

At its Zona Franca site near Barcelona, Henkel's Spanish subsidiary Pulcra has cut its water consumption by about three-quarters in the space of only four years. Starting from an already very low level, the aim was to reduce the figure by another 10 percent in 1997. This deliberately ambitious target was not, however, achieved. Due to an increase in production volume of about 7 percent, the

amount of water consumed even rose slightly, though specific water consumption per metric ton of manufactured product remained unchanged. To reduce the current low consumption level still further, new technical concepts will have to be developed.

By contrast, the second site target, i.e., to reduce the ►organic wastewater load by 30 percent – initially planned for the end of 1998 – was not only met in 1997, but clearly surpassed. The load dropped by 38 percent. Organizational production measures, including the modification of rinsing and cleansing processes, contributed to this, as did more efficient operation of the sewage plant.

Thought was also given to employee training. Among the many topics treated in an entire series of courses were occupational safety, internal hazard prevention, handling of hazardous substances, and how to react in emergencies.

All of these measures have established a favorable starting point for Pulcra's new environmental goal: to have the site's environmental management system certified to the international ►ISO 14001 standard by the end of 1998.

Naturally, Pulcra's employees are equally aware of the need for efficient energy management. Ingenious recuperation of the waste heat from various production processes now generates such high levels of extra

process steam that the planned extension to the steam generation system has become unnecessary. This saves energy and costs, while reducing ►emissions of the greenhouse gas ►carbon dioxide.

Henkel Ibérica, La Toja

Location: Industrial zone, about 10 kilometers from the city of La Coruña in the northwest of Spain

Employees: 200

Product groups: Oral hygiene products; toiletries

Teamwork speeds up improvements

At the La Toja plant, both management and staff are convinced that improvements in environmental protection and safety should be effected creatively, efficiently and quickly by means of teamwork. There are various teams, each composed of about ten persons from different organizational units and hierarchical levels within the company, and each focusing on a distinct goal. One of them concentrates, for instance, on reducing waste, decreasing water consumption, and encouraging eco awareness among their co-workers.

The success of the wastewater improvement team serves to illustrate the effectiveness of



Cleaning up: Henkel Magyarország now operates its own wastewater purification plant.

these efforts. Due to the very different product groups being handled by the production department, the type and amount of substances contained in the wastewater vary considerably. The wastewater treatment plant has to cope with this. Together with the staff who operate the sewage treatment plant, the team has implemented a great many improvements, both at the physicochemical stage and at the biological stage.

Their success is impressive. In just under one year, the ►organic wastewater load was decreased from 3.4 metric tons per year to 1.7, even though the output tonnage rose by 20 percent during the same period. As a particularly satisfying side effect, the total cost of wastewater treatment was also cut by over 12 percent.

Regular analytical monitoring of the organic load in the discharged wastewater – including monthly checks by an independent expert – confirms the sustained success of the measures taken.

It is not surprising that the members of the wastewater team wished to provide all site employees with visible proof of their achievements. For a period of five months they set up an aquarium in the canteen and filled it with water from the purifying plant as a habitat for tropical fish. These fish, which are very sensitive to the quality of water, are clearly very happy

with their environment. This was also welcome news to the many anglers who fish the river into which the plant discharges.

The next targets for the Ecoimprovement Teams have already been set: evaluating the use of the treated water on site, for example, in the boiler, or at least to water the gardens.

H Hungary

Henkel Magyarország, Körösladány

Location: 200 kilometers southeast of Budapest, on the southern border of Hungary

Employees: 220

Product groups: Shoe care products; household cleansers; dishwashing products; fabric softeners

In-house sewage treatment plant now in operation

The wastewater of the Henkel facility on the edge of the town of Körösladány used to be transported by tank truck to the sewage treatment plant in neighboring Szeghalom, 12 kilometers away. This complicated procedure was necessary because the sewage treatment plant in Körösladány is only capable of treating the household wastewater of a small town.

As production gradually expanded, so did the volume of wastewater. The existing method

of disposal became increasingly onerous for Henkel, and the sewage treatment plant in Szeghalom was approaching the limits of its capacity. After all, Henkel now produces about 70 cubic meters of wastewater every day.

As the town of Körösladány was unwilling to upgrade and expand its municipal sewage treatment plant, Henkel designed, built and put into operation a plant of its own.

The objective was to purify the site's wastewater so thoroughly that it could be discharged into a nearby body of water. The wastewater experts therefore decided on a much tried and proven two-stage process, awarding the contract to build it to the Hungarian subsidiary of an internationally operating manufacturing group. The high expectations have been completely fulfilled. The Henkel sewage treatment plant was put into operation on schedule and reduces the ►organic load, for example, by more than 99 percent.

The authorities have put up a barrier, however. They want to be sure that this high level of purification will be maintained in the long term. Analyses will therefore be carried out for a period of one year for the purpose of monitoring and demon-

strating the efficiency of the Henkel sewage treatment plant. During this period, the purified wastewater will be brought to the sewage treatment plant in Körösladány. Only after this trial period has been successfully completed will Henkel Magyarország be allowed to discharge its purified wastewater directly into surface waters.

Meanwhile, Henkel is planning still further. It should be possible to recycle at least part of the purified wastewater into the production processes. If this can be done, not only will the burden on the environment be reduced even further, but savings will also be achieved in the consumption of water, which is indeed an important resource.

IRL Ireland

Henkel Ireland, Cork

Location: Little Island industrial zone, 3 kilometers from the city of Cork

Employees: 122

Product groups: Metal extraction compounds; detergent additives

Highly motivated for eco improvements

►Responsible Care is indelibly impressed on the consciousness of every employee of Henkel Ireland. The European environ-



Henkel Ireland now sells its former production wastes as recoverable material. Organic impurities are removed from aqueous aluminum salt solutions for this purpose.

ment award received in not just one but two categories in 1996, is a source of considerable pride and has resulted in a high level of motivation. The targets set for 1997 were clearly exceeded, and a number of new activities have been started.

Henkel Ireland, together with neighboring companies, has initiated regular discussion groups as a forum in which neighbors and local citizens can put forward their questions and complaints, and engage in an exchange of views. A sponsoring program has also been launched to provide financial aid for ecological projects and further education measures that are initiated and implemented by local citizen's groups and regional associations (see page 12). Site visits by school and university students have been intensified.

A hazard prevention plan, which also covers measures beyond the site perimeter, has been drawn up and put into effect. Henkel Ireland has devoted special care and attention to the protection of soil and water since 1996. Tank farms, for example, now have spill contain-

ment zones, and an 800-cubic-meter storage basin for fire-fighting water has been constructed.

Impressive progress has been made in the field of waste management. Around 5,000 metric tons of hazardous waste generated by the production of metal extraction compounds – representing almost 60 percent of the current total amount – can be recycled in the future instead of being disposed of in landfills. This was made possible by the development of a process for removing ▶organic impurities from the aqueous aluminum salt solutions that are generated as production waste. This expensive and intensive development work has proved worthwhile. The materials recovered from the former wastes can now be sold at a profit to other industrial companies (see page 19).

The site's objective for 1996 – the reduction of aluminous waste – was therefore not only quantitatively exceeded by a wide margin, but was achieved one year earlier than planned.

A large-scale investment project has just been completed. A modern steam generation plant came on line in March 1998. It replaces two smaller steam boilers which had to be shut down due to excessive nitrogen oxide ▶emissions. The

new plant is designed on the ▶cogeneration principle and therefore also produces electricity. It will supply around 50 percent of the site's power requirement. The highly efficient cogeneration principle results in very low specific emissions of ▶sulfur dioxide, ▶nitrogen oxide and ▶carbon dioxide. This will make a significant contribution toward achieving the site's objective for 1998 (see page 51).

When the total concept was designed, provision was made for utilizing energy-rich organic production wastes – which previously had to be disposed of in external landfills – as fuel. This has a two-fold benefit. It drastically reduces the consumption of the fossil fuel petroleum, while lessening the burden on the local landfill.

Overall, this investment project proves that environmental protection must not necessarily be in conflict with economic efficiency.

I Italy

Henkel, Ferentino

Location: 70 kilometers southeast of Rome

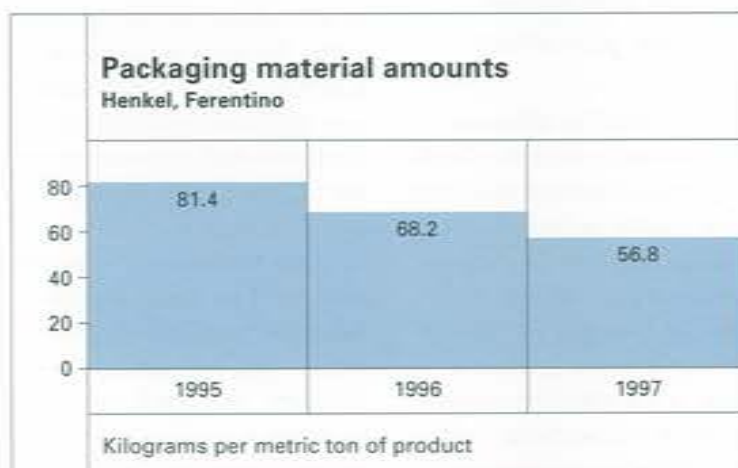
Employees: 260

Product groups: Detergents

Significant cuts in packaging

The Ferentino detergent plant had set itself the target of reducing the quantities of packaging materials per metric ton of detergent by 10 percent within 2 years. By the end of 1997 a very impressive result of merely 17 percent had been achieved.

The management team and employees have already lined up the site's new objective for 1998. They intend to cut water consumption. The target is a reduction of 30 percent, based on the 1996 figure, before 1999. After the situation in the different parts of the site has been



registered, measures will be initiated that focus on

- the recovery of steam condensate (with the associated savings in energy),
- the optimization of rinsing and cleansing processes in the production lines, and
- reducing the consumption of potable water in the administrative and staff amenities buildings.

The safety system in Ferentino was also improved in 1997. The automatic fire-extinguishing installations in the production plants now make no use of halons, a class of substances known to damage the ozone layer.

Henkel, Fino Mornasco

Location: South of Como in northern Italy

Employees: 100

Product groups: Products for the leather, detergent and cosmetics industries

Hazard prevention plan put into effect

In 1997, the Fino Mornasco site's efforts in the field of environmental protection and safety were focused on hazard prevention and measures to preclude environmental damage. At the heart of this work was the creation of a hazard prevention plan, which also takes account of events whose effects could be felt beyond the site perimeter.

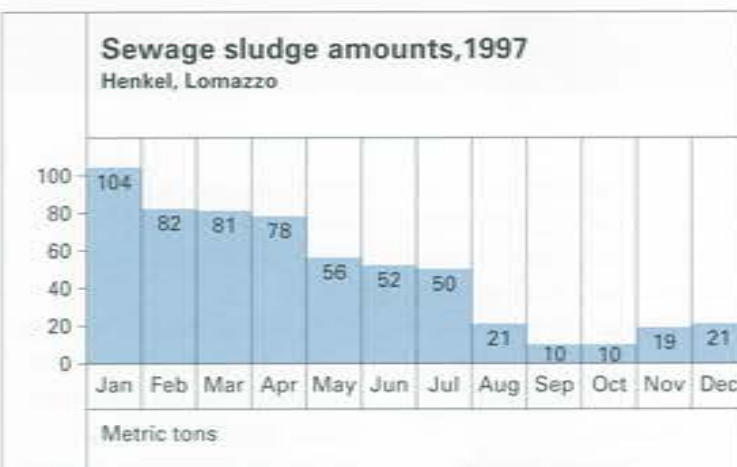
Procedures for protecting and informing the site's neighbors, as well as for notifying and cooperating with the authorities and the emergency services, are meticulously defined. The plan has been examined and approved by the regulatory bodies and put into effect.

An accompanying measure is the installation of a meteorological station on the site itself. In case of an emergency, it will be possible to use the data on the wind direction and speed to predict the path of the liberated substances and the extent of the area affected by them.

As part of the site's efforts to ensure that such dangerous situations never arise, a number of additional sprinkler systems were installed in 1997. As a result, all of the production plants and storage bays in Fino Mornasco are now fully equipped with automatic fire-extinguishing systems.

The purification efficiency of the sewage treatment plant, which was put into operation in 1995, was given special attention. The operation of the plant was optimized, resulting in a further marked improvement in the efficiency of the biological treatment stage.

More than 90 percent of the organic load is now degraded before the wastewater is discharged into the municipal sewer system. As a result, chemical treatment is now largely unnecessary. It is only applied as an upstream or downstream emer-



gency stage when there is an inflow of severely polluted wastewater. This reduces the amount of waste and the operating costs, without affecting operational reliability.

Further measures have also been taken to prevent any contamination of soil or groundwater on the site. All open areas of pavement, on which chemicals are handled, have been covered with a highly resistant and impermeable industrial coating.

Henkel, Lomazzo

Location: South of Como in northern Italy

Employees: 200

Product groups: Liquid detergents

More efficient wastewater purification

In 1997, Henkel's Lomazzo site reported completion of a study carried out to measure the organic load levels in wastewater and to identify the respective operational sources. The results

made it possible to pinpoint the causes of the pronounced fluctuations in load over time in the biological purification stage of the sewage treatment plant. This was a precondition for devising remedial action. The subsequent successful reduction in wastewater loads was due not only to technical modifications, but also to organizational measures, such as the reduction in rinsing processes through sophisticated production planning.

The Lomazzo site now has its wastewater purification processes performing satisfactorily. Approximately 98 percent of the organic load is biodegraded. Surfactants even undergo almost complete degradation.

An automatic analysis instrument was installed to ensure that this high performance can be permanently monitored and reliably maintained. It measures the organic wastewater load continuously, twenty-four hours a day.

The sewage treatment plant is required to achieve this positive result without generating too much sludge as waste. Here, too, further optimization of the operating process brought about

marked improvement. In the second half of 1997, the amount of sewage sludge dropped to 20 percent of the previous level. The quantities of sewage sludge varies with the monthly production schedule. The fluctuations between August and December are also due to the fact that it is not the quantities generated in the sewage plant which are recorded, but those quantities that are actually being disposed of.

The improvements in biological wastewater treatment also had a satisfying side effect. The upstream chemical wastewater cleansing stage is now normally utilized only in emergencies. This eliminates not only the waste previously generated at this point, but also the entire operating cost for the facility.

The Lomazzo plant has, however, by no means lost sight of the ambitious goal it set itself in 1996, i.e., to cut water consumption by half by the end of 1998. A new closed-circuit cooling water system was completed and started up in November 1997, thus substantially decreasing the plant's water intake.

Four new exhaust air purification systems were installed in 1997 in the production and packaging departments. They have helped to reduce the site's atmospheric emissions even further – to the benefit of neighbors and the environment.

NL Netherlands

Henkel-Ecolab, Nieuwegein

Location: Province of Utrecht

Employees: 110

Product groups: Detergents and cleansing products for institutional hygiene

Certification of the eco management system

The outstanding environmental event in 1997 was the successful certification of the environmental management system of the Nieuwegein site to the international ISO 14001 standard. In August 1997, the accredited external verifiers from N.V. KEMA carried out the approval audit to their satisfaction, after which they awarded the certificate to Henkel-Ecolab. The high level of commitment of the employees and the management team during the preparations for the audit played a crucial role in this success.

Since Henkel Ecolab is the first company in Nieuwegein to have a certified environmental management system, public interest was very high. The presentation of the certificate by the representative of the municipal administration was therefore attended not only by the employees, but also by members of the public and the site's neighbors.

As its next environmental objective, Henkel Ecolab intends to save resources and energy in



Reduced emissions: Coal was gradually replaced by gas in the power plant of Henkel Polska in Racibórz.

its detergent production line. One of the measures will be the step-by-step replacement of the spray drying process by granulation. The anticipated benefits are considerable. Relative to the amount of detergent produced, 80 percent less water and natural gas will be consumed. The emissions of the greenhouse gas carbon dioxide and of nitrogen oxides, which are responsible for acid rain, will also decrease accordingly.

PL Poland

Henkel Polska, Racibórz

Location: Southern Poland, on the Oder River

Employees: 270

Product groups: Detergents; soaps; sulfonic acids

Gas replaces coal as fuel

In 1997, environmentally related improvements at the Racibórz site centered around the phased conversion of the power plant from coal to gas. This was expected to cut emissions of dust and sulfur dioxide by 10 percent each, and soot by 35 percent. This objective could not be achieved in the stated form, however, due to a production increase of around 70 percent.

If this pleasing development is taken into account and the site's atmospheric emissions are calculated per metric ton of manufactured product, there was actually a decrease of 30 to 40 percent in each case. Independently of the power plant, a new natural gas-fired hot-air generator in the detergent production plant also contributed to the improved emissions situation.

The impressive successes in reducing emission levels did not yet satisfy Racibórz's plant management. The target for 1998 is to achieve further improvements with regard to dust and sulfur dioxide (see page 51). The planned measures will also decrease emissions of carbon monoxide and carbon dioxide.

RUS Russia

Henkel Era Tosno, Tosno

Location: Tosno industrial zone near Saint Petersburg

Employees: 930

Product groups: Detergents; adhesives

Improved occupational and environmental safety

A large number of individual measures brought about considerable progress in occupational safety and environmental protection at the Henkel site in Tosno. These measures included improvements in the quality of

Ecological research project: Henkel Zlatorog in Maribor is helping to safeguard the habitat of the olm.



the air in the workplace due to the installation of exhaust units in the detergent factory and the adhesives production department. In addition, protective devices were fitted to the mechanical moving parts of the machines.

The environmental situation was further improved by a new spill containment basin in the liquid raw materials warehouse, newly installed dust filters in the detergent production department, and more efficient operation of the sewage treatment plant.

These technical measures were complemented by a program of intensive training and efforts to raise the awareness of employees with regard to environmental protection and safety.

SLO Slovenia

Henkel Zlatorog, Maribor

Location: Maribor industrial zone

Employees: 500

Product groups: Cosmetics and detergents

Joint environmental projects

Staff training and awareness-raising measures played a central role at Henkel's Maribor site in Slovenia. In 1997, around 450 employees participated in safety and fire-prevention seminars.

Individual employees, from the plant fire department, for example, were given special training.

The company has become a member of the ►Responsible Care work group of the Slovenian chemical industry and plays an active part in, for instance, the Japanese-Slovenian project for improving the water quality of the Drau River. This project aims at more efficient purification of industrial wastewater in Maribor. The project guidelines were already taken into account at the planning stage of the site's new wastewater treatment plant, which will be constructed in 1998.

The company also supports an ecological research project of national importance, which is intended to safeguard the habitat of the olm. This salamander is a highly specialized vertebrate, which lives in the dark, underground caves and rivers of the limestone mountains of Slovenia. Its survival is threatened (see page 13).

TR Turkey

Türk Henkel, Cayirova

Location: Near the town of Gebze in the province of Kocaeli (Greater Istanbul area)

Employees: 420

Product groups: Organic specialty chemicals; leather and textile auxiliaries; industrial adhesives; adhesives and auxiliary products for professional and DIY building applications

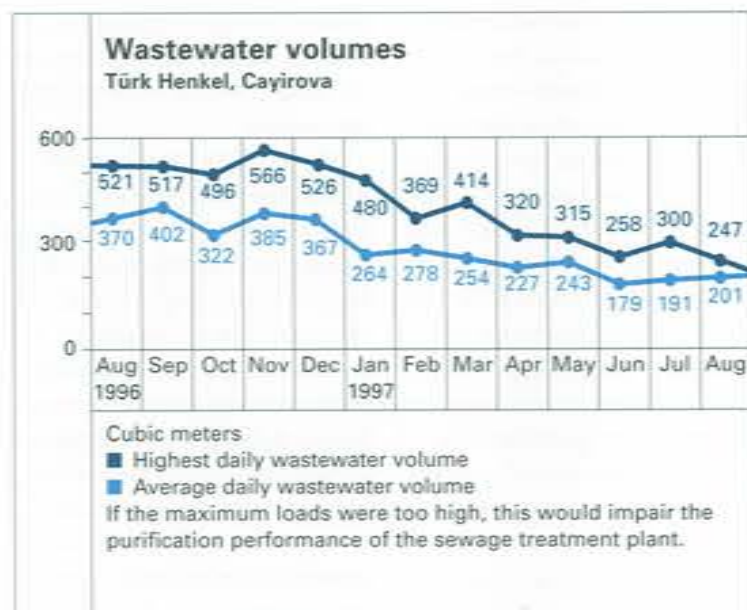
Wastewater cuts ahead of schedule

In 1997, projects for improving environmental protection at the Cayirova site were focused on the site's objective of achieving a drastic reduction in the amount of wastewater. The environmental management team established for this purpose is com-

posed of employees from the company's various organizational units. Its work was so successful that, by the summer of 1997, 40 percent less wastewater was flowing into the company-owned sewage treatment plant. The site's objective was thus achieved 9 months earlier than planned.

This success is the result of a number of separate measures taken at many different points within the site. Water consumption in the administrative and staff amenities building, for example, was cut by 60 percent. Employee awareness of the importance of using water sparingly in all areas played a key role.

The water consumption data in the individual production plants are registered by flow meters and stored in the central computer. This information can be accessed by all employees.



Safe solvent storage: LePage in the Canadian city of Brampton now operates a new above-ground tank farm.



The inflows to the sewage treatment plant are also displayed, enabling employees to consult the up-to-date daily figures.

In-plant measures are expected to achieve a decrease of around 30 percent in the ►organic load in 1998. This will reduce the quantity of sewage sludge by the same amount. Achieving the site's objective of over 50 percent will, however, prove more difficult. Preliminary tests revealed that the planned technical measures in the sewage treatment plant were less effective than anticipated. The situation must be reassessed, and alternative techniques will have to be identified and tested.

The Cayirova site plans to obtain certification to the international ►ISO 14001 standard by the end of 1998, thus clearly demonstrating the effectiveness of its environmental management system to its customers, its neighbors, and the wider public.

Türk Henkel, Izmir

Location: Seaport city of Izmir in western Anatolia

Employees: 400

Product groups: Liquid and powdered detergents; edible fats

Wastewater register and staff training

The year 1997 at the Izmir site of Türk Henkel was characterized by very detailed wastewater analyses. The specific amounts and the composition of the wastewater associated with each product group were measured, and the results were documented in a wastewater register. Improvement measures were then developed with the help of this register.

The first of these measures have already been implemented. For example, the ►organic load of the wastewater from the edible fat production department has been reduced by 25 percent. By the end of 1998 a decrease of around 25 percent is anticipated in the organic wastewater load of the site as a whole.

The use of gas as a source of energy in the detergent production department should result in a 12-percent decrease in ►nitrogen oxide ►emissions by the end of 1998. Reductions in wa-

ter consumption and the amount of wastewater are also planned.

As a contribution toward improving working conditions in the warehouses, diesel-engine fork-lift trucks have been replaced by electrically powered and LPG models.

As part of the total concept, all employees have received instruction on environmental protection and safety. In this context, clearly visible safety information has been posted throughout the production plants, employees have been given training at their workplaces, and the health and accident hazards in each employee's working environment have been explained.

CDN Canada

Henkel Canada/LePage, Brampton

Location: Province of Ontario

Employees: 225

Product groups: Do-it-yourself adhesives; sealants; adhesives for office and home; correction rollers

Safe handling of solvents

Henkel Canada/LePage in Brampton produces not only water-based, but also a certain

amount of ►solvent-based adhesives. The necessary solvents had always been stored in underground tanks. In 1996, a new tank farm was erected above ground and put into operation.

The environmental advantages are obvious: Any leaks in the tanks are easily identifiable. And should any unexpected spillage of the stored raw materials occur, it is retained in the sealed containment basin in which the tanks stand.

The technical layout and operation of the tanks were also decisively improved. The solvent ►emissions associated with the former tank farm have been completely eliminated by various measures, including the use of pressurized vessels.

Another project for reducing solvent emissions has already been launched. The solvent vapors from production lines are recycled to the production process after condensation and recovery of the solvent mixture.

Henkel Canada, Toronto

Location: Etobicoke near Toronto

Employees: 80

Product groups: Fatty acids and fatty acid esters for the cosmetics and food industries

Air assessment patrols

Responsible care, production facilities that cause the least possible neighborhood impact, and close contact with local residents and the community – these are key objectives for the Henkel site in Etobicoke near Toronto.

In 1997, Henkel employees systematically tracked down all traces of odor in the vicinity of the site. Since 1995, a number of technical improvements have been implemented with the aim of reducing odor ▶emissions, and the “air assessment patrols” want to monitor the success of these measures.

A very special objective at Etobicoke was the verification of the site in the context of the ▶Responsible Care Program of the Canadian Chemical Producers Association (CCPA). An inspection of the production facilities, its processes and procedures by a team of accredited external verifiers – including CCPA, industry, government, and public representatives – revealed that the requirements are largely fulfilled.

Some of these requirements go far beyond the currently applicable legislation.

The team confirmed that the site possesses a modern production plant with state-of-the-art ▶monitoring and control systems. Henkel Canada received its Responsible Care verification in December 1997.

USA USA**Henkel Corporation, Charlotte**

Location: North Carolina

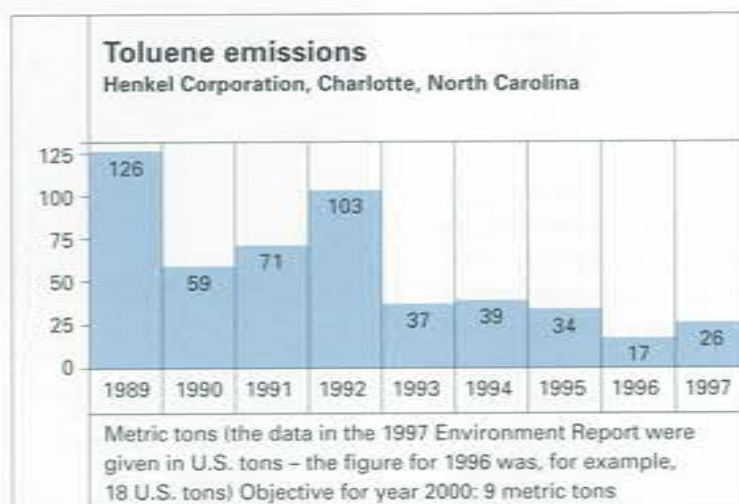
Employees: 100

Product groups: Organic specialty chemicals; surfactants for the cosmetics, textile, paint and paper industries

Further cuts in toluene emissions

Between 1989 and 1996, Henkel Corporation's Charlotte plant reduced its ▶emissions of the ▶organic ▶solvent ▶toluene, from 126 to 17 metric tons per year – a decrease of almost 90 percent. However, the plant's management decided that there was still room for improvement. In 1996, it set itself the objective of cutting toluene emissions by a further 45 percent, to around 9 metric tons per year, by 1999.

This “fine tuning” demands more sophisticated solutions and complex technical processes. Selection of the appropriate technology has taken more time



than expected. As a consequence, the deadline set by the development team for the targeted toluene reduction turned out to be too optimistic. The planned cuts in toluene emissions will not be achieved in 1999, but rather in the year 2000. The environment program on page 51 has been amended accordingly.

Henkel Corporation, Cincinnati

Location: Ohio; the Henkel Group's largest facility in North America

Employees: 600

Product groups: Oleo-chemical base materials and specialty chemicals

Focus on wastewater and odors

To achieve the plant's objective of a 10-percent reduction in the ▶organic wastewater load (measured as ▶biological oxygen demand) by the end of 1997, Henkel Corporation undertook a detailed analysis of the waste-

water situation in the Cincinnati plant before drawing up a package of measures. A new technology produced very good results in mid 1997, but unexpected problems were then encountered, and the causes could not be identified. An automatic analyzer was installed to obtain more information. It operates around the clock, measuring the organic load in the plant's wastewater. So much new knowledge has already been gained about the wastewater composition that the plant's management is confident of meeting its target in 1998.

Further excellent progress has been made in reducing atmospheric ▶emissions of volatile organic substances. This program will run until the end of the year 2000. Impressive results have already been achieved by incinerating exhaust air that contains ▶formic acid, for example. This has brought about a decrease of 90 percent in emissions. In addition, some 50 met-



Odors can no longer escape from Henkel Corporation's wastewater purification plant in Kankakee. The new equalization tank is shown here.

ric tons of ►methanol are currently recovered from air emissions each year.

A systematic approach has been taken to the odor problems at the Cincinnati plant for many years. In particular, odors from the fat-processing lines drifted occasionally beyond the plant's perimeter. Decisive improvements have been achieved here.

To support the odor reduction program, communication with the plant's neighbors has been cultivated on a regular basis since 1996. Permanently established Community Advisory Panels help to define the problems, facilitate the initiation of selective measures, promote mutual understanding, and convince the plant's neighbors of the seriousness of its efforts to solve these problems.

Henkel Corporation, Hoboken

Location: New Jersey

Employees: 90

Product groups: Chemicals for cosmetics, as well as for detergents and household cleansers

Municipal plant degrades surfactants

In 1996, Henkel Corporation's Hoboken plant set itself the objective of achieving a reduction of around 80 percent in the amount of ►anionic ►surfactants

in its wastewater by the end of 1997. This appeared necessary because the municipal sewage treatment plant was gradually approaching the limit of its capacity, and it was feared that it would no longer be able to degrade surfactants with the necessary efficiency.

In addition to Henkel, another large neighboring company also discharges its wastewater into the municipal sewage treatment plant. To reliably handle the load of the two plants in the years to come, the community upgraded its facility.

The surfactant load in Henkel's wastewater can now be efficiently degraded, and it is no longer necessary to implement in-house measures. Henkel pays its share of the costs through the wastewater charges.

The Community Advisory Panel that was established in 1997 and is sponsored by Henkel demonstrates how closely the plant is integrated into community affairs. The panel serves as a forum where representatives of local industry, the city government, the police force, and the fire department, as well as local citizens, can discuss problems and share experience.

Henkel Corporation, Kankakee

Location: Illinois

Employees: 400

Product groups: Specialty chemicals for plastics, cosmetics, coatings and inks, adhesives, as well as for detergents and household cleansers; manufacture of vitamin E from renewable raw materials

Odors successfully eliminated

Improving the wastewater situation was a key theme at Henkel Corporation's Kankakee plant, in view of the fact that two objectives had to be achieved in this area by the end of 1997. The eco team identified exactly the right places to implement its measures. As a result, the targeted 65-percent decrease in ►suspended solids in wastewater was not only attained, but also easily exceeded by mid 1997. In fact, the solids content was cut by 90 percent, in comparison with the 1996 figure. In absolute terms, this is a drop of 1.8 metric tons per day, to the current figure of around 200 kilograms.

This gained praise and appreciation of the city authorities for the plant, because the low load levels in Henkel's wastewater make the city's sewage treatment system simpler and safer to operate. In addition, they have resulted in a considerable reduction in wastewater charges.

Henkel Corporation's executives recognized the importance of this success: Kankakee's team won the Henkel Corporation's prestigious President's Award for its contribution to the company.

The plant's second wastewater objective was to reduce the ►organic load (measured as ►biological oxygen demand). In this case, too, it exceeded its target (28 instead of 25 percent).

Total discharges of wastewater fell by more than 7 percent. Due to the significant load reduction, the wastewater is now generally much cleaner. For this reason, consideration is being given to recycling 25 percent of it into the production process for use in certain applications. This would cut consumption of fresh water by a corresponding amount.

The planned 80-percent reduction in atmospheric ►emissions of substances requiring special monitoring could unfortunately not be achieved with the chosen technology. The situation must be completely reviewed. The plant now aims to achieve this objective by the end of 1999.

Complaints of occasional odor problems have been received from neighbors over the past few years. The responsible

managers take these complaints seriously. The problems have been discussed openly and extensively with the Community Advisory Panel, which was established in 1995.

The panel has been kept informed about the nature and extent of ongoing investigations into the sources of the odors and planned measures. This has helped build confidence.

A consultant was hired to address the problem of eliminating the odor sources. Technical measures and operational improvements were implemented to deal with the three main identified sources of nuisance (the wastewater treatment plant and two production lines) and to reduce the odors to acceptable levels.

In the ►methylation process, whose odor ►emissions could be traced to specific substances, the improvement was also physically measurable. Some 90 percent of the odor-intensive substances were eliminated. The other one of the two production units was permanently shut down.

These measures were clearly successful. Whereas there were more than 20 complaints in 1996, not a single one was received in 1997. One thing has not changed, however: Regular communication with the Community Advisory Panel still ensures that the plant remains in continuous contact with its neighbors.

Henkel Corporation, Lock Haven

Location: Castanea, Pennsylvania

Employees: 25

Product groups: Intermediates for dyestuffs; raw materials for synthetic resins

Small site – ambitious objectives

Henkel Corporation's small Lock Haven plant set itself ambitious objectives for 1997: reductions of 30 and 8 percent, respectively, in energy and water consumption. Both were achieved.

Henkel's Lock Haven employees remain just as ambitious as ever. Inspired by the ►Responsible Care philosophy of continuous improvement, the plant has drawn up a program to reduce ►emissions. The target is to achieve drastic cuts in emissions of volatile ►organic ►solvents, which are the most important components used in Lock Haven's production processes.

Consultants have been retained to determine the "best available technology" for reducing these emissions, and to help prepare a schedule of measures and an investment plan. The program also provides for the measures to be explained to the local community before they are implemented.

Henkel Corporation, Mauldin

Location: South Carolina

Employees: 90

Product groups: Specialty chemicals, mainly for the textile and plastics industries; dyestuff intermediates

Eco improvement despite higher production

Henkel Corporation's Mauldin plant had set its sights on reducing its total water consumption by 8 percent in 1997. What could not be foreseen, however, was a marked increase in production of 17 percent in 1997 over 1996. This increase in production orders is, of course, very gratifying. However, a closer analysis of the water consumption data also gives cause for satisfaction. Although there was only a small overall decrease, consumption per metric ton of manufactured product was down by around 18 percent. Admittedly, the objective, as originally formulated, was not achieved. Reformulated in terms of specific water consumption per metric ton of product, however, it is clear that the target figure was comfortably exceeded.

The higher production figures had a similar effect on the projected reduction in the amount of waste generated. Instead of less waste, there was 10 percent more. A one-time ware-

house cleanout that involved the disposal of a significant amount of out-dated inventory contributed to this, as did a process change that successfully reduced air ►emissions.

As a result of this change, there was more water in the waste, which consequently had a much higher mass. Despite these unfavorable factors, there was a decrease in waste per metric ton of manufactured product.

RA Argentina

Henkel Argentina, Avellaneda

Location: Industrial zone near Buenos Aires

Employees: 200

Product groups: Specialty chemicals for the cosmetics, textile, plastics and paint industries; products for the surface treatment of metals

Cuts in BOD, despite problems

Henkel Argentina had planned to start operating a biological wastewater treatment plant at its Avellaneda site in 1997. The objective was to reduce the ►biological oxygen demand (BOD) of the site wastewater by 90 percent within the first six months of the year. This would result in a corresponding decrease in degradable ►organic substances.

The failure of a technical component delayed start-up of the biological treatment stage until September 1997. Nevertheless, the BOD had already been cut by 70 percent as early as October. By the end of the year, in fact, the target of 90 percent had not only been achieved, but even slightly exceeded.

Intensive efforts have been made to stabilize the biological treatment stage with a view to maintaining this satisfactory performance, thus ensuring certain compliance with the official threshold value.

BR Brazil

Henkel Indústrias Químicas, Jacarei

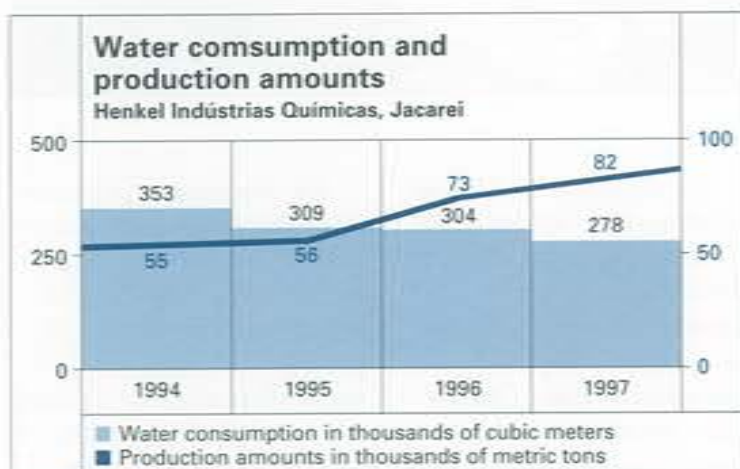
Location: Between São Paulo and Rio de Janeiro, near the Paraíba River

Employees: 440

Product groups: Organic specialty chemicals; adhesives

Raft of Responsible Care activities

Careful use of water is one of the ways of achieving sustainable development (see page 10) and, as such, is an important objective for the Jacarei site. Employees receive ongoing training to raise their awareness of this



fact. Work instructions, particularly for cleaning processes, are continually optimized to reduce water consumption. Further savings are achieved by resourceful production planning, including scheduling of successive production runs according to product families.

Despite a sharp rise in output tonnage, water consumption has thus decreased remarkably over the past three years. In 1997, only half as much water per metric ton of manufactured product was required as in 1994.

Besides fresh water consumption, the site's wastewater situation was also closely examined. Achieving the planned 30-percent reduction in the ►BOD content of the wastewater proved difficult. The chosen technique was found to be unequal to the task. Other solutions therefore had to be designed and tested. The increase in production by about 50 percent did not make this any easier. Per metric ton of product, the wastewater BOD content sank by almost 10 percent, while the ►COD content fell by as much as 28 percent.

The program of analyses undertaken to characterize the wastewater in Jacarei has progressed and will be completed in 1998. The data collected will be used to prepare a series of measures designed to improve wastewater quality.

The newly developed waste management software for solid wastes was presented to an informed public at a ►Responsible Care National Workshop in Brazil (see page 9). The software and the system details attracted keen interest from customers, indicating that the concept will surely be widely emulated.

Both the site's high level of involvement in the Brazilian chemical industry association's Responsible Care program and its commitment to implementing the Henkel Group's Responsible Care Management System underline the company's responsible attitude toward the environment and the neighborhood.

One example of this is the cost-intensive groundwater analysis program. Jacarei has

been a production site since 1958. Not all of the operations conducted in former decades are fully documented. The risk of chemicals having contaminated the soil in some areas of the site cannot therefore be completely excluded. Twelve measurement stations have been set up on the site to analyze the quality of the groundwater. These will be monitored at regular intervals until the end of 1999 to check for any signs of ►contamination.

In 1998, Jacarei's management team and employees will also be concentrating their efforts on obtaining certification of their eco management system to the international ►ISO 14001 standard.

RCH Chile

Henkel Chile, Santiago

Location: Industrial zone in the north of Santiago

Employees: 250

Product groups: Adhesives

No costly relocation

Sustained efforts in environmental protection and safety literally pay in the long run. Henkel Chile's Santiago site is a perfect example of this. The production plant has been exempted from a compulsory and costly relocation program to the



Environmentally compatible production facilities can remain at their old site. Henkel Chile does not have to relocate to a suburb of Santiago.

outskirts of Santiago and can remain exactly where it is inside the Chilean capital.

This exemption was not a matter of course. The city authorities intend to move all those manufacturing companies operating within city limits whose activities have an unacceptable impact on the neighborhood's environment and safety. The regulation applied to the Henkel plant, as well as to all other companies in urban Santiago.

The company therefore commissioned an external consultant to help it record and document all of the site's activities and precautions relating to environmental protection and safety. The 17-point program inventoried existing permits and licenses, hazard prevention plans, and the various safety measures. It demonstrated that Henkel Chile's production operations definitely complied with government regulations and that the threshold values relating to environmental protection and safety were not exceeded.

The independent experts merely recommended drawing up a hazard prevention plan that would include the neighborhood. They also suggested planting trees along the site's roads and on its green areas.

The city authorities have declared that they will not accept any future expansion of production capacity unless it is achieved by using state-of-the-art processes. This does not worry Henkel Chile. Like any other site, the Santiago plant participates in technology transfer within the Henkel Group and thus has access to the latest techniques.

AUS Australia

Henkel Australia, Kilsyth

Location: Industrial zone, Melbourne

Employees: 60

Product groups: Specialty chemicals for the surface treatment of metals

More production, more conservation

Henkel Australia's Kilsyth site had set itself the target of reducing water consumption by 20 percent in 1997. This figure was based on the assumption that production output would develop normally, however, and this was not the case. In fact, output in 1997 was nearly double that of the previous year. Instead of being reduced as planned, water consumption at the site rose by around 11 percent. Nevertheless, water consumption per metric ton of manufactured product decreased by more than 40 percent.

The expansion in production meant that the measures initially chosen to achieve efficient conservation of resources and improvements in environmental protection and safety were no longer adequate. Other measures will have to be implemented. The responsible work teams have agreed to focus on five major projects in 1998, aiming at reducing consumption of electricity, water, paper and pallets, as well as generating less production waste.

PRC China

Guilin Henkel Detergents & Cleaning Products, Guilin

Location: Southern China

Employees: 500

Product groups: Detergents and cleaning products

Reduced dust emissions

In 1997, the efforts of Guilin Henkel Detergents & Cleaning Products were mainly focused on reducing dust emissions from the steam boiler firing system. A new dedusting system was installed on one of the two

boilers. If the system proves successful, it will be retrofitted to the second boiler.

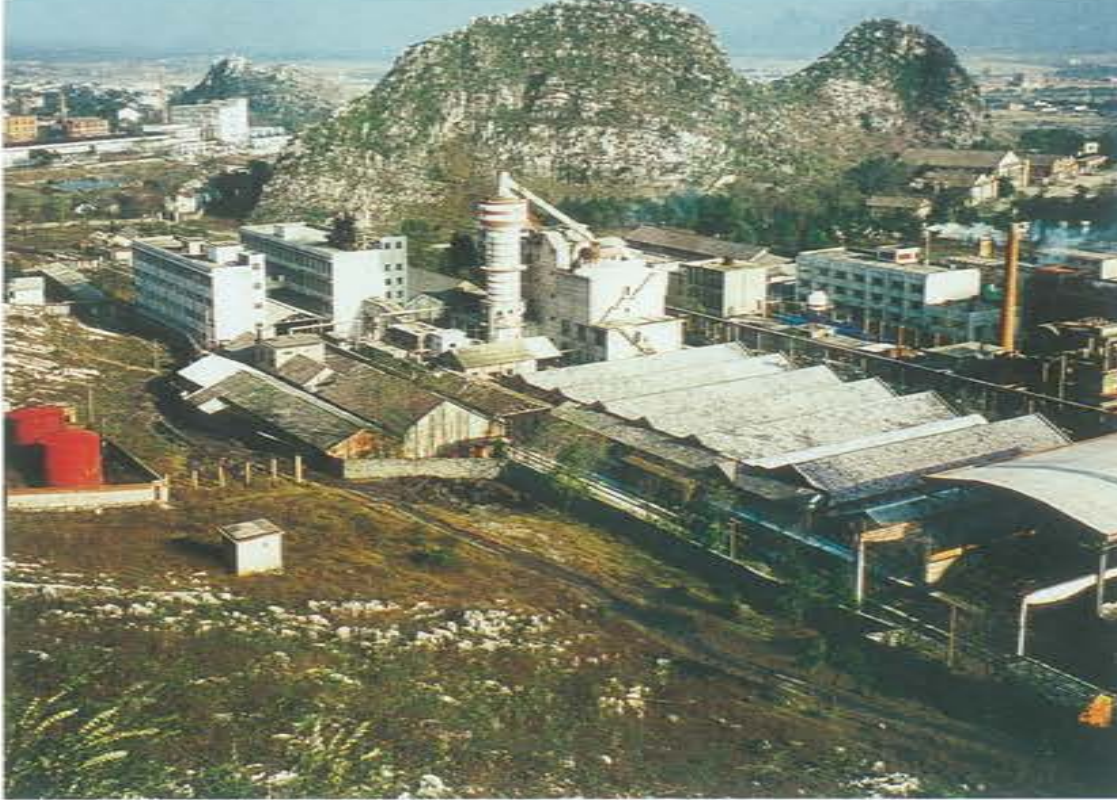
The coal-fired heating boiler in the Guilin detergent plant operates on the fluidized bed principle. Scrubbers are used to wash out the coal ash contained in the flue gas.

The ash-laden water from the scrubbers is routed into the company's own water purification plant. The water is first neutralized, after which the solids are sedimented out. Once purified, the water is reused in the dedusting system, as well as to cool the boilers. The ash that was separated out in the purification plant is sold to third parties for further use.

The fine dust generated during the detergent production process does not have to be disposed of. It is collected in bag filters and returned to the production process.

Production wastewater is also treated. It contains readily biodegradable surfactants, which degrade to such an extent in the biological stage of the wastewater treatment plant that the resultant levels are well within the legal limits.

Recycling is the ultimate goal in waste avoidance. Production of the water glass used as a raw material for detergents generates alkaline sludge. This



Better air in Guilin. The detergent plant has reduced its dust emissions.

sludge is treated, and the major part of it is then returned to the production process. Only very small amounts of alkaline wastes requiring especially close monitoring actually need to be disposed of.

The site employs ingenious methods to raise employee awareness of environmental protection and safety. A safety quiz and a firefighting contest were held on the company's own sports field. Fifty-six employees competed in these events, with a further 200 of their co-workers looking on.

Shanghai Henkel Chemicals, Tao Pu

Location: Industrial zone on the outskirts of Shanghai

Employees: 64

Product groups: Metal surface treatment products

Completely renewed wastewater system

Environmental protection is given great emphasis even at the smaller sites of the Henkel Group, such as Tao Pu, Shanghai. In consultation with the local authorities, the site's wastewater system has been completely renewed. Precipitation water and production wastewater are now channeled into separate systems. Precipitation water flows directly into the municipal precipitation sewage network.

Production wastewater is first passed through the company's own wastewater purification plant before being discharged into the public sewer system and finally into the river. As a result of the new drainage system, leaks and the associated soil contamination inside the site

have been eliminated, and the operation of the site's own purification system means that the public sewage network has to cope with much smaller wastewater loads.

Shanghai Henkel Oleochemicals, JinShan

Location: Some 80 kilometers southwest of Shanghai, on the outskirts of an industrial zone

Employees: 360

Product Groups: Ionic and nonionic surfactants; textile auxiliaries; chemical-technical products

Reorganized steam supply

The Shanghai Henkel Oleochemicals joint venture, owned by Henkel and two Chinese partners, was founded at the end of 1994. Ever since then, the site's management has given high priority to improving environmental protection and safety,

and, in particular, to implementing appropriate awareness-raising and training measures for employees. This policy is reinforced by special events. These included a firefighting day, which was jointly organized with the municipal authorities and the city fire department. Among the activities was a fire-extinguishing contest.

Considerable energy savings have been achieved by completely reorganizing steam supply at the site. The company's own coal-fired boiler house was shut down. It was not only oversized, but also uneconomical. Instead of generating excess steam, supply has now been balanced with actual demand, the required steam being provided by the joint venture partner's central generating system. ▶Emissions of ▶sulfur dioxide and ▶nitrogen oxide have, moreover, diminished accordingly. The company also benefits economically from the new situation, as the outsourced steam is less costly than that previously generated on-site.

Taken overall, even apparently minor improvements can be extremely beneficial to the environment. This is illustrated by the replacement of a considerably overdimensioned water circulation pump. The responsible engineer described this figuratively as extremely large horse pulling a small cart. The reduced

Focus on waste avoidance. Considerable improvements were achieved in the zeolite plant in Karaikal.

power requirement of the newly installed pump saves nearly 2,000 kilowatt hours of electricity per day.



Siping Henkel Detergents & Cleaning Products, Siping

Location: Northern China

Employees: 895

Product groups: Detergents

Progress in safety and environment

High priority was assigned to improving occupational safety and hazard prevention in the detergent plant of Siping Henkel Detergents & Cleaning Products. Workplace-related safety instructions were drawn up, for example, and employees were trained in occupational safety and how to combat incipient fires.

Noise protection in the workplace was consistently improved. Progress was also made in environmental protection. Water consumption was reduced by some 35 percent, and there was an associated decrease in wastewater.

An extensive analysis of the composition of the wastewater has been initiated in the detergent plant. The results will serve as a basis for improvements.

Tianjin Henkel Detergents & Cleaning Products, Tianjin

Location: Near the capital city of Beijing

Employees: 1,000

Product groups: Powdered detergents

Efficient use of energy

In 1997, the management of the Tianjin detergent plant focused on the more efficient use of energy. Steam leaks were eliminated, and better quality coal was used as fuel.

Loading sites were upgraded to enable spills to be contained.

Water meters have been installed in the individual production lines, providing an overview of the water consumption of the individual users.

► Surfactant-rich wastewater from the detergent production plant is now fed back into the process.

All measures were accompanied by training for a large proportion of the site's employees.

IND India

Henkel SPIC India, Karaikal

Location: Pondicherry, southern India

Employees: 170

Product groups: Soap; detergents; zeolites

Production without plant wastewater

Waste avoidance was a central theme at the Karaikal site of the Henkel SPIC India joint venture in 1997. The use of completely soluble ► water glass in the ► zeolite plant eliminated the necessity of filtering the raw solutions. The amount of waste thus fell from one metric ton per day to zero.

At subsequent stages of zeolite production, sedimented solid residues were fed back into the process, or ► alkaline liquid residues were used in other production units. These measures resulted in a further decrease of around 1.7 metric tons of waste per day.

Wastewater discharges were cut by more than 50 percent in 1997. Some of the wastewater is so pure that it can be used to water the lawns and bushes on the site. Areas of greenery are, moreover, fertilized with the

ammonium nitrate-laden wastewater from the zeolite plant.

The rest of the production wastewater is discharged into a basin. The sun and a sprayer system are sufficient to evaporate this water. Starting in 1998, the mineralized residues will be collected from this pond and disposed of.

Karaikal's management team has defined two objectives for the current year. It wants to achieve a decrease of approximately 50 percent in dust ► emissions from the detergent plant and to create a green belt around the site perimeter. Each year, 10 percent of the 25,000 square meters available for this purpose will be planted.

RI Indonesia**Henkel Indonesia, Cimanggis**

Location: A residential area about 20 kilometers from Jakarta

Employees: 500

Product groups: Raw materials and additives for detergents and household cleansers, cosmetics, plastics, adhesives and surface treatment products

Extensive modernization

A two-year program was launched at Henkel Indonesia's Cimanggis site in 1997. Its objective is to achieve improvements in environmental protection and safety through extensive modernization. The program casts a wide net. For example, it calls for the upgrading of the gas scrubbers in the ►sulfation plant to reduce atmospheric ►emissions of ►sulfur oxides and the recycling of ►sulfate-rich wastewater into the production process to reduce the amount of salts – especially ►sodium sulfate and ►nitrates – discharged into surface waters.

Because of the higher risk of operational malfunctions and generation of excess process waste during start up of continuous processes after a power

failure, modernizing the power supply system has substantially improved plant reliability and safety.

Rain that falls on the roofs of the buildings is no longer channeled into the drains, but is diverted to absorption wells distributed over the green areas of the site. In this way, Henkel Indonesia acts as a pioneer for the Indonesian government's flood protection program.

Although almost half of the site, which covers more than four hectares, consists of areas of greenery, the authorities do not consider this to be enough. The proportion of the site that is devoted to greenery will be increased to the required 60 percent by acquiring adjacent unutilized lots.

J Japan**Henkel Japan, Kitatone**

Location: Kitatone industrial zone

Employees: 103

Product groups: Surfactants; fatty acid derivatives; industrial and institutional cleansers

Sewage sludge to garden soil

For many years, the sludge cake from the biological wastewater purification plant in Henkel Japan's Kitatone plant had been disposed of in a landfill as waste. Recent analyses and stud-

ies have proved, however, that the sludge is simply too valuable to be thrown away. As the oils and fats processed in the production plants are derived mainly from renewable raw materials, the content of hazardous materials in the sludge – such as ►heavy metals or ►chlorinated hydrocarbons – was often over one hundred times less than the limits set by the Japanese authorities. There was, therefore, no reason why the sewage sludge should not be used as a fertilizer or soil improver.

A suitable customer was soon found: A manufacturer of garden mold now enriches his product with Henkel's sewage sludge, which makes up around 10 percent of the volume. This application not only saves 154 metric tons of landfill space a year, but is also economical. Henkel has considerably less waste disposal costs, and the partner receives a valuable raw material with high fertilizing power for his products.

MAL Malaysia**Henkel Oleochemicals (Malaysia), Telok Panglima Garang**

Location: Near the capital city of Kuala Lumpur

Employees: 380

Product groups: Oleochemical base materials such as fatty acids, fatty alcohols, fatty acid esters, and glycerine

Fire protection winner

Systematic studies are a key factor in preparing plans for measures to improve safety and environmental and health protection. A perimeter noise level measurement and monitoring program has been initiated at Telok Panglima Garang to assess the noise situation in the site's neighborhood. Studies were also conducted to analyze and assess safety in the workplace and around the ►fatty alcohol facility.


An extensive safety training program for employees was obviously very effective. At the annual district firefighting contest, the Henkel team was the overall winner. In "the best safety poster" category, Henkel Oleochemicals (Malaysia) came out a respectable third.

Objectives of the Product Divisions


Chemical Products

	Objectives	Status
	Development of new raw materials on a purely vegetable basis: ● Start with cosmetics raw materials	New surfactant on purely vegetable basis: cocomonoglyceride sulfate (see page 19)
	Minimization of the consumption of energy and raw materials during manufacture: ● Start with products for the cosmetics industry	First result: production of cocomonoglyceride sulfate (see page 19)
	● Development and active marketing of ►APEO-free ►emulsifiers for ►polymerization	New objective; development work has already started
	● Development of ►additives for environmentally more compatible paint systems	New objective; development work has already started
	● Biodegradable distillates and cleansing oils for the printing ink industry	New objective; development work has already started


Surface Technologies

	Group-wide auditing of environmental management by accredited external verifiers on the basis of the European Union's ►Eco Management and Audit Scheme and/or the international ►ISO 14001 standard: ● Auditing of the first European sites Continuation of the project in 1998: Introduction of environmental management under the European Union's ►Eco Management and Audit Scheme and/or the international ►ISO 14001 standard at all European sites: ● Magdeburg in Germany ● Cosne sur Loire in France ● Belvedere in Great Britain ● Settala in Italy ● Mölndal in Sweden	Successful certification of the following sites: ● Henkel Oberflächentechnik (until the end of 1997, Gerhard Collardin GmbH) in Herborn-Schönbach, Germany (November 1996) ● Henkel Belgium in Herent, Belgium (March 1997) ● Henkel Teroson in Heidelberg, Germany (July 1997)
	● Development and marketing of chrome-free ►conversion processes	New objective; development work has already started
	● Development and marketing of environmentally more compatible pickling processes for stainless steel	New objective; development work has already started


Adhesives

	Group-wide auditing of environmental management by accredited external verifiers on the basis of the European Union's ►Eco Management and Audit Scheme and/or the international ►ISO 14001 standard: ● Preparation for first audit	Successful certification of the following site: ● Henkel in Düsseldorf-Holthausen (November 1996)
	Continuation of the project in 1998: ● Establishment of an integrated management system for safety, health, the environment and quality ● Planning and starting up of new sites with already integrated SHEQ management system	Initiated for 8 pilot sites in Italy, France, Ireland and the USA
	● Permanent revision and consistent optimization of the whole range of products	New objective; development work has already started
	● Development of new emission-free or low-emission adhesives	New objective; development work has already started
	● When choosing raw materials, preference given to renewable feedstocks	New objective; development work has already started


Cosmetics/Toiletries

	Objectives	Status
	<ul style="list-style-type: none"> ● Use of renewable raw materials, preferably on vegetable basis 	Permanent objective in the development of new formulations (see page 24)

Detergents and Household Cleansers

	Use of eco performance indicators for complete evaluation of the environmental impacts of detergents throughout their life cycle: <ul style="list-style-type: none"> ● Definition of the indicators 	Continuation of the project in 1998: "Eco Principles" (see page 15)
	<ul style="list-style-type: none"> ● Reduction of 5% in energy consumption per wash cycle (relative to the 1996 level) by the end of 2001 	Development work in the planned time schedule (see p. 15)
	<ul style="list-style-type: none"> ● Reduction of 10% in the amount of detergent per wash cycle (relative to the 1996 level) by the end of 2001 	Development work in the planned time schedule (see p. 15)
	<ul style="list-style-type: none"> ● Reduction of 10% in the amount of packaging per wash cycle (relative to the 1996 level) by the end of 2001 	Development work in the planned time schedule (see p. 15)

Henkel-Ecolab





	Long-term, Group-wide certification of the environmental management systems by accredited external verifiers on the basis of the ISO 14001 standard	Successful certification of the following sites: <ul style="list-style-type: none"> ● Valby in Denmark (September 1997) ● Nieuwegein in the Netherlands (August 1997)
	Continuation of the project in 1998: <ul style="list-style-type: none"> ● Tessenderlo in Belgium ● Henkel-Ecolab in Germany 	
	<ul style="list-style-type: none"> ● Reduction of wastewater pollution in customer plants in the food sector (breweries, dairies) 	New objective; development work has already started

Research/Technology

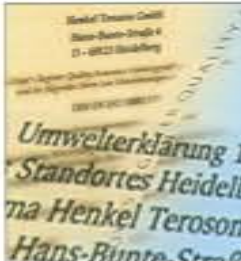
	Extension of the range of raw materials by tapping new ▶native sources	<ul style="list-style-type: none"> ● Sunflower oil with a high oleic acid content ● ▶Chitin/chitosan ▶derivatives as starting material for the development of new cosmetics raw materials
	Opening up new fields of application with new combinations of different renewable raw materials	<ul style="list-style-type: none"> ● Combination products made from carbohydrates and oleochemical raw materials
	<ul style="list-style-type: none"> ● Opening up fields of use for ▶enzymes in ▶organic syntheses 	Development work started in early 1998; projected completion date is year 2000
	Avoidance of animal experiments wherever possible under current legislation, while maintaining the same high level of consumer protection.	Work on eliminating animal experiments started as early as 1980, with the development of test methods to evaluate skin- and eye-irritation potential, and has been continuously followed up. Inclusion of in vitro studies of skin penetration in Henkel's safety assessment strategy.
	Process optimization through the use of ▶catalysts to facilitate conservation of resources	New objective; development work has already started
	Reduction of the material intensity for products and processes	Permanent objective in the development of products and processes

Site objectives

Conservation of resources




	Target	Result	Period							Info	
			1995	1996	1997	1998	1999	2000	2001		
	Reduction in water consumption										
	Projects completed in 1997										
	Spain, Barcelona	-10%	⊙			■					Page 33
	USA, Lock Haven, PA	-8%	-8%			■					Page 42
	USA, Mauldin, SC	-8%	⊙			■					Page 42
Australia, Kilsyth	-20%	⊙			■					Page 44	
Current projects											
Germany, Herborn-Schönbach	⊙				■	■	■	■	■		
Germany, Siegburg	-5%				■	■	■	■	■		
Italy, Lomazzo	-50%				■	■	■	■	■	Page 36	
New projects											
Belgium, Herent	-15%					■	■			Page 29	
Germany, Hannover	-55%					■	■	■		Page 31	
Italy, Ferentino	-30%					■	■			Page 35	
Turkey, Izmir	-8%					■	■			Page 39	
	Reduction in volume of wastewater										
	Projects completed in 1997										
	Germany, Düsseldorf-Holthausen	-15%	-22%		■	■					Page 29
	Turkey, Cayirova	-40%	-40%		■	■					Page 38
	Current project										
Germany, Herborn-Schönbach	⊙				■	■	■	■	■		
New project											
Turkey, Izmir	-20%					■	■			Page 39	
	Reduction in packaging materials										
	Project completed in 1997										
	Italy, Ferentino	-10%	-17%			■					Page 35
New project											
Germany, Heidelberg	-30%	⊙				■	■			Page 32	
	Reduction in energy consumption										
	Project completed in 1997										
	USA, Lock Haven, PA	-30%	-30%			■					Page 42
Current project											
Germany, Düsseldorf-Holthausen	⊙				■	■	■	■	■		

Certification of the management system


	Certification targeted for and achieved in 1997									
	Germany, Heidelberg: EU Eco Audit and ISO 14001				■	■				
Germany, Düsseldorf-Flingern: ISO 14001					■	■				Page 32
Netherlands, Nieuwegein: ISO 14001					■	■				Page 37
New projects										
Germany, Loxstedt: EU Eco Audit and ISO 14001						■	■			Page 33
Spain, Barcelona: ISO 14001						■	■			Page 38
Turkey, Cayirova: ISO 14001						■	■			Page 38
Brazil, Jacarei: ISO 14001						■	■			Page 43

- ① Project cannot yet be quantified ② Objective not completely achieved ③ Metal packaging materials
 ④ Objective no longer relevant ⑤ Waste for disposal ⑥ Aluminum waste

Reduction in emissions

	Target	Result	Period								Info
			1995	1996	1997	1998	1999	2000	2001		
 Wastewater load											
Projects completed in 1997											
Germany, Düsseldorf-Holthausen	-24%	-62%									Page 29
Spain, Barcelona	-30%	-38%									Page 33
USA, Hoboken, NJ	-80%	Ⓞ									Page 41
USA, Kankakee, IL	-65%	-90%									Page 41
Argentina, Avellaneda	-90%	-91%									Page 42
Brazil, Jacarei	-30%	Ⓞ									Page 43
Current project											
USA, Cincinnati, OH	-10%										Page 40
New projects											
Turkey, Cayirova	-30%										Page 38
Turkey, Izmir	-25%										Page 39
 Waste Ⓞ											
Projects completed in 1997											
Germany, Siegburg	-10%	-10%									Page 30
Ireland, Cork Ⓞ	-40%	-60%									Page 34
Turkey, Cayirova	-70%	Ⓞ									Page 38
USA, Mauldin, SC	-10%	Ⓞ									Page 42
Current projects											
Germany, Siegburg	-5%										
France, Nemours	-10%										
France, Ponthierry	-60%										
New project											
Germany, Hannover	-5%										Page 31
 ► Emissions to the air											
Projects completed in 1997											
Poland, Racibórz: ► Sulfur dioxide	-10%	Ⓞ									Page 37
Dust	-10%	Ⓞ									Page 37
Soot	-35%	Ⓞ									Page 37
Current projects											
Ireland, Cork: Sulfur dioxide	-40%										Page 34
Nitrogen oxide	-25%										Page 34
Carbon dioxide	-25%										Page 34
USA, Charlotte, NC: ► Toluene	-45%										Page 40
USA, Cincinnati, OH: ► VOC	-50%										Page 40
USA, Kankakee, IL: VOC	-80%										Page 41
New projects											
Poland, Racibórz: Sulfur dioxide	-45%										Page 37
Dust	-45%										Page 37
Soot	-45%										Page 37
Carbon dioxide	-20%										Page 37
Turkey, Izmir: Nitrogen oxide	-12%										Page 39
USA, Lock Haven, PA: VOC	-25%										Page 42

Safety and hazard prevention

 Project completed in 1997											
Germany, Düsseldorf-Holthausen: Minimization of the dangers resulting from accidental leaks or escapes											Page 29
New project											
Safety audits at about 150 sites											Page 7

Explanatory notes on the Henkel Group environmental data

The Henkel Group has expanded

The environmental data in last year's Environment Report were compiled from a total of 52 sites, which were representative of the Henkel Group as a whole. During the year under review (1997), this situation changed significantly. Three of the 52 sites have been sold, and the data from 12 production plants of the newly acquired companies, Loctite, Schwarzkopf and Novamax, as well as 7 Chinese sites, have been included in the overview.

The data collection system has also been extended to cover a fur-

ther 20 sites which have belonged to the Henkel Group for a number of years. Because they are relatively small, inclusion of their data hardly makes the overview more representative. Nevertheless, their presence reflects our desire to take into account as many of the countries in which Henkel has production facilities as possible.

In this report, the environmental data for the years 1992 to 1996 were collected from 52 sites. The data for 1997 – the aggregated figures from 88 sites – are representative of the Henkel Group in its new and expanded configuration. Because the data in this report are derived from a different number of sites, the individual environment parameters for 1997 cannot be directly compared with the pre-1997 values.

Reference parameter simplifies data evaluation

The production volume is an indicator of the growth of the Henkel Group. This year's Environment Report is the first one in which this reference parameter has been included. The environmental parameters shown in the charts for the given period of time can be evaluated better in the light of the development of the production

volume. In view of the very broad and widely diversified product range of the Henkel Group, however, it would be meaningless to use this parameter for purposes of quantitative comparison. This report, therefore, makes no attempt to represent the Group data in terms of specific parameters such as energy consumption per metric ton of manufactured product. Only the more significant primary data are given.

Specific data can be meaningful

Specific data would mask the environment situation in the Henkel Group. For example, the Group's specific energy consumption (the amount of energy consumed per metric ton of manufactured product) was reduced simply by the acquisition of the three major companies, Loctite, Schwarzkopf and Novamax. This decrease in specific energy consumption was not the result of improvement measures. It simply reflects the fact that the acquired companies' products are less energy-intensive than those of the other Group companies.

Within carefully defined limits – for individual production lines or sites, for example – specific data can be very meaningful. In the Production chapter of this report, for example, they are used

to evaluate whether the sites have achieved their objectives.

Energy consumption and carbon dioxide emissions

The carbon dioxide liberated by the activities of the Henkel Group stems almost exclusively from the generation of energy. Although the 35-percent growth in production in 1997 caused a 17 percent rise in energy consumption, carbon dioxide emissions increased by 24 percent.

The disproportionate escalation in carbon dioxide emissions was due to the sources of energy used at the sites whose data were recorded. The energy consumption chart shows a clear increase in the percentages of coal and fuel oil. These fuels liberate comparatively large amounts of carbon dioxide in relation to the amount of energy they generate.

The rise in the proportion of externally generated energy (electricity, steam, district heating) also contributed to the disproportionate increase in carbon dioxide emissions. This is because the recognized factors used to estimate the amounts of carbon dioxide emitted outside the Henkel sites are based on relatively high carbon dioxide emissions per unit of generated energy.

Representative survey

Data from 88 sites in 35 countries

Argentina	Malaysia
Australia	Mexico
Austria	Netherlands
Belgium	Poland
Brazil	Portugal
Canada	Puerto Rico
Chile	Russia
China	Slovenia
Egypt	South Africa
Finland	Spain
France	Sweden
Germany	Thailand
Great Britain	Tunisia
Hungary	Turkey
India	USA
Indonesia	
Ireland	
Israel	
Italy	
Japan	

Expenditure on environmental and consumer protection											
Henkel Group, in DM millions											
	257.7	281.9	311.7	367.4	355.2	368.6	382.7	394.6	374.5	388.5	Total expenditure
400				56.3	42.4	45.1	49.1	58.4	37.5	43.6	Investments
	25.9	29.6	36.3	84.9	86.1	84.3	88.6	88.7	78.3	81.4	R&D
200	71.7	75.3	78.1	226.2	226.7	239.2	245.0	247.5	258.7	263.5	Operating cost
0	160.1	177.0	197.3								
	1988	1989	1990	1991	1992	1993	1994	1995	1996*	1997	* Comparable values determined in accordance with International Accounting Standards (IAS)

The operating costs are mainly attributable to the operation of plant intended to reduce (emissions ("end of pipe" technology). The investments relate to the construction of such plant. In the future, as the emphasis shifts towards integrated environmental protection, such investments will become less significant, as will the expenditure recorded here for research and development,

which only relates to projects specifically concerned with environmental and consumer protection. Integrated environmental protection takes environmental protection and safety aspects into account as early as the product and process development stages, as well as at the plant construction stage. It is, therefore, not possible to isolate the additional costs involved.

Wastewater situation

The significant factor with regard to wastewater emissions is the magnitude of the loads actually discharged into surface waters. Of the 88 companies covered, 23 are direct dischargers. In other words, the site wastewater is treated in-house and is then discharged into surface waters (for example, a river or the sea). The wastewater loads of these sites can be added directly to the amount for the Henkel Group as a whole.

The other 65 sites, however, are indirect dischargers, and only a proportion of their wastewater loads therefore enters the environment. In order to reflect the actual burden on the environment in the total amount for the Henkel Group, it was assumed that, on average, 70 percent of the wastewater load from these indirect dischargers is degraded or eliminated in municipal or jointly operated sewage treatment plants. This is a very conservative estimate. Efficiently operated sewage treatment plants generally attain degradation and elimination rates well in excess of 90 percent.

► Heavy metals are eliminated in sewage treatment plants by ► adsorption on sewage sludge. Depending on the composition of the sludge, it is either used as an agricultural fertilizer or dried and incinerated. After incineration, the ashes are disposed of in landfills.

Traditionally, zinc is also recorded as a heavy metal. However, its environmental impact is of a different dimension from that of lead, nickel and chromium. For example, sewage sludge that contains zinc can be used as an agricultural fertilizer in areas where there is a shortage of this metal. For this reason, zinc is shown separately in the charts on heavy-metal loads.

Occupational safety

Reportable occupational accidents are defined differently in different countries, depending on the prevailing national legislation. Henkel is currently setting up a new, Group-wide, unified system of record-keeping for the purpose of achieving comparability. This system has already been introduced at all European Group companies, with the exception of those in Spain and Portugal.

All occupational accidents that involve Henkel employees and result in more than one day of absence from work are recorded. Lethal accidents, including those that occur outside of Europe, are recorded separately. Accidents occurring away from the workplace, such as on the way to and from work, are excluded from the figures. The implementation of this system is still on-going.

Employee training

Henkel in Düsseldorf has defined the scope and intensity of measures aimed at training employees in environmental, health and safety matters and raising their awareness in these areas. Employees at other German sites are also trained in line with this concept. Previous issues of the Environment Report published the number of employees who received this training.

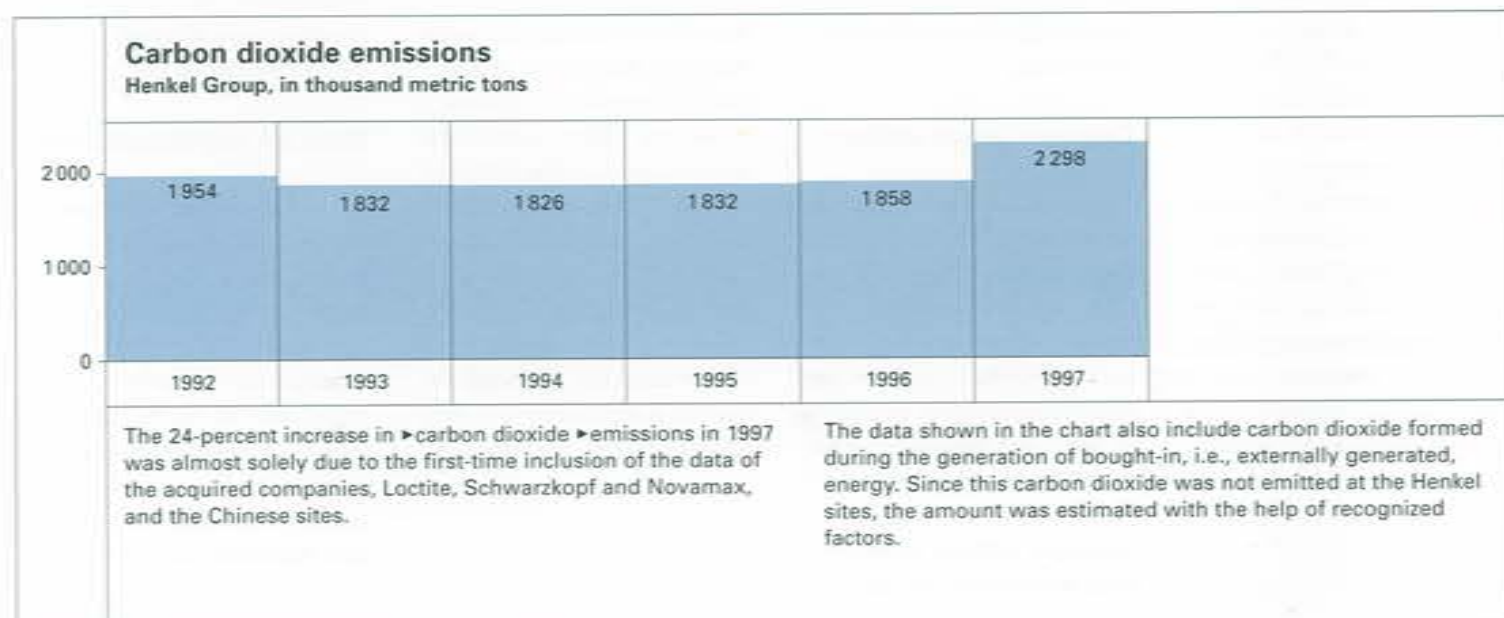
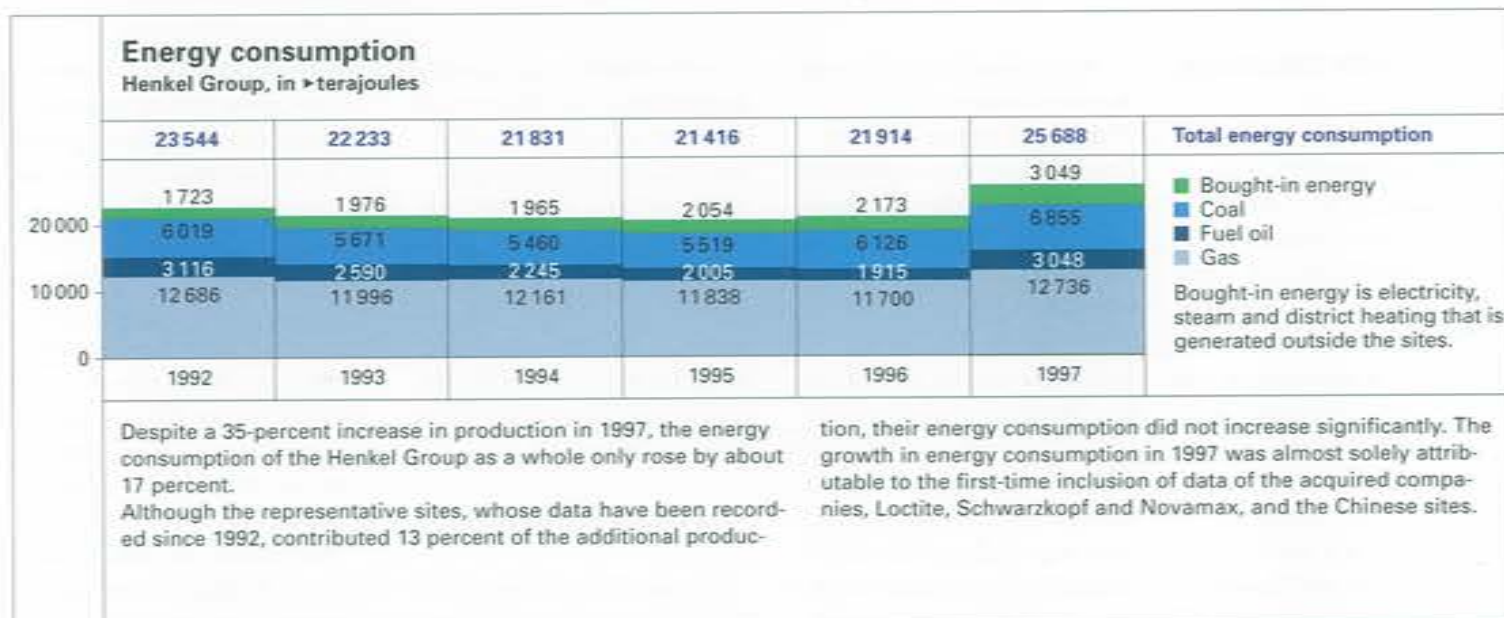
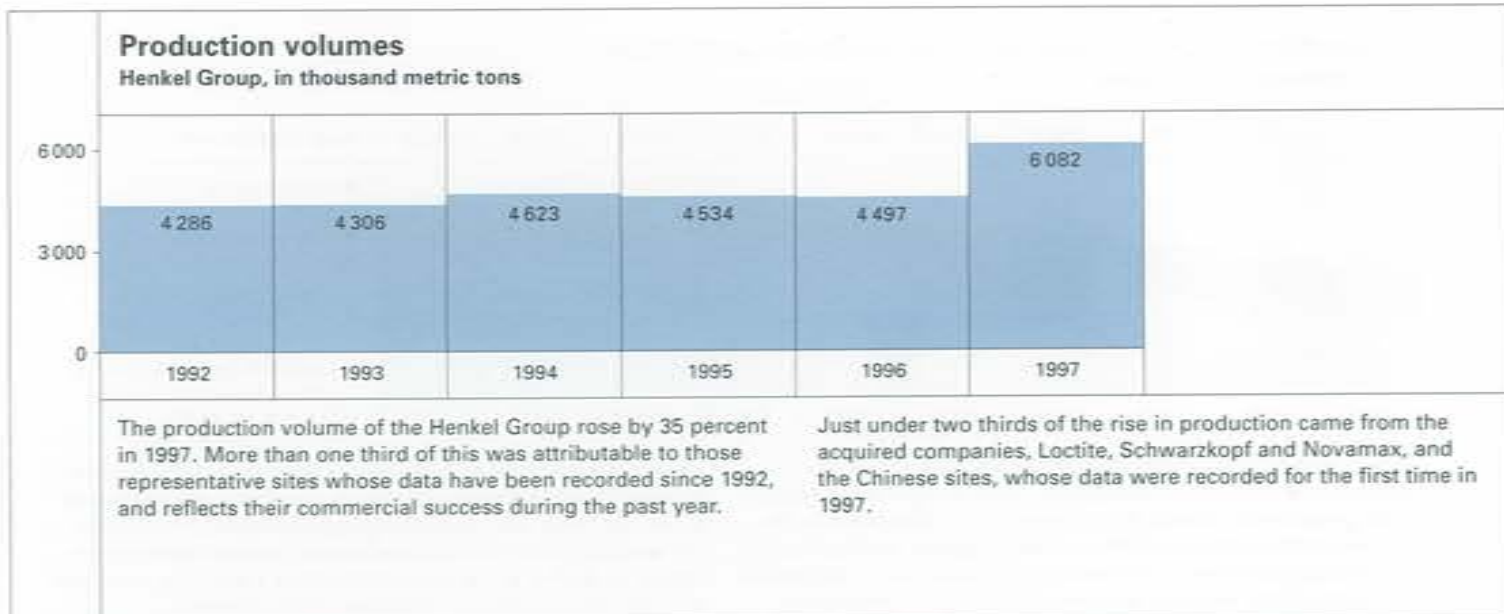
The Group companies outside of Germany carry out employee training in accordance with a variety of concepts. In view of the

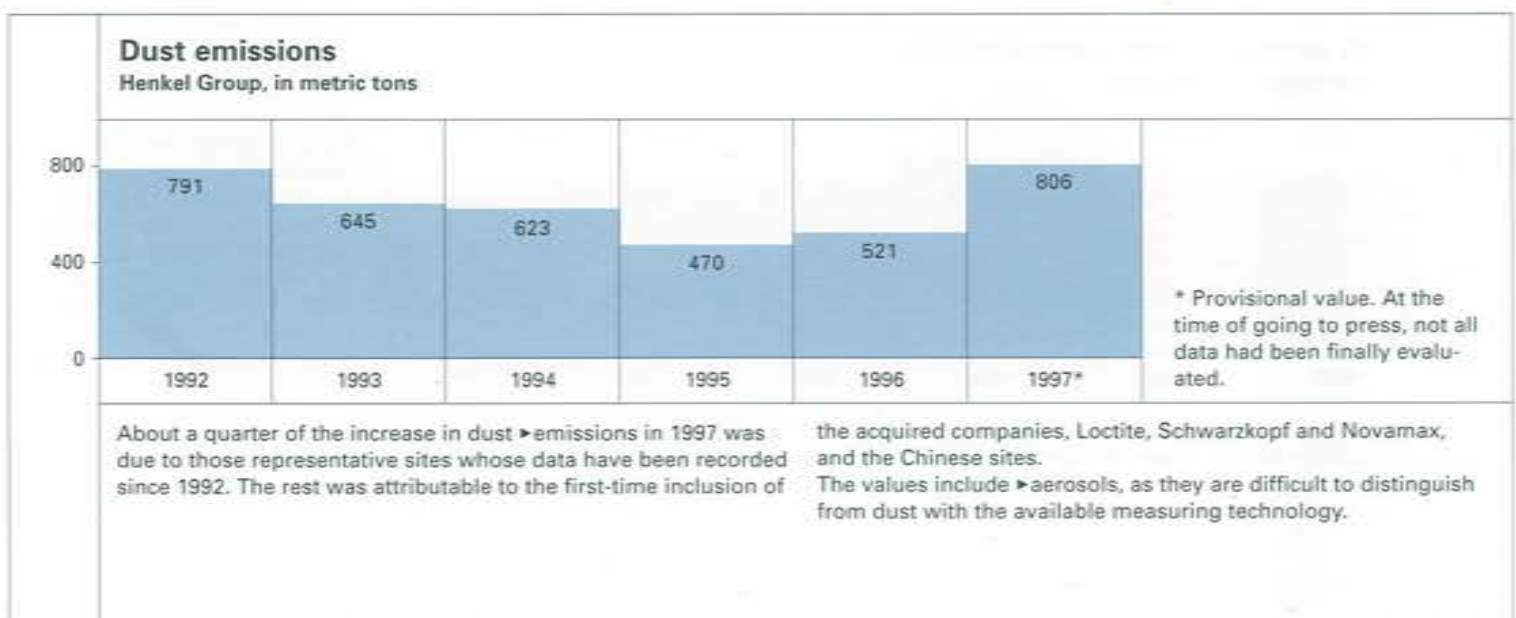
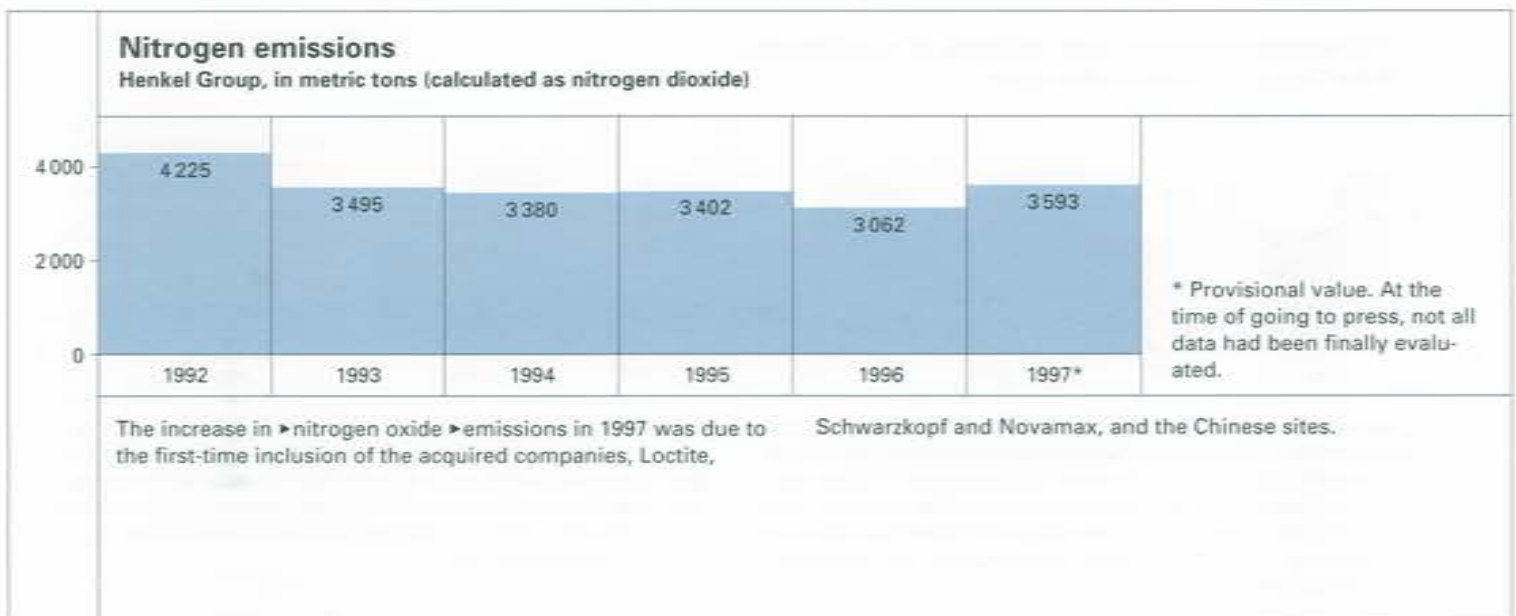
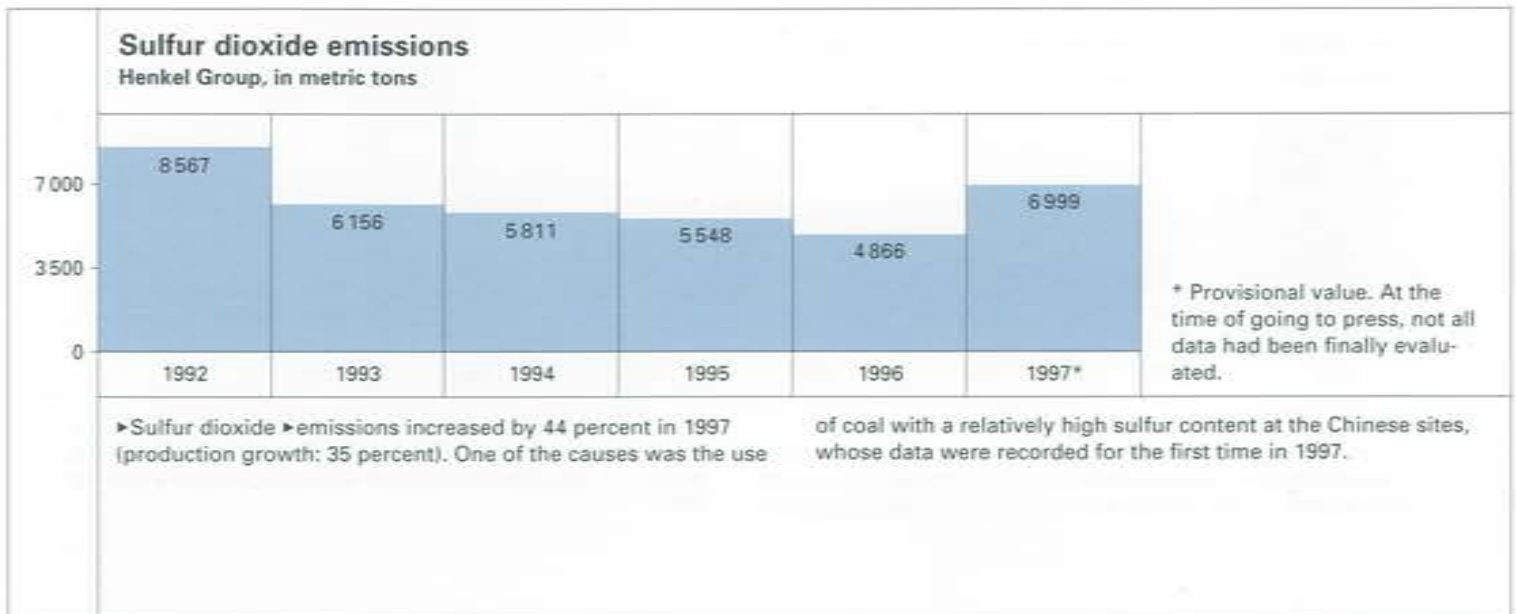
lack of uniformity in the type and content of the training measures, it would be meaningless to quantify the total number of trained employees at this time. This Environment Report, therefore, no longer contains a chart on environmental protection courses. Figures relating to training are, however, published in the Environmental Statements of the sites that have been certified under the ► Eco Management and Audit Scheme of the European Union (EU).

The Management chapter describes individual training measures and hazard prevention drills (pages 10 and 12). Whenever appropriate, such information will also be provided in future reports.

Data on individual sites

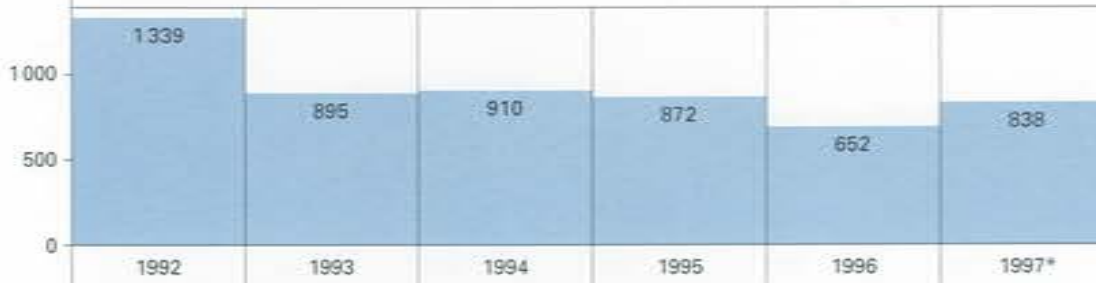
Selected up-to-date environmental data from individual Henkel Group sites are published in the chapter on Production. Sites that have participated in the EU Eco Management and Audit Scheme publish environmental data in their Environmental Statements. These Statements are available (in German) on request (see reply card attached to back cover).





Emissions of volatile organic compounds

Henkel Group, in metric tons



* Provisional value. At the time of going to press, not all data had been finally evaluated.

The clear decrease in the emissions in 1993 was due to improvements at the large production site in Kankakee, Illinois. Only one third of the increase in emissions of volatile organic compounds in 1997 was caused by those representative sites

whose data have been recorded since 1992. About two thirds was attributable to the first-time inclusion of the acquired companies, Loctite, Schwarzkopf and Novamax, and the Chinese sites.

Water consumption and volume of wastewater

Henkel Group, in thousand cubic meters



■ Water consumption
■ Volume of wastewater

The water consumption includes all water, whether bought-in or extracted from Henkel's own sources. Most of this water is process water. Only a small proportion of drinking water is used. Precipitation water (e.g., rainfall) is not included in the wastewater figures.

The volume of wastewater is less than the volume of water consumed. The difference is accounted for by evaporation losses from cooling towers and the water that is present in products. The increase in the water consumption and the volume of wastewater in 1997 was almost solely due to the first-time inclusion of the acquired companies, Loctite, Schwarzkopf and Novamax, and the Chinese sites.

The water consumption and the volume of wastewater of the representative sites recorded since 1992 decreased by 10 percent and 4 percent in 1997, respectively. This shows that the measures implemented at many sites for the purpose of using water more efficiently and reducing the volume of wastewater are already proving effective.

COD emissions into surface waters

Henkel Group, in metric tons



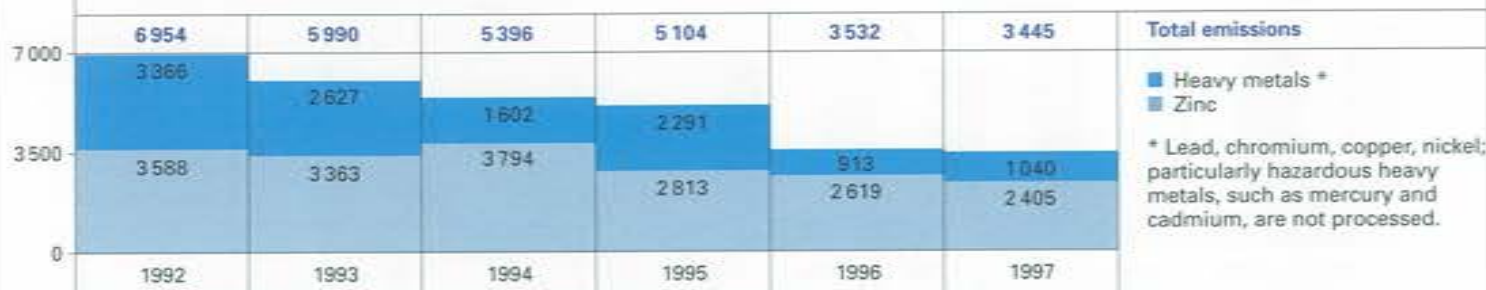
For sites that are indirect dischargers, it was assumed that an average of 70 percent of the organic load of the site wastewater – measured as chemical oxygen demand (COD) – is degraded in jointly operated or municipal sewage treatment plants.

The representative sites recorded since 1992 cut their COD emissions by 14 percent. The measures implemented at many sites for the purpose of reducing the wastewater load are therefore already proving effective.

The total COD emissions of the Henkel Group (including the acquired companies, Loctite, Schwarzkopf and Novamax, and the Chinese sites) decreased by 8 percent in 1997.

Emissions of heavy metals into surface waters

Henkel Group, in kilograms



The ►heavy-metal loads of those representative sites recorded since 1992 decreased by 12 percent in 1997, despite a 13-percent increase in production at these sites. This decrease compensated for the first-time inclusion of the loads of the acquired companies, Loctite, Schwarzkopf and Novamax, and the Chinese sites. For sites that are ►indirect dischargers, it was assumed that an

average of 70 percent of the ►heavy-metal load of the site wastewater is degraded in jointly operated or municipal sewage treatment plants.

Zinc ►emissions are regarded as less critical than those of the other heavy metals and are therefore shown separately.

Waste for recycling and disposal

Henkel Group, in thousand metric tons



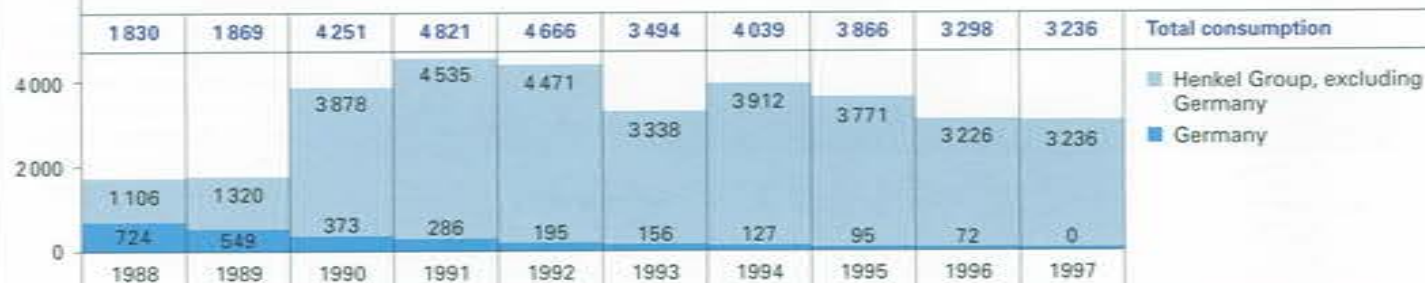
The waste data for 1997 include the data of the acquired companies, Loctite, Schwarzkopf and Novamax, and the Chinese sites for the first time.

Although the amount of waste increased, the percentage increase remained below the Henkel Group's 35-percent increase in production. "Hazardous waste for disposal" includes not only the kinds of waste that are classified as hazardous under the

laws of the relevant countries, but also all hazardous wastes listed in the ►Basel Convention of 1989. Because individual countries continue to extend their list of hazardous wastes, it is possible for the volume of hazardous waste to increase without any change having occurred in the waste situation in the Henkel Group.

Consumption of chlorinated hydrocarbons

Henkel Group, in metric tons



The increase outside Germany in 1990 was attributable to the acquisition of new companies in Europe, such as the largest British manufacturer of pickling agents that still contain ►chlorinated hydrocarbons (CHC).

On the markets outside Germany, acceptance of alternative products without chlorinated hydrocarbons has not matched expectations. No chlorinated hydrocarbons were used in Germany in 1997.

Environmental monitoring: Surfactants in the Rhine

Measuring site: Düsseldorf; in grams per second (▶yearly median values)



Since 1958, Henkel has carried out systematic analyses of the concentration of ▶anionic ▶surfactants in the Rhine and selected tributaries.

After ▶nonionic surfactants started to be used on a large scale in detergents and household cleansers, in 1972 the analyses were also extended to include this product group. The increased value in 1995 was caused by temporary peak concentrations of BiAS of

unknown origin, possibly attributable to the presence of unspecified nonsurfactant bismuth active substances.

The measurements in the Rhine are carried out every two weeks. Updated official discharge data for the Rhine have been used to calculate the loads from the measured concentrations. The loads therefore differ slightly from the average values published in earlier Environment Reports.

Environmental monitoring: Boron and phosphate in the Rhine

Measuring site: Düsseldorf; in grams per second (▶yearly median values)



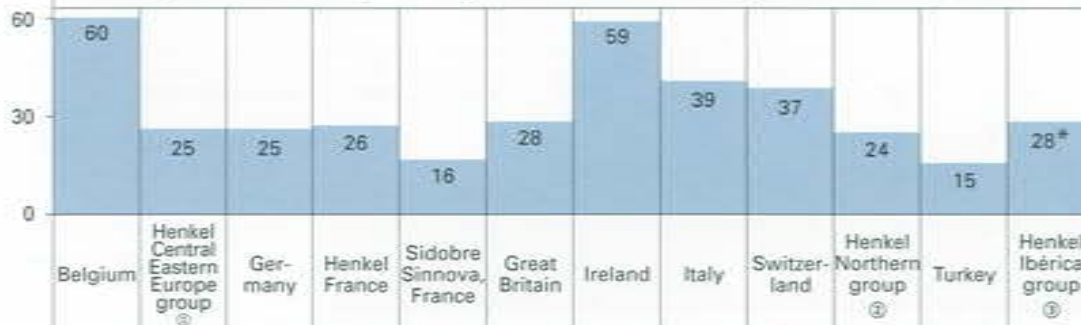
Although Henkel switched to phosphate-free formulations for all its detergents in Germany by 1989, it still monitors the phosphate content of surface waters.

Boron is present in many detergents in the form of the bleaching agent sodium perborate.

The measurements in the Rhine are carried out every two weeks. Updated official discharge data for the Rhine have been used to calculate the loads from the measured concentrations. The loads therefore differ slightly from the average values published in earlier Environment Reports.

Occupational accidents in 1997

Number of occupational accidents with more than one day of absence per thousand employees (excluding accidents occurring on the way to and from work) in Europe



*At Henkel Ibérica, only accidents with more than three days of absence are recorded. Past experience has shown that the number of accidents with more than one day of absence can be expected to be twice as high as the shown number of accidents with more than three days of absence.

The data are for the Henkel sites in Europe, including the head offices of the relevant countries or the relevant Henkel subsidiary. (The number of accidents in Ireland relates solely to the Cork production site, with a very small administrative component.) About 25 percent of the staff in the Henkel Central

Eastern Europe group are employed in Austria, and the other 75 percent in the named central and eastern European countries. One lethal accident occurred at the Cayirova site in Turkey. Otherwise, there were no lethal accidents at Henkel Group sites.

① (until February 1998: Henkel Austria Group) Austria, Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia

② Denmark, Finland, Norway, Sweden

③ Spain, Portugal

Principles and objectives of environmental protection and safety

How we interpret our responsibility

As a leading company and Specialist in Applied Chemistry, Henkel accepts its responsibility to society. As one of the first companies to endorse the Business Charter for Sustainable Development of the International Chamber of Commerce, we are committed to its principles and to the international program Responsible Care®.

We are committed to developing and supplying products and systems that offer special benefits to our customers in all parts of the world.

Along with this performance and quality leadership, we are committed to ecological leadership (Eco Leadership).

This includes continuously improving plant safety, environmental and health protection, as well as occupational safety.

We set ambitious goals for ourselves. With the aid of efficient management systems, we monitor the progress, making our results available both internally and externally.

We encourage our business partners and suppliers to aim for the same standards of environmental protection and safety.

Our corporate culture promotes our employees' true dedication to their jobs. Through multifaceted programs, we develop and promote our employees' understanding of environmental protection and safety. We recognize that these demanding standards can only be met by motivated and creative employees.

Goals we have set for ourselves

Sustainable Development must give equal priority to economic, ecological and social goals. Only economically successful companies will be able to contribute to effective environmental protection and social progress.

Products

Henkel supplies only products and systems that are recognized by acknowledged scientific criteria as environmentally compatible. To make sure that our products and systems are used safely, we inform and advise our customers on an ongoing basis.

Production

Throughout the world, all our production processes are designed in such a way that, if properly operated, our employees and our neighbors are not exposed to any health hazard. In order to maintain and enhance the safety of our existing manufacturing plants, we carry out regular and systematic checks according to uniform Group-wide criteria. Through continuous improvements, we reduce the potential for accidents and any adverse impact our plants may have on the environment. In the development of new production processes and in the construction of new

plants, important components of conception and planning are environmental protection and safety, low consumption of resources, as well as minimizing emissions and waste.

Occupational safety

Protecting employees at work from health hazards is a top priority for Henkel.

Our occupational safety concept is based on an integrated approach that includes the organization of the work, safety management, safety technology, production processes, the substances used, and occupational health precautions.

How we intend to achieve our goals

Management systems

We utilize management systems to maintain our environmental standards and monitor the degree to which our environmental and safety goals have been achieved. Regular audits are part of these systems. Henkel's own internal rules are binding for all concerned.

Employee motivation

With our ongoing environmental protection and safety training, we sensitize our employees and ask them to contribute to environmental protection and safety at each workplace and in each working environment. All our employees are committed to the goals

of plant and occupational safety and environmental and health protection. To achieve this, employees with leadership responsibility are given the necessary decision-making authority, adequately qualified personnel and the necessary resources.

Employee performance in matters of environmental protection and safety is taken into account both in performance reviews and career planning.

Technology transfer

We systematically carry out the Group-wide transfer of technologies and management methods in the fields of environmental and

health protection and safety. In that way, we also contribute to global social progress.

Dialogue

We encourage our employees to work at all levels on issues relating to environmental protection and safety.

In dealing with the public, we seize the initiative. We inform the public regularly, candidly and fully - even when we have made mistakes. Questions and concerns on the part of the public are treated seriously and are responded to.

Specialist in applied chemistry

Henkel is a specialist in applied chemistry. The Henkel Group comprises over 330 companies in more than 60 countries. Group sales in 1997 amounted to DM 20.1 billion, of which 24 percent were generated in Germany

and 76 percent elsewhere. The parent company is Henkel KGaA in Düsseldorf. Henkel is one of the German companies with the most business activities abroad and offers a wide range of different product lines.

The Group employs 54,000 people, of whom 38,500 work for companies outside Germany. 8,500 of the 15,500 employees in Germany work at the Düsseldorf parent plant, which is the Group's largest production site.

The Henkel Group is the world's largest supplier of oleochemical base materials (chemical products derived from renewable raw materials, such as coconut oil and palm kernel oil) and products for the surface treatment of metals. Henkel is the international market leader in adhesives. In Europe, the Group is one of the leading manufacturers of toiletries, detergents and household cleansers.

Along with the American company Ecolab Inc., Henkel operates Henkel-Ecolab, a joint venture, in Europe. Together, Henkel-Ecolab and Ecolab are the international market leader in industrial and institutional hygiene.

Applied research and development is one of the Group's core fields of competence. Extensive know-how, creativity and imagi-

nation provide a basis for successful innovation, high product quality, an optimal price-performance ratio, and the best possible environmental compatibility – the main objectives in all of the Group's research projects.

Environmental obligations of ecological leadership

One of Henkel's central corporate objectives is to be a global leader in environmental and consumer protection. The Henkel companies take environmental protection requirements into account in all of their activities.

The production processes at the individual sites must be safe for employees and the local community.

The Group works to increase public awareness of its ecological leadership role and to use this to boost its competitive edge in the marketplace.

A wide variety of instruments exist within the Group for actively dealing with environmental topics. Henkel also has two central departments in its corporate sector

Research/Technology which have focused on these tasks for many years.

Technical departments cooperate on environmental protection and safety

Safety, Health, Environment, Quality handles all production- and site-related topics, including ►emissions and ►immissions, energy, waste gases, wastewater and noise, while Biology and Product Safety deals with all aspects of product safety for mankind and the environment. The two departments cooperate with each other, as well as with the technical departments of the business or corporate sectors.

Environmental protection and safety concerns are by no means restricted to the experts, however. All employees are responsible for environmental protection, occupational safety, and health protection at their workplaces.

Product Groups

For industrial customers and for consumers

The Henkel Group manufactures almost 10,000 products. Worldwide responsibility for these products rests with six distinct business sectors.

Chemical Products

● Oleochemicals

Fatty acids; glycerine and fatty acid derivatives; fatty alcohols and their derivatives; food and feedstuff additives; natural-source vitamin E and carotinoids.

● Care Chemicals

Products for the cosmetics, toiletries and pharmaceutical industries, for detergents and household cleansers; aroma chemicals/perfume compositions.

● Organic Specialty Chemicals

Base materials and additives for plastics, paints and coatings; auxiliary products for textile, leather and paper production; specialty products for mining, oil drilling and for lubricants, plant protection formulations and the construction industry.

● Inorganic Products

Water glass

Surface Technologies

Products and application systems for the chemical surface treatment of metals and metal substitutes; lubricants; cleaning products; corrosion inhibitors; products for conversion processing and for the treatment of cooling, process and waste-

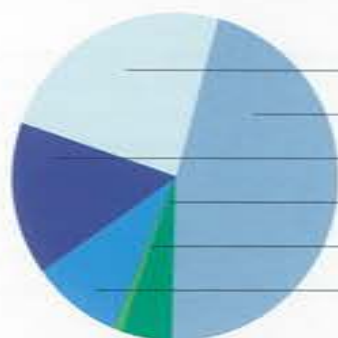
water; process control and metering equipment; antifreeze agents and corrosion inhibitors for motor vehicle cooling systems; CHC substitutes for cleaning applications. Specialty products for the automotive industry: polyurethane adhesives and elastomer sealants, epoxide structural adhesives, PVC and polyacrylate plastisols, dispersion adhesives, hotmelt adhesives and corrosion protection waxes.

Adhesives

● Consumer and Craftsmen Adhesives
Wallpaper pastes; ceiling, wall covering and tile adhesives; home decoration products; sealants; polyurethane foam

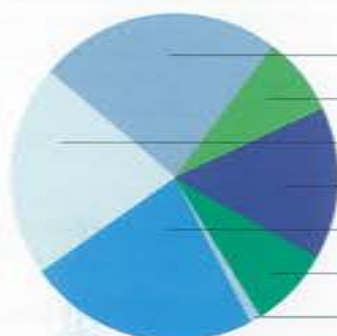
Sales by regions, 1997

by customer location



Total sales	20,065	(in DM millions)
Germany	4,741	(24%)
Rest of Europe	9,166	(46%)
North America	3,013	(15%)
Latin America	1,023	(5%)
Africa	317	(1%)
Asia, Australia	1,805	(9%)

Sales by product groups, 1997



Total sales	20,065	(in DM millions)
Chemical Products	4,851	(24%)
Surface Technologies	1,632	(8%)
Adhesives	4,237	(21%)
Cosmetics/Toiletries	2,972	(15%)
Detergents/Household Cleansers	4,636	(23%)
Industrial and Institutional Hygiene	1,498	(8%)
Other	239	(1%)

fillers; cyanoacrylates; contact adhesives; wood glues; PVC pipe adhesives; flooring adhesives; building chemicals; coatings; glue sticks; glue rollers; correction rollers.

- **Industrial and Packaging Adhesives**
Packaging and labeling adhesives; shoe adhesives; cigarette adhesives; book-binding adhesives; adhesives for the wood processing industry; laminating adhesives; adhesives for nonwovens; leather board.

- **Engineering Adhesives**
Reactive adhesives; high-performance sealants; sealing systems; assembly adhesives.

Cosmetics/Toiletries

Toilet soaps; bath and shower products; deodorants; skin creams; skincare products; dental care and oral hygiene products; hair shampoos and conditioners; hair colorants; hair styling and permanent wave products; perfumes and fragrances; hair salon products.

Detergents/Household Cleansers

Universal detergents; specialty detergents; fabric softeners; dishwashing products; household cleansers; scouring agents; floor and carpet care products; bath and toilet cleansers; glass cleaners and lens wipes; furniture and kitchen

care products; shoe care and laundry conditioning products; plant care products.

Industrial and Institutional Hygiene

Products, appliances, equipment, systems and services for cleaning, laundry care, maintenance, sanitizing and disinfecting applications at major industrial and institutional customers, in the food and beverage industry and the agricultural sector.

A

Additives Substances that are added for the purpose of imparting specific properties to a product.

Adsorption Attachment of gaseous or dissolved substances to a carrier material with a large surface area. Adsorption can be used to remove substances from gases or liquids.

Aerosols Finely distributed solid or liquid particles suspended in air or other gases – for example, smoke or fog.

Alcohols ▶ Organic compounds whose molecules contain one or more -OH groups. This makes them more soluble in water than the hydrocarbons from which they are derived.

Alkaline Aqueous solution with a ▶ pH above 7.

Alkaline phosphating Phosphating process for white goods (such as refrigerators and electric stoves).

Alkylbenzene sulfonate ▶ Surfactant made from ▶ petrochemical raw materials.

Alkyl polyglycosides (APG®) ▶ Surfactants made only from ▶ native raw materials, such as starch and sugar on the one hand and ▶ fatty alcohols on the other.

Ammonium nitrate A salt of nitric acid.

Anionic surfactants ▶ Surfactants that break down into electrically charged ▶ ions in aqueous solutions, and whose special surfactant properties are attributable to the negatively charged ▶ anions.

Anions Negatively charged ▶ ions.

AOX load Measure of the sum of the ▶ organic halogen (especially chlorine) compounds in wastewater.

APEO (alkylphenol ethoxylate) Group of ▶ nonionic surfactants made from ▶ petrochemical base materials.

Aromatics Class of ▶ organic compounds derived from ▶ benzene.

B

Basel Convention International treaty, concluded in 1989, which regulates the cross-border transport of hazardous waste.

Benzene The ring, consisting of six carbon atoms, is characteristic. Benzene is the simplest representative of the class of substances known as ▶ aromatics.

BiAS (Bismuth Active Substance) Analytical parameter for expressing the total content of ▶ nonionic surfactants.

Bioavailable A substance that enters the environment and is absorbed by living organisms.

Biological Oxygen Demand (BOD) Parameter expressing the pollution of wastewater with biodegradable ▶ organic substances. The BOD value is the amount of oxygen needed by ▶ microorganisms to degrade the organic substances.

Business Charter for Sustainable Development Charter agreed at WICEM II (Second World Industry Conference of Environmental Management) in Rotterdam in April 1991. It formulates principles of environmental management. WICEM II was organized by the International Chamber of Commerce (ICC) in cooperation with the United Nations Environment Program (UNEP) and the UN Conference on the Environment and Development (UNCED).

C

Carbon dioxide Gaseous combustion product of all substances that contain carbon. Considerable amounts of carbon dioxide are liberated by the exploitation of fossil raw materials such as coal and petroleum, especially for energy production and vehicle traffic.

Carbon monoxide Odorless, toxic gas, which is formed when fuels containing carbon undergo incomplete combustion in the absence of sufficient oxygen.

Catalyst Special substance that accelerates a chemical reaction while itself remaining unchanged.

Chemical Oxygen Demand (COD) Measure of the total pollution of wastewater by ▶ organic substances. The COD value is the amount of oxygen needed to effect the chemical degradation of these substances.

Chitin/Chitosan Chitosan is obtained from chitin, a substance occurring in the shells and exoskeletons of shrimps, crabs and insects.

Chlorinated hydrocarbons ▶ Organic ▶ solvents with incorporated chlorine, as a result of which they are not flammable. They are thus

safe to handle, but this advantage is offset by disadvantages in the field of environmental protection.

Cogeneration Name for the combination of electricity production and utilization of the heat which is simultaneously generated. If the large amounts of waste heat generated during electricity production can be utilized for heating purposes – for example, as process heat on production lines – this can result in considerable savings in primary energy (fuel) and, therefore, in higher levels of efficiency.

Complexing agent Substances used to soften water.

Contamination Slight pollution.

Conversion process A process for protecting metal surfaces against corrosion.

D

Decibel (A) A measure of sound pressure and therefore of the noise experienced by the human ear.

Derivatives Chemical compounds obtained from another substance.

Dermatology Science of the effects of substances on skin.

Dispersion Finely distributed undissolved particles in water.

E

Ecology Science of the influence of substances on the environment, especially on water and soil. Henkel carries out numerous ecological studies in order to ensure that its products exert no harmful effects on the environment.

Eco Management and Audit Scheme Regulation of the European Union (EU), providing for voluntary eco auditing and certification of companies. This regulation applies in all EU member states, and was adopted by the Council of Ministers of the then European Community (EC) under number 1836/93 in 1993.

Emissions Gaseous, liquid or solid substances that enter the atmosphere from industrial production plants, motor vehicles with internal combustion engines, domestic heating systems, or during the course of other industrial processes.

Emulsifier Substance that supports the formation of stable ►emulsions.

Emulsion Fine drops of a liquid dispersed in another liquid. Examples include water in oil, and oil in water.

Enzymes High-molecular proteins that function as bio-►catalysts. Certain enzymes are included in detergents to remove stubborn stains because they accelerate their decomposition.

F

Fatty acids Class of substances that are found – bonded to glycerol – in all vegetable and animal fats and oils. Important starting materials for numerous oleochemical derivatives.

Fatty acid esters Reaction products obtained from ►fatty acids and ►alcohols. The best known fatty acid esters are the natural oils and fats. Other acid esters are intermediate and end products in the widely branching field of oleochemistry.

Fatty acid methyl esters ►Fatty acid esters with ►methanol; intermediate products in the manufacture of ►fatty alcohols.

Fatty alcohols Long-chain ►alcohols, which Henkel obtains from ►fatty acid methyl esters by reacting them with hydrogen (►hydrogenation). Fatty acids are important raw materials for the manufacture of ►surfactants.

Fatty alcohol sulfates (FAS) Important group of ►surfactants based on ►fatty alcohols.

Flocculants Chemicals for precipitating solids; for example, during the purification of fresh water.

Formic acid Low-molecular ►organic acid. Used, for example, as a preservative.

H

Halon Short-chain hydrocarbons with a high content of chlorine, bromine or iodine. They are used as fire extinguishers, but are being phased out due to their harmful effect on the ozone layer.

Heavy metals Metals with a density greater than 4.5 metric tons per cubic meter. Because many heavy metals and their compounds are toxic and environmentally hazardous, they are

the subject of critical attention. There are, for example, strict limits on the amounts of heavy metals in drinking water and food, arable soil, and wastewater discharged into sewage treatment plants or surface waters.

Homogeneity Consistency of a mixture made from different components.

Hotmelts Collective name for a class of adhesives.

Hydrogenation Chemical reaction with hydrogen.

Hydroxyethane diphosphonate ►Complexing agent.

I

Immissions Effects of atmospheric pollution, noise, vibration or radiation on humans, animals, plants or objects. In the context of German clean air legislation, it refers to the ►emissions absorbed by the atmosphere and distributed up to a certain concentration.

Indirect dischargers Companies that do not discharge their wastewater directly into surface waters, but into a municipal or jointly operated sewage treatment plant.

Inorganic chemistry Science of the behavior of the elements and their compounds, with the exception of compounds of carbon, which are the field of study of ►organic chemistry.

Ions Electrically charged particles.

ISO 9001 International standard that describes a universal, comprehensive quality management system covering all stages of a product's life, from its development, through materials purchasing and production, to shipping to the customer.

ISO 14000 International group of standards relating to environmental protection. ISO 14001 is a standard for corporate environmental management systems.

L

Linear alkylbenzene sulfonate (LAS) Important group of ►surfactants based on ►petrochemicals. The basic hydrocarbon incorporates unbranched – i.e., linear – alkyl groups.

LIX® (Liquid Ion Exchange) A Henkel product range. These ion exchangers facilitate the economically feasible extraction of precious and semiprecious metals from low-grade ores.

M

MBAS (Methylene Blue Active Substance) An analytical parameter for expressing the total content of ►anionic ►surfactants.

Membrane Thin sheet or film, usually made of plastics or natural products, whose pore structure and material properties are such that it permits certain substances to pass through and remains impermeable to others.

Methanol Simplest compound in the group of substances known as ►alcohols. Toxic, flammable, readily biodegradable liquid, which is miscible with water.

Methylation process Introduction of one or more methyl groups into an ►organic molecule.

Microorganisms Microscopically small living creatures such as bacteria.

Monitoring system System for carrying out regular measurements of the concentration of chemicals in the environment – for example, in the air or in rivers.

N

Native Natural. For example, native substances = substances that occur in nature.

Nitrate Salt of nitric acid.

Nitrogen oxides Compounds of nitrogen and oxygen, formed, for example, from atmospheric nitrogen during all combustion processes.

Nonionic surfactants Group of ►surfactants that do not form ►ions in aqueous solutions and are surface-active in both acid and alkaline environments.

O

Organic substances Substances whose characteristic main element is carbon. Organic substances occur naturally, but can also be manufactured synthetically – for example, from petroleum.

P

Passivating Process for bringing about a physicochemical change on metal surfaces to improve their resistance to corrosion.

Petrochemical Obtained from petroleum or natural gas.

pH A measure of the basic (alkaline), acidic or neutral character of aqueous solutions. pH 7 is neutral; alkaline solutions have a pH greater than 7; acidic solutions have a pH lower than 7.

Phosphating Treatment of metal surfaces (steel, galvanized steel) to give them a thin coating of phosphate as protection against corrosion.

Pig-compatible pipelines Pipelines through which a "pig" can be sent. The pig is a special plug that separates the products pumped through the pipeline. It largely eliminates the need to rinse the pipelines when there is a change of product.

Polyethylene Plastic manufactured solely from ethylene. Used for consumer articles and packaging materials.

Polymers Substances, for example plastics, that are composed of a large number of repeated basic units.

Polypropylene A widely used plastic made from propylene.

Polyurethane Plastic with an extremely wide range of specifically adjustable practical properties. Suitable for adhesives, sealants, foams, molded articles, and many other applications.

Precipitation A method of separating out a dissolved substance by adding substances that cause it to form an insoluble precipitate.

Product stewardship The product-related aspect of ▶Responsible Care. Product stewardship puts the product and its complete life cycle (raw materials, manufacture, packaging, transport, use, disposal) at the heart of all considerations of environmental and health aspects.

R

Responsible Care® A worldwide initiative developed by the chemical industry. It stands for commitment to continuous improvement in safety and the protection of health and the environment, independently of legal requirements. The chemical industry in more than 40 countries has joined the initiative. It is identified worldwide by the same logo. Responsible Care is a registered trademark.

**S**

Sodium sulfate Sodium salt of sulfuric acid.

Solvent-free Often used to describe products that contain no ▶organic ▶solvents. Although water is also a solvent, it is ignored in this context.

Solvents Substances in which high concentrations of other substances can be dissolved. Often understood to refer only to ▶organic solvents, although water is frequently used as a solvent.

Sulfates Salts of sulfuric acid.

Sulfation plant Plant for manufacturing ▶anionic ▶surfactants that contain ▶sulfate or sulfonate groups (for example, ▶fatty alcohol sulfates or ▶alkylbenzene sulfonates).

Sulfur dioxide Gaseous combustion product of sulfur and its compounds. Because sulfur is contained in coal and fuel oil, sulfur dioxide is present in the flue gases of these products.

Sulfur oxides In general, mixtures of ▶sulfur dioxide and sulfur trioxide.

Surfactants Surface-active substances that reduce the surface tension of water.

Suspended substances Dispersed, finely distributed solids in a liquid.

T

Terajoule Unit of energy. 1 terajoule is equivalent to 1 trillion joules (= 238.8 million kilocalories).

Toluene ▶Aromatic ▶organic compound derived from ▶benzene.

Toxicology Science of poisons. Henkel carries out toxicological studies to ensure that its products have no harmful effects on humans or animals.

Tri-cation system Modern phosphating system for corrosion protection of metal surfaces that have to satisfy the most exacting quality demands – for example, in the automotive industry. Tri stands for zinc, manganese and nickel, which are added to the bath.

V

VOC See ▶volatile organic compounds.

Volatile organic compounds Low-molecular ▶organic compounds that remain in the atmosphere and contribute to the photochemical formation of low-lying ozone.

W

Water glass

Alkaline silicon compound that is soluble in water. Important intermediate product in ▶inorganic chemistry, but also a corrosion-inhibiting component of detergents.

Y

Yearly median value Yearly value, calculated from a number of individual measurements by a statistical method.

Z

Zeolite Sodium aluminum silicates (Henkel brand name Sasil®), whose three-dimensional structure contains cavities, enabling them to combine with ▶ions of hardness elements in water.

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and health at Henkel please
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