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Value beyond chemistry

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## Environment, Health and Safety 1998



## A message from our Chairman and CEO



**Rolf A. Meyer**  
Chairman of the Board  
and Chief Executive Officer

In the last year, the specialty chemicals industry has experienced some of the more difficult market conditions of the past few years. This does not mean, however, that good EHS practice will now take a back seat. As we stated last year, we firmly believe that environmental performance is strongly linked to business success. Providing our customers with environmental solutions and reducing our own costs associated with energy and materials purchases we can directly affect the Company's results.

In 1998 we made good progress in further improving our EHS performance. A challenge remains in energy use reduction where we will intensify our efforts. We estimate that potential annual savings of CHF 15-20 million exist in the area of energy and materials usage. Specific areas where these savings can be made have already been identified and will be pursued over the next year.

Our safety data for 1998 were impressive, with both the frequency and severity of lost time incidents reduced by almost a quarter. Let's remember, though, that our goal is zero incidents. This is by no means an impossible aim – we know that the vast majority, if not all, incidents are avoidable. In my role as CEO I have implemented a system whereby I am personally informed of any lost time accident occurring in the Company within 24 hours of occurrence.

Though our safety record in general is improving, we did experience three fatalities last year. Our sympathies are with the families and friends of the employees involved. These tragic accidents resulted in the reassessment of our safety training and prevention programmes.

It is a known fact that when business conditions become more difficult, employees may become distracted so that the likelihood of accidents increases. I'd like to stress that personal safety is a number one priority. At Ciba we have a solid reputation in employee health and safety and have established extensive training programmes to support this. We must remember, however, that often our personal safety is in our own hands.

We have established new procedures for investigating the root causes of incidents. New findings and potential improvements have been widely disseminated through Ciba's international networks, to contacts in related industries and to our customers and suppliers.

I would like to congratulate our EHS networks who have achieved a great deal in the last year, particularly in the area of training and product design. Product stewardship is an area of increasing importance and I am well aware that any Company that intends to be sustainable must focus on a thorough understanding of its products throughout their life-cycle. As a result, we are increasing the collaboration between our EHS and research and development departments to ensure that EHS considerations are an integral part of product design.

In addition, my congratulations go to employees at a number of sites who achieved specific EHS goals during the last year. Our site in Pontecchio Marconi, Italy became the first chemicals plant in Italy to obtain EMAS certification. The Klang facility in Malaysia was awarded the "Selangor State Environmental Award" for excellence in EHS standards. And 14 of our sites recorded zero lost time incidents during 1998, proving that the zero incident goal is indeed achievable. Let us extend this success to more sites in 1999.

Rolf A. Meyer

Ciba Specialty Chemicals (SWX:CIBN) is a leading company dedicated to producing high-value effects for our customers' products. Our specialty chemicals, added in small quantities, enhance the performance, look and feel of the final product. Business success is driven by our long-term strategy of innovation and continuous operational improvements. Ciba brings new and creative thought to the processes and products of our customers in more than 117 countries.

## Achievements and challenges

Major changes in environmental performance do not usually occur over the short time-span of a year. We will, therefore, be publishing a full EHS report every second year to provide a detailed discussion of major changes. In the meantime, we have decided to provide an interim EHS report containing data for the year 1998.

We continue to use our SEEP (Safety, Energy and Environmental Performance) system to collect data from our operations worldwide. This year we are pleased to report that 62 sites, a significant increase on 1997, are now able to report according to the SEEP system. This provides us with more than 95% of the total EHS data for the Company.

We have achieved significant improvements in a number of our target areas. One particular area is our safety record where we have managed to reduce both the frequency and severity of lost time incidents at our sites. We also reduced distribution incidents to zero in 1998. Distribution incidents are significant accidents, such as spills or leaks, occurring during the transportation of our products.

However, 1998 will be remembered as a year in which we lost three employees in fatal accidents. A forklift truck driver in Basel and two process operators, one at Grenzach, Germany, one at our Santa Monica site in Goa, India were killed. These deaths disturbed us immensely and, as a consequence, the Executive Committee acted immediately in establishing a Safety Council. The council will help us to achieve further progress in reaching our goal of zero incidents.

We also made improvements in our materials efficiency in 1998. Water usage was reduced dramatically by cutting down on water used for cooling processes. However, energy efficiency remained constant, and we still have some way to go in achieving our goal of a 10% improvement by the end of the year 2000. We continue to stress the importance of reducing our energy usage in manufacturing and have identified specific target areas and process improvements to this end.

Additional guidelines and guidance notes covering EHS matters in manufacturing operations were introduced in 1998. These include a product audit guideline: a new initiative to support our product stewardship responsibilities. Audit guidelines have been defined in order to reassess product related risks throughout the supply chain – from raw materials to disposal of the final product. Audit results provide valuable input to business plans and allow us to better balance business and EHS requirements.

A guidance note on sustainable product design has been drafted and should come into force in 1999. This aims to provide direction during the product research and development phases to ensure that innovation proceeds within a set framework. This will assist in the earlier identification of potential environmental concerns associated with the manufacture and use of our products.

Hans-Ulrich Müller

Peter Donath



**Hans-Ulrich Müller**  
Executive Vice President  
Law and Environment



**Peter Donath**  
Global Vice President  
Environment, Health and  
Safety



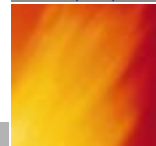
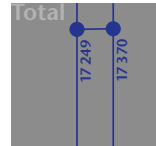
**Occupational  
Accidents  
and Illnesses**

## Our 1998 figures

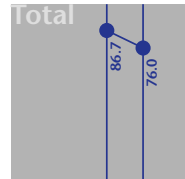
### Production Quantity in tonnes



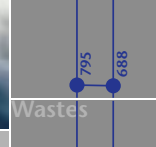
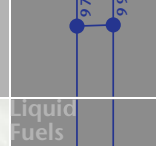
### Energy Purchases in terajoules



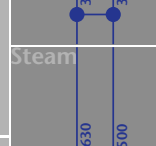
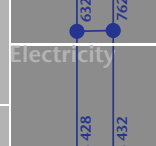
### Water Usage in million cubic metres



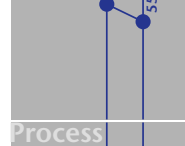
#### Natural Gas



#### Liquid Fuels



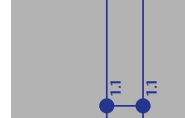
### Cooling Water



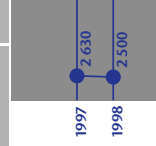
### Process Water



### Sanitary Water



#### Wastes



#### Electricity



Ciba Specialty Chemicals is entering its third year of operations. This year we can report, for the first time, comparative data, showing not only the absolute performance figures (in tonnes, m<sup>3</sup> or terajoules) but also the trends and developments over the two years. Again, we are presenting EHS data collected using our standardised data reporting system SEEP (Safety Energy and Environmental Protection).

We have increased the number of sites submitting SEEP data from 47 in 1997 to 62 in 1998, therefore providing a broader picture of our environmental performance. Additionally, we have introduced a number of new measurements to improve the detail of the information we provide.

With the exception of one newly acquired site in Germany, all of our chemical production sites and major formulation units, including joint ventures, were required to submit a SEEP report. Four very small formulation units did not submit a report this year, but are modifying their data collection systems to become SEEP compatible and will be included next year. Despite these omissions, we are confident that the data shown represents over 95% of the Company totals. Figures relating to joint ventures are included in full and are not reduced according to our percentage holding. In order to allow comparison, figures for 1997 have been revised to include data from the Water Treatments division (the former Allied Colloids).

All data apply only to the operations on our sites and do not include the emissions or energy consumed by our suppliers in the production of raw materials or intermediates. We have, however, included the CO<sub>2</sub> resulting from the electricity supplied to us.

This report generally follows the recommendations made by CEFIC, the European Chemical Industry Council, in their Responsible Care Reporting Guidelines. However, we have supplied additional data on effluent discharges, solvent and water usage and production quantities.

#### Production Quantity

Production quantity, which is virtually unchanged from 1997, is measured in metric tonnes and is the quantity of products shipped to customers. We do not include materials shipped between our sites or intermediates which are processed further within our group.

#### Energy

Our energy needs are met by the purchase of primary energy such as natural gas and oil, and secondary energy such as electricity and steam. Additionally, we generate some steam and hot water by incinerating wastes.

Overall energy consumption was maintained at about 17 300 terajoules. We will intensify our efforts to meet our target of increasing energy efficiency (energy consumption per tonne of product) by 10% by the end of 2000.

#### Water

Water, which we use for cooling equipment and as a medium in which chemical reactions are carried out, is an essential resource for us. In many areas of the world good quality water is becoming scarce, so we are continuing our efforts to use water more efficiently.

Our use of water as a cooling medium has been significantly reduced. At one of our sites in Germany, the boilerhouse was shut down and steam purchased from a neighbour. This resulted in a saving of 7 million cubic metres of cooling water which would otherwise have been used in the boilerhouse. Most other sites have also contributed to the reduction in cooling water requirements.

Use of water for sanitary purposes and of process water – so-called because it takes part in our chemical and physical processes – has remained constant. Process and sanitary water make up about 27% of our total water usage and this water is treated before being returned to the environment.

#### Solvents

Solvents are generally organic liquids that do not participate in chemical reactions but facilitate them. It is our objective to minimise loss of solvent and to recycle and reuse as much solvent as possible. Where solvents cannot be reused, they are incinerated, usually as a substitute for fossil fuels. Of the 670 000 tonnes of solvent which we use, 513 000 tonnes are recycled through our plants. About 157 000 tonnes of new solvent were purchased to replace:

- solvent contained in our products
  - solvent that cannot be recovered and is incinerated
  - solvent lost into the air and water.
- Total solvent loss has been reduced from 2.4% to 2.0% of the total solvent used.

#### Wastes

The definition of hazardous or special waste varies from country to country. For the sake of uniformity, we define the following as special or hazardous wastes:

- contaminated excavation and building debris
- used oil
- bio-sludge from effluent treatment plants
- wastes containing mercury
- waste sulphuric acid
- solid and liquid chemical wastes (incl. sludges and pastes, but not effluents going to drain)
- returned, out-of-date and non-specification products
- contaminated packing
- wastes containing asbestos.

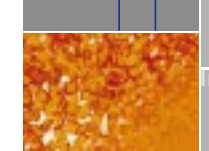
Other wastes generated at our sites are typical industrial wastes, such as scrap metal, wood, glass, paper and cardboard. These are classified as non-hazardous and we are reporting these for the first time this year.

The quantity of hazardous waste sent for thermal treatment (incineration and *wet air oxidation*) has increased. Landfilled wastes have risen, mainly as a result of the clean up of a newly acquired site in the US. We expect that next year the amount of landfilled material will return to previous levels. The recycling and reuse of wastes continues to play the most important role.

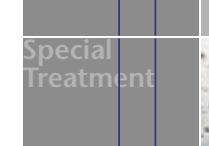
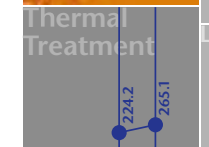
*Terajoule (TJ)*  
Joule is a unit of energy. Terajoule is a trillion (10<sup>12</sup>) joules or the energy content of about 23 tonnes of heating oil.

*Wet air oxidation*  
Method of treating effluents using high temperatures and pressures in the presence of air which breaks down the organic molecules into water and CO<sub>2</sub>. The method is used for the destruction of contaminants which cannot be broken down in a biological effluent treatment plant.

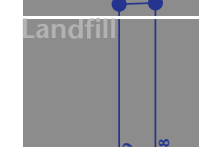
### Special Waste Disposal in thousand tonnes



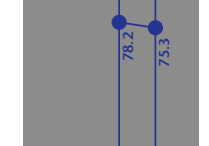
### Recycling



### Thermal Treatment



### Special Treatment



### Landfill



### Incinerated



### Sold in Product



### Sold for Reuse



### Recycled and Reused



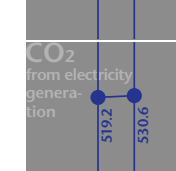
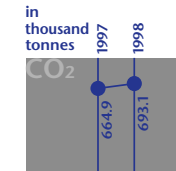
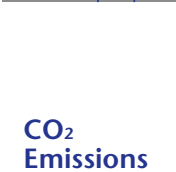
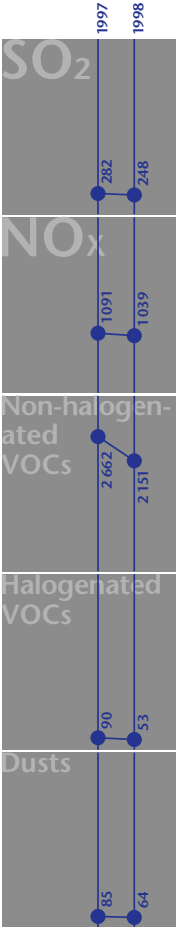
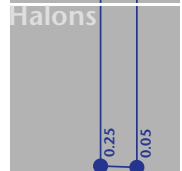
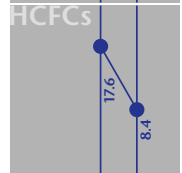
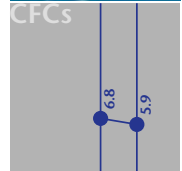
### Non-hazardous Wastes in thousand tonnes



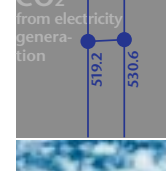
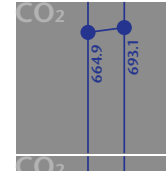
### Solvent Usage in thousand tonnes



## Off-Gas Emissions in tonnes



## CO<sub>2</sub> Emissions in thousand tonnes



### Off-Gas Emissions

#### Carbon Dioxide

Carbon dioxide (CO<sub>2</sub>) is a so-called "greenhouse gas" and is believed to be the main contributor to global warming and climate change. CO<sub>2</sub> is formed when carbon based fuels such as natural gas, oil or coal are burned. We burn these fuels to produce steam for heating in our plants. Our CO<sub>2</sub> emissions have increased, mainly because we have burned more waste than in 1997.

About 20% of our energy consumption is electricity supplied by outside companies. As electricity generation can also produce CO<sub>2</sub>, we have calculated the emissions which can be attributed to the electricity we have purchased. We have used the national electricity generating statistics to calculate the theoretical CO<sub>2</sub> emissions. The carbon dioxide attributable to our electricity purchases has risen by 2%. This is because some sites in countries which produce large amounts of electricity from coal (Australia, China and Indonesia) submitted SEEP reports for the first time this year.

#### SO<sub>2</sub>, NO<sub>x</sub>

Oxides of sulphur (SO<sub>2</sub>) and nitrogen (NO<sub>x</sub>) are products of the combustion of fuel in our boilerhouses and incinerators. The quantities emitted depend on the type and quality of fuel used and the boiler technology.

The bulk of our SO<sub>2</sub> emissions come from one plant, which uses heavy oil as a fuel. We had hoped to convert this site to natural gas, which produces no SO<sub>2</sub>, but supplies have not yet become available; we will carry out the conversion as soon as natural gas becomes available. In the

meantime the site has managed to acquire somewhat better quality oil with lower sulphur content. This is one of the main contributors to our lower SO<sub>2</sub> emissions.

NO<sub>x</sub> emissions have been reduced through technical improvements in steam boilers. Further reductions in these emissions will be made as older boilers are replaced by modern, low emission equipment.

#### Volatile Organic Materials

Almost all our products are organic chemicals and most are produced using organic materials such as solvents. Both solvents and products are known as volatile organic compounds or VOCs if they have a high vapour pressure and evaporate very easily. Emission of VOCs is a contributor to the problem of *photochemical smog*.

All our plants have air pollution control equipment, designed to ensure that we meet the legal emission limits. We have made significant reductions in the emissions of VOCs, including halogenated VOCs. The latter contain chlorine, bromine or fluorine and tend to persist in the environment. We will continue our efforts to reduce the emissions of VOCs through continued process improvements.

#### Dusts

Many of our products are sold in powder form. The manufacture of these powders usually involves physical operations such as drying, grinding, granulation and packing. In all these operations dust emissions could result, and we take special care to clean the dust laden air before it is emitted to the atmosphere. Filters and dust removal devices have been installed to ensure that all legal requirements are complied with or exceeded, especially where our highly coloured products might be emitted.

#### Chlorofluorocarbons, Halons

Chlorofluorocarbons (CFCs), Halons and hydrogenated chlorofluorocarbons (HCFCs) are used in refrigeration and fire extinguishing systems. They are extremely stable. CFCs and Halons have the potential to break down the stratospheric ozone layer (so-called "ozone depleters"). We do not produce any of these classes of products. Any emissions are caused by accidental leaks from the refrigeration and fire extinguishing systems. The reduction in emissions is a direct result of our programme to actively seek and eliminate such leaks.

#### Aqueous Discharges

We continue to report our emissions to water in accordance with the recommendations of the European Chemical Industries Council (CEFIC). For our plants that have their own dedicated effluent treatment facilities, we have consolidated the actual discharge loads. For those manufacturing sites that have their effluent treated together with neighbouring communities and industries, we have calculated our contribution to the total effluent discharged to the environment.

#### Greenhouse gases

Trace gases in the atmosphere which contribute to potential climatic changes. These gases, mainly CO<sub>2</sub> and chlorofluorocarbons, allow light and UV radiation to reach the earth's surface while reducing the release of infrared radiation (heat). This may lead to an increase of the global temperature.

#### Photo-chemical smog

In the lowest layer of the atmosphere, different air pollutants react under the influence of sunlight to form new air pollutants (secondary pollutants). These are formed mainly during the summer when solar radiation is strong. They are toxic because of their strong oxidation capacity.

In various countries different methods are used to measure parameters such as phosphorus, nitrogen and organic load. We have converted these measurements into a single parameter to provide a clear overview.

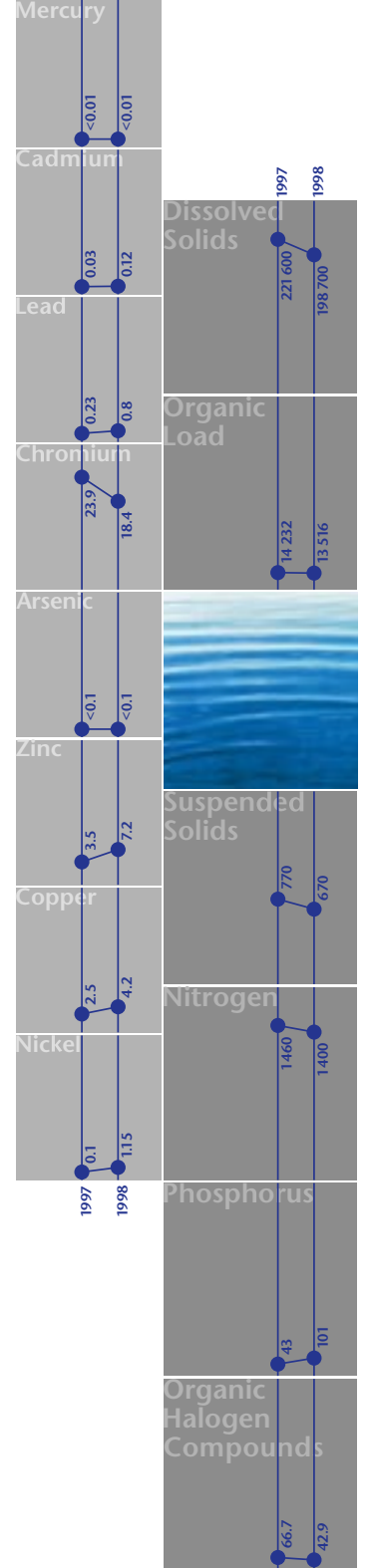
The reported increased discharge of phosphorus is misleading as it arises from the improved and more frequent sampling and analysis of the effluent discharged from one site.

#### Safety

We experienced three tragic fatalities during 1998. Lessons learned from these accidents have been rapidly communicated throughout the Company to help prevent any similar incidents.

Our accident statistics cover all accidents which result in more than one lost working day. We calculate the frequency as the number of occupational accidents and illnesses per 1000 employees and the severity as the number of lost days per million working hours.

Both frequency and severity of occupational accidents and illnesses have dropped significantly, but our target of zero lost time accidents is still a long way off. Of our production and formulation sites, four in Japan, six in the US, and one each in Taiwan, Singapore, Canada and Australia all recorded zero lost time accidents in 1998. The administrative headquarters in France, Spain, Brazil and the UK also reported zero lost time accidents or illnesses. We introduced improved procedures for reporting and investigating the root causes of incidents and accidents during 1998.



## Discharges to Surface Waters in tonnes