SUMITOMO CHEMICAL


# Environment, Health & Safety Report 2000

## Responsible Care Activities of

## Sumitomo Chemical Company, Limited

Responsible Care refers to voluntary activities conducted by companies in the areas of environment, health and safety throughout the entire product life cycle. Currently, there are Responsible Care associations in 42 countries.

## Our Code of Conduct: Nine Guiding Principles

1. We will respect Sumitomo's business philosophy and act as highly esteemed "good citizens."
2. We will observe national and international laws and regulations and will carry out business activities according to our corporate rules.
3. We will develop and supply useful, safe products and technologies that will contribute extensively to the progress of society.
4. We will take voluntary and active initiatives to achieve zero-accident and zero-injury operations and to preserve the global environment.
5. We will conduct business transactions based on fair and free competition.
6. We will endeavor to make our workplace sound and energetic, and every one of us will make efforts to become a professional who has advanced skills and expertise in his or her field of responsibility.
7. We will actively communicate with our various stakeholders, such as shareholders, customers and regional communities.
8. We, as a corporate member of an international society, will esteem the culture and custom in each region around the world and contribute to the development of those regions.
9. We will strive for the sound development of our Company through business activities conducted in accordance with the guiding principles stipulated hereinabove.

## Contents

*Working for the Benefit of People, Society and the Earth*

We are in an era that can be called the Age of Chemistry and the Environment, in which the relationship between chemical substances and the environment is coming under greater scrutiny. While many chemicals are indispensable to maintaining the quality of life that we enjoy today, misuse of these substances can endanger the environment and human health. Therefore, in carrying out our corporate activities, we must place high priority on human health and environmental safety.

In recent years, chemical companies have joined together in an international alliance with a view to "creating a society in which sustainable growth is realized on a global scale." These companies have pledged to pursue responsible policies with respect to health, safety, and the environment on a voluntary basis. These initiatives have come to be widely known by the term Responsible Care (RC).

Sumitomo Chemical Company, Limited, recognizes that it is a corporate citizen actively involved in a complex web of global interactions. With this in mind, we regard the RC initiatives as an important cornerstone of our corporate management. We intend to fulfill our social and international responsibilities by working for the benefit of people, society and the Earth.

As a concrete means to achieve this end, we are doing our utmost to enhance efficiency and make effective use of limited natural resources. We believe that this will enable us to conduct our operations, both at home and abroad, in a way that will minimize any potential impact on the environment.

In accordance with the guidelines laid out in our "Corporate Policy on Product Quality, Safety and Environment," we will continue to consolidate our available resources to promote the RC initiatives in every area of our operations, including R&D, production, logistics and marketing. Through such efforts, we intend to play an active role in building a society that is mindful of the importance of preserving the global environment and the need to recycle and conserve the Earth's valuable resources.

This report is designed to provide a brief overview of the RC measures that Sumitomo Chemical has been implementing over the years. We welcome readers' candid and constructive comments on the report.

Hiromasa Yonekura
President

# Sumitomo Chemical's Responsible Care Activities

**In April 1994, Sumitomo Chemical formulated its Corporate Policy on Product Quality, Safety and Environment.**

**This corporate policy expresses Sumitomo Chemical's commitment to giving customer satisfaction, maintaining zero-accident and zero-injury operations, ensuring the safety of raw materials, intermediates and products, and making efforts to reduce the environmental burden of its products at all stages in their life cycles. Sumitomo Chemical's employees are fully aware of this policy and act on the basis of its commitments as they constantly strive for improvement and strictly observe legal requirements.**

Oita Works

Established April 1, 1994

## Corporate Policy on Product Quality, Safety and Environment

In conformity with the business philosophy of the Sumitomo Group, our Company fulfills its responsibility to develop, manufacture and supply a variety of products which satisfy the fundamental necessities of human life and contribute to the growth of society. Since its establishment, Sumitomo Chemical has managed its activities on the basic principles of (i) ensuring "customer satisfaction," (ii) maintaining "zero-accident and zero-injury operations," and (iii) promoting "co-prosperity with society."

With due respect to these principles, our Company is determined to conduct all activities, including production, research and development, sales and distribution, in accordance with the following policy related to product quality, safety and environment.

1. **To supply high-quality products and services that satisfy customer needs and ensure safety in their use;**
2. **To maintain zero-accident and zero-injury operations and the safety of neighboring communities and our employees;**
3. **To ascertain the safety of raw materials, intermediates and products and prevent our employees, distributors, customers and consumers from being exposed to any possible hazard;**
4. **To assess and reduce environmental burden at all operational stages, from product development to disposal, and to exert all practical environmental protection measures.**

All sections and employees of our Company shall be fully aware of the significance of this policy and shall always strive to improve operational performance while, of course, abiding by all relevant laws, regulations and standards.

米倉弘昌

Hiromasa Yonekura, President
Sumitomo Chemical Company, Limited

**In January 1995, Sumitomo Chemical reinforced its internal organization to promote Responsible Care initiatives more comprehensively and efficiently.**

## The Responsible Care Committee

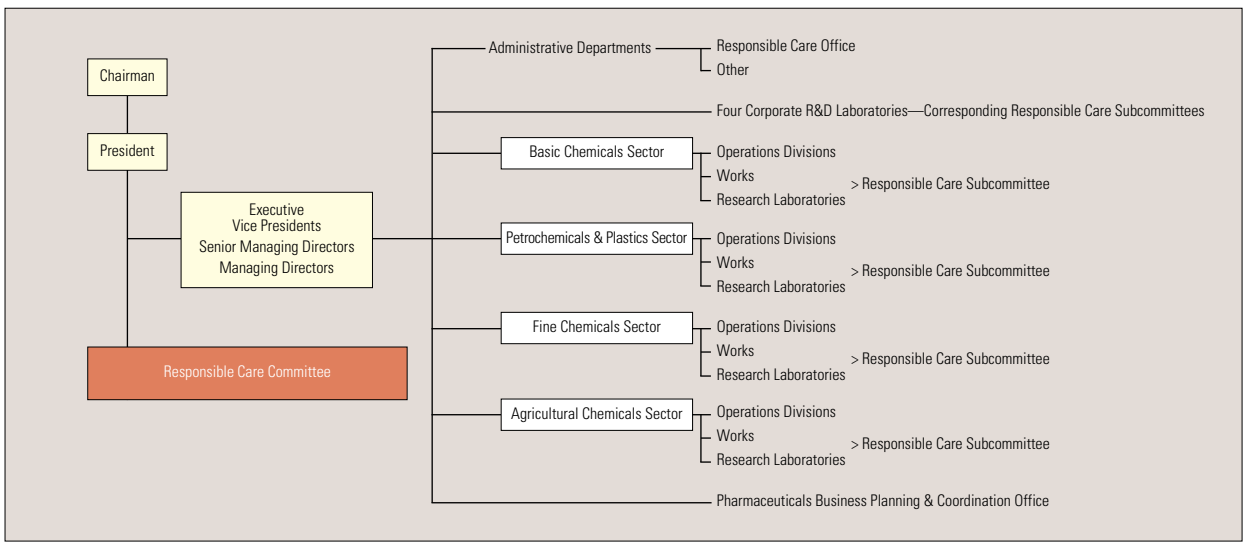
Sumitomo Chemical's Responsible Care Committee comprises the board members in charge of the Company's four Business Sectors and the Pharmaceuticals Business Planning & Coordination Office; the board members in charge of the administrative departments; and the heads of each of the five manufacturing works. The Committee is responsible for the implementation of the Company's Corporate Policy on Product Quality, Safety and Environment as well as the long-term planning, coordination and supervision of RC-related matters. Furthermore, to implement specific RC measures, committees have been set up at each of the Company's manufacturing works and research laboratories.

**Responsible Care Office**

The Responsible Care Office is in charge of environmental preservation, process safety and disaster prevention, occupational health and safety, product stewardship and product quality assurance. The office also acts as secretariat to the Responsible Care Committee.

The Responsible Care Committee

## Sumitomo Chemical's Responsible Care Organization



**Sumitomo Chemical has established the Responsible Care Activities Policy to develop specific initiatives that enable the Corporate Policy on Product Quality, Safety and Environment to be applied in practice.**

## Responsible Care Rules and Regulations

To ensure that all Sumitomo Chemical employees carry out their duties while thoroughly recognizing both the Corporate Policy on Product Quality, Safety and Environment and the Responsible Care Activities Policy, the Company has produced these policy statements in pocket-sized form and distributed them to all employees.

In addition, the Company has established various classifications of regulations that are intended to develop the RC provisions into a specific codified form. The regulations encompass environmental management, process safety management, chemical safety management, etc. To conduct RC audits, the Company has established various corporate guidelines, including those for RC internal audits, environmental audits, process safety and occupational safety audits, and chemical safety management audits.

Pocket-sized booklets distributed to all employees

**To effectively promote Responsible Care activities, Sumitomo Chemical is improving its internal audit processes by strengthening audit resources.**

## Responsible Care Internal Audit System

The Company employs a two-stage audit system, comprising specialized audits and overall audits, to maintain the thoroughness and accuracy of internal RC auditing. In fiscal 1999, the Company introduced an expert auditor system to further improve the quality of internal RC auditing.

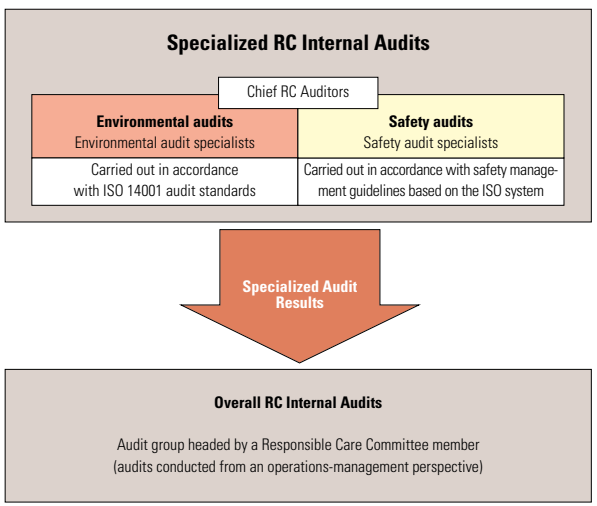
Specialized environmental and safety audits are conducted by teams comprising a senior RC audit specialist and audit experts in the field of environmental control and safety over two to three days at each facility. The heads of these teams are appointed by the chairman of the Responsible Care Committee.

Based on the results of specialized audits, a special team, headed by a member of the Responsible Care Committee, carries out an overall audit from a managerial point of view.

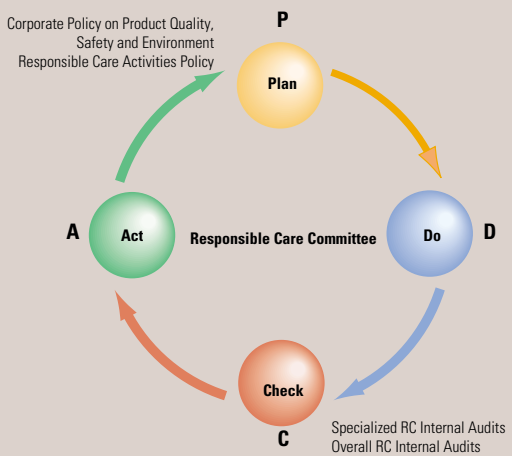
In fiscal 1999, Sumitomo Chemical began RC auditing for its subsidiaries and affiliates as a part of support activities.

Environmental audit

Sumitomo Chemical Group Liaison Conference




## Responsible Care Management System




Sumitomo Chemical has established an integrated environmental and safety activities framework known as the Responsible Care Management System, based on the PDCA cycle. In this and other ways the Company is striving to raise the quality of its RC activities.

## ISO 14001 Certification

Sumitomo Chemical promotes environmental control activities—an integral part of RC—in accordance with ISO 14001 certification, an internationally recognized set of standards for environmental management systems.

By the end of fiscal 1998, all five of the Company's manufacturing works had obtained ISO 14001 certification, and their certification has been renewed in subsequent years following regular inspections.

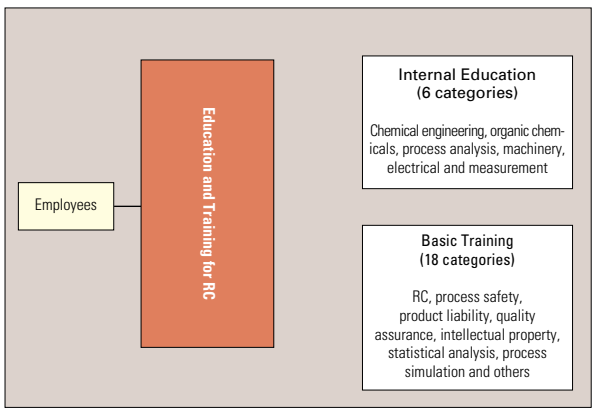
Works and certification number
Ehime Works: JCQA-E-018
Chiba Works: KHK-97ER-04
Osaka Works: JQA-E-90072
Oita Works: JQA-E-90152
Misawa Works: JQA-EM0355

ISO 14001 certificates

## Education for Employees

Sumitomo Chemical has various education and training programs for each level of management and employees. Among them, the RC educational program constitutes an important part. Particular curricula were prepared for training managers and staff engaged in manufacturing, logistics, sales, procurement and R&D. The Managers and employees engaged in their respective assignments shall be well trained and obtain knowledge of RC as professionals working at a chemical company.

### Responsible Care Education and Training




## Raising Responsible Care Consciousness

The management of Sumitomo Chemical, from the President to the general manager of each manufacturing works and research laboratory, is continually conveying the RC message to the Company's employees.

In addition, the Company endeavors to raise employee awareness of RC by giving special awards to the business operation unit that achieves outstanding performance in RC activities.

Sumitomo Chemical also makes use of such internal communication media as the Company's intranet and in-house magazines to broaden RC consciousness among management and employees.

In-house publications as a means of raising awareness about environmental safety

**A wide range of technical data relating to environmental safety, process safety, accident prevention, occupational health and safety, and chemical safety is essential for the promotion of Responsible Care. Two of our Corporate Research Laboratories, therefore, provide comprehensive technical backup in the areas of the environment and safety.**

## Support from Corporate Research Laboratories

### Environmental Health Science Laboratory

Sumitomo Chemical's Environmental Health Science Laboratory is one of the largest toxicological research facilities in Japan. At the facility, approximately 200 specialists use state-of-the-art technology to evaluate the safety of raw materials, intermediates and products and their impact on the environment.


Research areas relating to the safety assessment of chemical substances

### Process & Production Technology Center

The Process & Production Technology Center has developed integrated process safety technologies and carries out the research and evaluation of a variety of materials used in manufacturing facilities. This Corporate Research Laboratory plays an important role in achieving the Company's zero-accident and zero-injury operations.

Particle explosion tests

# *Promoting Responsible Care throughout the Life Cycle of Our Products*

**Responsible Care comprises voluntary initiatives to assess the environmental and safety issues involved throughout the life cycle of each product, from R&D to final product disposal, and take appropriate measures to improve environmental and safety controls in the chemical industry.**

**As a chemical manufacturer, Sumitomo Chemical develops and markets a wide range of chemical products that contribute to a better quality of life. At the same time, it devotes constant attention to the safety and environmental aspects of these products at every stage from R&D to final product disposal.**

## From R&D to Manufacturing

In April 1994, Sumitomo Chemical drew up its Corporate Policy on Quality, Safety and Environment as part of its plans to promote a shift from a statutory compliance-based approach to one formulated on self-regulatory principles. At the same time, the Safety Management Guidelines were introduced to make safety assessments at each stage of development, thereby reducing environmental burden and achieving zero-accident and zero-injury operations.

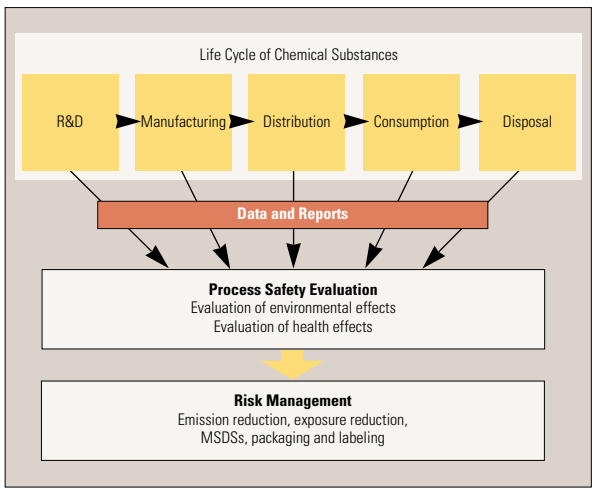
In September 1997, the Company revised its Process Development and Commercialization Regulations, which stipulate requirements for executing process development and production projects and specify health, safety and environmental issues that should be dealt with throughout the life cycle of its products. In addition, more-detailed regulations and guidelines to RC objectives were established.

From the process development through manufacturing stages, the following principles are maintained and applied to ensure process and product safety.

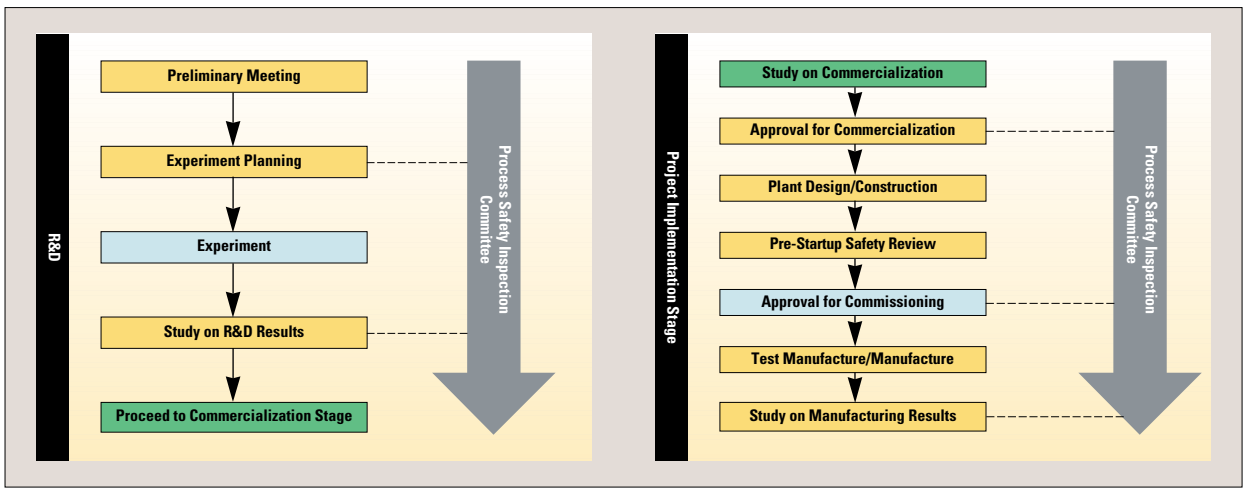
1. Detailed survey and evaluation of information regarding chemical substances
2. Collection and evaluation of experimental data
3. Studies on the process, equipment and facilites for manufacturing
4. Providing relevant information to all parties concerned

As shown in the diagram below, any process development stage is not forwarded to the next stage unless it is proven to satisfy safety requirements. The Process Safety Inspection Committee convenes at each step. Recently, the Post-Commissioning Safety Review was upgraded to the Fifth Inspection Committee to enhance the Company's risk assessment system.

## Risk Management of Chemical Substances



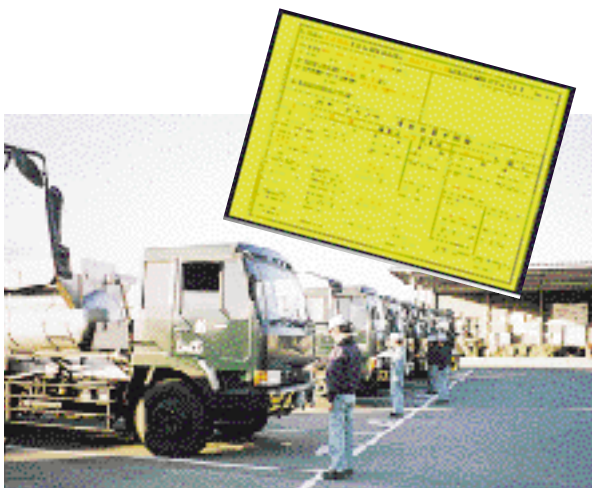

## Risk Assessment from R&D to Manufacturing



## Safety in Logistics Operations

Sumitomo Chemical strives to ensure chemical safety throughout the logistics process. The Company cooperates closely with logistics contractors to establish safety standards and conducts necessary training together with other accident-prevention activities. The Company also distributes Material Safety Data Sheets (MSDSs), Yellow Cards (instruction cards for emergency response) and Guidance for Emergency Response in the Transportation and Handling of Hazardous Materials and prepares broad emergency measures.

Sumitomo Chemical is developing logistics systems for lower environmental burden through the recycling, reuse and industry standardization of transport materials and packaging.



Ensuring safety in chemical transportation: the Yellow Card

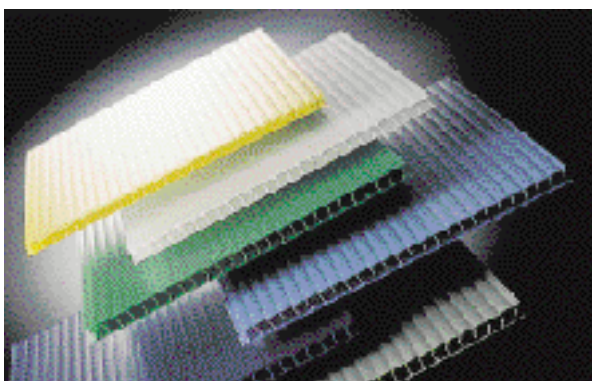
## Reducing Waste

Sumitomo Chemical has been working to incorporate the three R's—reduce, reuse and recycle—into every aspect of its operations.

The Company is cooperating with other chemical manufacturers to promote the above initiatives through the activities of the Plastic Waste Management Institute and similar industry organizations in which it participates.

Through the development of a high-performance catalyst for the manufacturing process and similar innovations, Sumitomo Chemical has increased production yield while reducing energy and resource consumption. Furthermore, the Company is engaged in developing new technologies that reduce the output of by-products in the manufacturing process while it searches for the recovery and effective use of those by-products.

The Company is developing those products useful for recycling processes and has succeeded in developing and marketing new products that are easily recyclable.



*Sunply* reusable plastic cardboard

## Chemical Safety Management

In the early 1980s, the Company developed a system called the Toxicity Assessment System for Chemical Substances (TASCS), which provides a framework for compiling, analyzing, and evaluating safety data for each chemical product. Since then, it has improved this system by setting up a risk assessment and a risk management system that stipulates the appropriate usage conditions of respective products. The Company is determined to bring about the further improvement of this system.

Under this system, the data is evaluated and stored in a product safety database called CHEMSAFE2. This database expedites the transmission of chemical-related safety data within the Company and also streamlines the transfer of MSDSs* between the Company and its customers, ultimately ensuring the safety of both the workplace and its environment.

This evaluation system has greatly facilitated the Company's compliance with the standards of both High Production Volume (HPV) chemicals—which is a voluntary worldwide chemical industry effort—as well as the Pollutant Release and Transfer Register (PRTR), which requires that specific chemical substances released into the environment be reported.**

* MSDS completion was at 95% in 1999.
** The Law Concerning Reporting, etc., of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management

# Product Quality Assurance

**Sumitomo Chemical has achieved a high level of customer satisfaction under the guidance of the Responsible Care Committee. The Responsible Care Committee has set conduct policies that guarantee product safety and quality as well as prompt, reliable product delivery.**

## Policy for Quality Assurance Activities

To implement the Corporate Policy on Product Quality, Safety and Environment, the Company has determined specific objectives and methods to realize them as follows:

**Objectives**

1. Efficient supply of products with international competitiveness in terms of safety, quality, cost and delivery readiness
2. Prevention of significant irregularities in product quality and safety
3. Product quality improvement and cost reduction for better performance of the Company

**Methods**

1. Give priority to customers' safety and satisfaction
2. Establish quality assurance systems, define responsibilities and promote standardization
3. Educate employees for better understanding of quality assurance and product safety
4. Improve the mode of work and the standard of management by utilizing scientific management methodology
5. Activate the PDCA (plan, do, check and act) cycle

ISO 9002 certificates

### ISO 9002 Certification

Sumitomo Chemical had received ISO 9002 certification for international product quality assurance at all five of its works as of the end of fiscal 1995. Such certification has been renewed in subsequent years following regular inspections.

| | | | |
|---|---|---|---|
| Ehime Works: | JCQA-0019 | Osaka Works: | JQA-0721 |
| | JCQA-0320 | Oita Works: | JQA-1069 |
| Chiba Works: | JQA-0829 | Misawa Works: | JQA-0752 |

### Company Organization Relating to Quality Assurance

In 1994, Sumitomo Chemical established the Quality Assurance Department (which became the Responsible Care Office in January 2000) and clarified product quality management responsibilities.

Furthermore, the Company has set up quality assurance departments at each manufacturing works. These sections are responsible for the quality control of raw materials, intermediates and products as well as for managing product safety.

# Environment-Friendly Product Lineup

## Water

**Sumitomo Chemical has not only installed comprehensive water purification systems to treat wastewater emitted from its own plants but also makes full use of its excellent capabilities for the development of diversified technologies and products that are helpful in preventing water contamination.**

## Water Purification Products

Agents for water purification

### Water Treatment Agents

■ ***Sumifloc*** **organic polymer flocculant**

*Sumifloc* is widely used as a flocculation and sedimentation treatment for many types of wastewater.

■ **Aluminum sulfate inorganic flocculant**

This product is used to purify water supplies and treat sewage and wastewater from factories.

■ ***Sumix*** **inorganic flocculant**

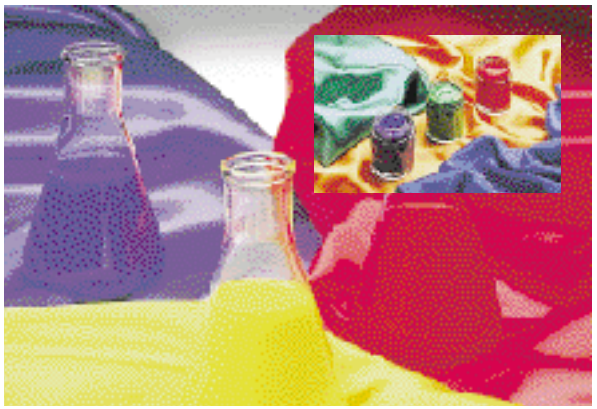
*Sumix* aluminum polychloride has superior flocculation capabilities that make it particularly effective in purifying water at temperatures at or under 5°C, very hard water, highly turbid water and alkaline water.

■ **Sodium aluminate inorganic flocculant**

Sodium aluminate is an auxiliary precipitate water treatment which, when combined with aluminum sulfate, increases water purification capability.

■ ***Duolite*** **ion-exchange resins**

*Duolite ES-371 N* ion-exchange resin has been widely acclaimed for its effectiveness with respect to the removal of boron from water at large-scale effluent treatment facilities.



Environment-friendly dyes

### Dyestuffs

■ ***Let's dyeing,*** **a new environment-friendly dyeing method**

Sumitomo Chemical has developed a new dyeing method called *Let's dyeing* that reduces the volume of inorganic salts in effluent from dyeing factories. *Sumifix Supra E-XF* and *Sumifix Supra NF* dyes are best suited for the *Let's dyeing* method.

■ ***Sumifix HF*** **new environment-oriented dye series**

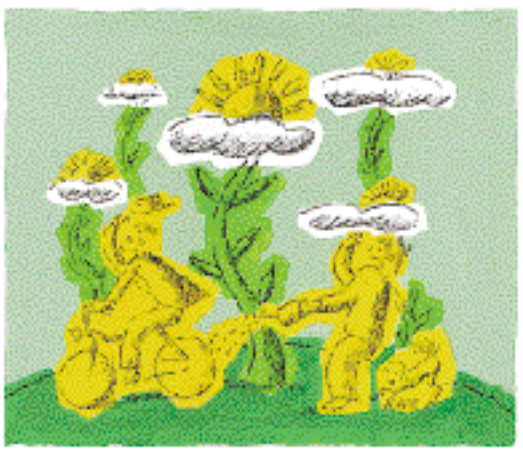
*Sumifix HF,* a new reactive dye series with high fixation, was developed to achieve a high color yield with minimum dyeing auxiliaries, thus reducing the amount of colored water and inorganic salts in effluent from dyeing factories.

■ ***Sumifix WF*** **reactive dyes for wool**

Acid-mordant dyes and metal-complex acid dyes, which contain heavy metals harmful to the environment and health, have traditionally been used for wool dyeing. Sumitomo Chemical developed *Sumifix WF,* a new reactive dye series that is heavy-metal-free yet suitable for wool dyeing.

## *The Green Mother Earth*

**Sumitomo Chemical is making a significant contribution to the coexistence and coprosperity of mankind and the Earth through its agricultural products and greenification technologies.**



## Agricultural and Greenification Products

Evaluating medicine at an experimental farm abroad

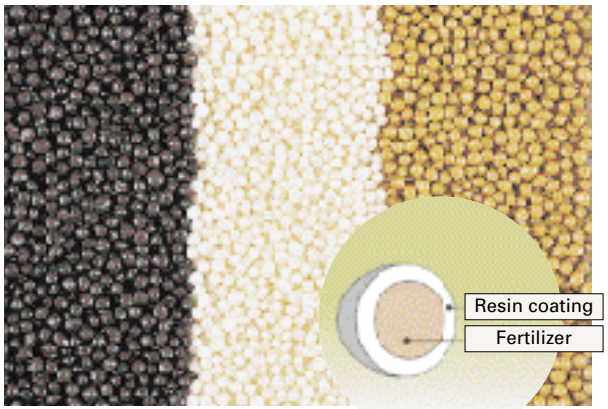
■ **Agricultural and household pesticides**

Agricultural chemicals and fertilizers are essential for growing crops and cultivating and protecting forests. Sumitomo Chemical gives priority to safety and the environment in developing products. When a plague of desert locusts occurred in Africa in 1988, both the Food and Agricultural Organization (FAO) and the World Health Organization (WHO) strongly recommended using our insecticide *Sumithion* because of its safety and effectiveness.

The Company is devoting attention to developing not only traditional agricultural and household pesticides but also innovative new products that use plant and animal biomechanisms. Examples of such product development include *Sumiseven P* and *Lomica* plant growth regulators and *Sumilav* insect growth regulator.

■ **Coated seeds**[1]

Coated seeds are good for use in automated sowing, offering increased efficiency in large farms. The use of coated tree seeds is a possible means of preventing desertification.




Environment-friendly coated fertilizers

■ **Coated fertilizers: *SR Coat, Super SR Coat***

The use of coated fertilizers—fertilizers coated with organic materials—increases efficiency and reduces the burden on the environment because such fertilizers need be applied less frequently and in lower quantities than conventional fertilizers.

■ **Water-absorbant resin: *IGETAGEL***

*IGETAGEL* is a super water-absorbant resin that is mixed into soil to increase its water retention. Research is currently being carried out at a number of locations to develop applications for this product, such as the stabilization of desert dunes and soil on steep slopes.

■ **Irrigation system products: *Sumidrip, Sumisansui*[1]**

The Company's products for use in irrigation systems—including *Sumidrip,* an irrigation hose, and *Sumisansui,* a sprinkler—are used to greenify dry land.

[1] Marketed by the Company's subsidiary Sumika Agrotech Co., Ltd.

## *Daily Life*

**Sumitomo Chemical offers environment-friendly products for use in everyday life.**

## Environmental Products for Household Applications

Dioxin-absorbant film used in garbage bags

■ ***Suiaru-Power*** **dioxin-absorbant film**

Sumitomo Chemical has developed *Suiaru-Power* dioxin-absorbant film, a new complex resin film that absorbs heavy metals and such poisonous gases as the dioxins produced at garbage incineration facilities.

Garbage bags made from the film have been approved by local government bodies. In addition, the development of other product applications, such as kitchen-use water drainage garbage bags and functional papers, is under way.

■ ***Sevix*** **gas barrier film**

This gas barrier film effectively shuts out oxygen and is widely used for wrapping and preserving food. *Sevix* has won wide acclaim because it emits no chlorine gas during the disposal process.

■ ***Sumikaflex*** **ecological wallpaper binding agent**

In light of environmental issues related to dioxins and plasticizers, which have spurred demand for a change to water-based paint compounds, Sumitomo Chemical is developing such environmentally friendly products as *Sumikaflex,* an ethelyne emulsion wallpaper binder that provides quality on a par with or superior to existing products.

The *Sumibox-Patacon,* useful for the separate collection of recyclable items

■ ***Sumibox-Patacon*** **foldable box[2]**

The *Sumibox-Patacon* is one in a lineup of light, foldable boxes made from polypropylene. It has been adopted for storage and removal as well as a wide range of other uses in homes and offices.

■ ***Sunply*** **polypropylene double wall sheet and** ***Sumipanel*** **thick hollow panel[2]**

Polypropylene sheets and panels are lighter in weight and have more resistance to water and weather than wood- or paper-based products; they also enable the recycling of resins and contribute to forestry resource protection. Demand for these products has been increasing.

■ ***Sumithermal*** **floor-heating system[2]**

The *Sumithermal* system stores the surplus electricity made available by reduced demand at night and releases it during the day to power a floor-heating system, smoothing out the peaks in the daily demand for electrical power.

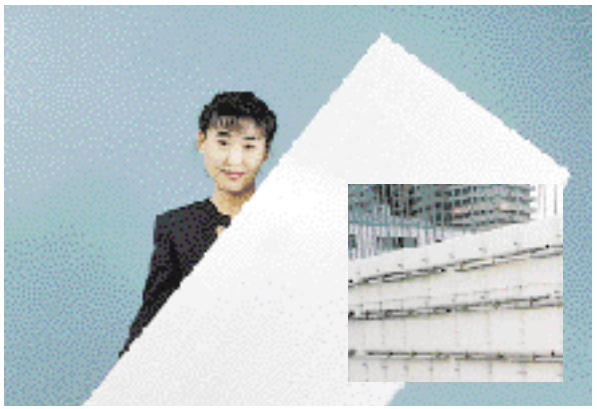
The residential heating system *Sumithermal LUNAKIT* was developed jointly with Kansai Electric Power Co., Inc.

[2] Marketed by the Company's subsidiary Sumika Plastech Co., Ltd.

# *Recycling*

**Sumitomo Chemical is contributing to expedite the transformation from an era of mass production and consumption to the new age of recycling through the development of suitable technologies and products.**


## Recycling-Related Products



*Katawork* polypropylene molding panels contribute to environmental protection.

■ ***Katawork*** **polypropylene panels**

A polypropylene panel for molding concrete that acts as a substitute for commonly used plywood from the South Sea Islands, *Katawork* is excellent for use in construction and extremely economical. *Katawork* is an environmentally sound product that can be recycled.

■ ***Sumitomo TPE*** **polyolefinic thermoplastic elastomer**

*Sumitomo TPE* polyolefinic thermoplastic elastomer, a polyolefinic speciality resin, is experiencing strong demand from such industries as automotive manufacturers for vehicle interior parts.

Demand is expected to expand in other areas, as this plastic is recyclable and easy to dispose of by incineration.

■ ***Klintate, Klinalpha***[3] **polyolefin agricultural films**

*Klintate* and *Klinalpha* are special polyolefin films for agricultural use. After use they can be used as fuel material or easily recycled to make resins.

■ ***Sumitomo Press Mold (SPM)*** **technology**

*SPM* technology, a skin material and core resin lamination molding system, is attracting attention in Japan and overseas because of its superior plastic recycling qualities.

*IGETABOND* is expected to facilitate the recycling of polyethylene terephthalate (PET) bottles.

■ **Plastic compatibilizer** ***IGETABOND***

*IGETABOND* has made a significant contribution to the manufacture of a wide range of polymer alloys. In addition, it is being promoted as a compatibilizer for the recycling of PET bottles and polyethylene bottle caps.

■ **Paint-removal technology**

Sumitomo Chemical has developed paint-removal technology that is considered a key process in the recycling of used car bumpers.

■ ***Sumipex Extra*** **MMA (methyl methacrylate) resin for large-scale blow and foam molding**

Sumitomo Chemical's technology has enabled MMA resin, known for its high transparency and weatherability, to be used for large-scale blow and foam molding. It is expected that *Sumipex Extra*'s range of applications will expand as a result of its recyclability.

■ ***Sumirez Resin*** **paper-strengthening finishing resin**

Paper recycling is increasing as paper pulp companies make efforts to reduce the use of forestry resources. *Sumirez Resin,* which increases the strength of recycled paper, has a wide range of applications.

[3] Marketed by Sumika Plastech Co., Ltd.

**The terms Sustainable Chemistry and Green Chemistry have become familiar throughout the world. These catchphrases refer to the chemical technologies that reduce or eliminate the output and use of chemical products or by-products that are harmful to the environment and human health.**

**Sumitomo Chemical has vigorously engaged in introducing sustainable chemistry into its operations. The Company has undertaken the development of energy-efficient and resource-saving processes to control $CO_2$ emissions and other materials that are alleged to cause global warming. At the same time, the Company is actively working to develop processes that can reduce burden on the environment and lessen environmental impact on air and water.**

## Sustainable Chemistry

Resorcinol manufacturing technology developed using Sumitomo Chemical's proprietary technology

### Low environmental impact process development

Sumitomo Chemical has succeeded in developing manufacturing processes that have a low environmental impact by eliminating the quantity of hazardous material produced. Such processes include a process for the direct oxidation of MMA monomer, which is the raw material for methacrylic resin; a hydroperoxide process for manufacturing resorcinol, which is used as an adhesive for rubber; and a non-mercury dyeing process using 1-aminoanthraquinone.

- **Direct oxidation process for MMA monomer, the raw material for methacrylic resin**
- **Hydroperoxide process for resorcinol, an adhesive for rubber**
- **1-aminoanthraquinone and nonmercury dyeing process**
- **Water-based solvent process for household insecticides**
- **Geometrical isomer control technology, asymmetrical polymer processes and plant growth regulators**

Developing a new process

### Reduction of $CO_2$ emissions through lower energy consumption

Sumitomo Chemical has developed many sophisticated manufacturing processes over the years. To count up a few, the Company has excellent processes for manufacturing isobutylene, gas-phase polypropylene, and gas-phase linear low-density polyethylene, all of which improve energy consumption and contribute to reduced $CO_2$ emissions. In addition, the Company has been working to develop a bioreactor that enables the replacement of traditional chemical reactions that require higher temperatures and higher pressures. Sumitomo Chemical has already yielded significant results by applying this process to the manufacture of active ingredients for household insecticides.

- **Gas-phase linear low-density polyethylene manufacturing facilities**
- **Isobutylene manufacturing facilities**
- **Gas-phase polypropylene manufacturing facilities**
- **Bioreactors**

## Professional Individuals

**Sumitomo Chemical promotes a variety of programs to improve employees' knowledge of environmental and safety matters. Our employees are encouraged to obtain professional qualifications regarding the environment and safety.**

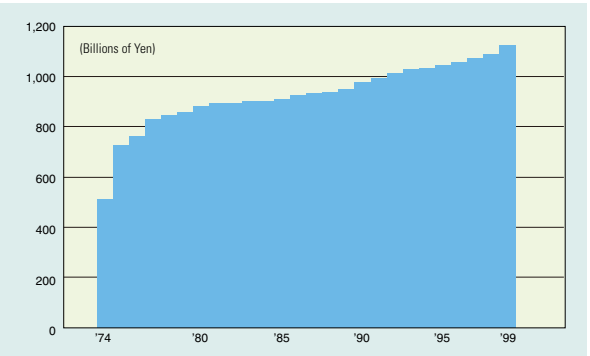
Number of Employees with Environmental and Safety-Related Qualifications

| | |
|---|---|
| National certification for plant operations | 9,756 |
| National certification relating to safety and hygiene | 2,723 |
| National certification for pollution prevention and waste treatment | 1,212 |
| ISO examiners and equivalents | 19 |

## Environmental Protection and Safety-Related Expenses and Investment

**Sumitomo Chemical has a long history of implementing environmental protection measures, including its commitment to "zero-accident and zero-injury operations" as well as "co-prosperity with society." From 1971 to 1999, the Company invested ¥111.3 billion in total for environmental and safety controls, 76% for environmental measures and 24% for safety control.**

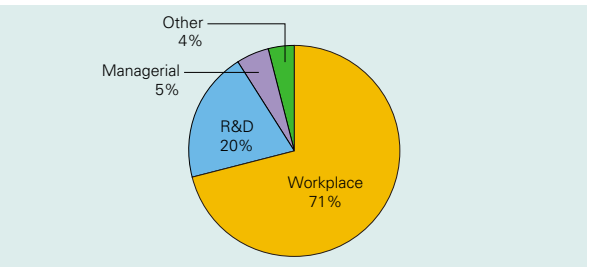
Accumulated Environmental Protection and Safety-Related Investment Since 1971




Note: Environmental protection and safety-related investment that formed part of the expenditures on streamlining, new plants, additions to existing plants or starting new businesses was not included.

**In 1999 alone, expenses incurred through environmental protection amounted to ¥12.0 billion.**

Expenses Related to Environmental Protection




## Occupational Health and Safety

**It is stipulated in Sumitomo Chemical's Responsible Care Activities Policy that the highest level of occupational health and safety measures shall be adopted in the Company. In fact, the Company has implemented such measures to realize zero-accident and zero-injury targets.**

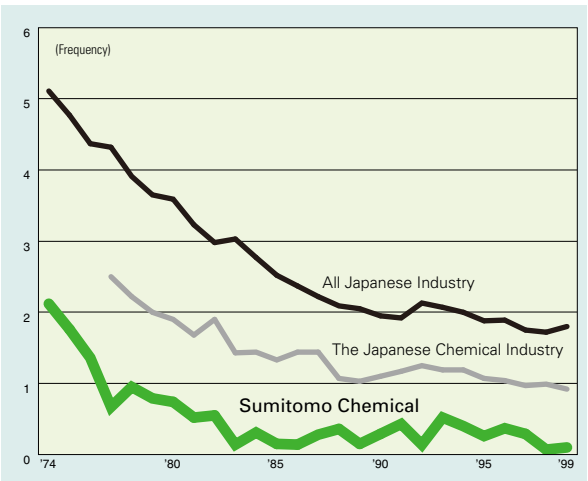
**The progress of RC activities implemented in the previous year is put forward in annual management plans. They are carefully monitored and evaluated during Responsible Care internal audits. In this way, Sumitomo Chemical continually strives to improve its standards of occupational health and safety.**

**Additionally, the Company is now preparing the Occupational Health, Safety and Management System (OHSMS) to comply with international standards.**

Aiming for zero-accident, zero-injury operations

In recognition of its efforts in the fields of labor safety and health control, Sumitomo Chemical has received a number of awards given by the Ministry of Labor.

## Annual Frequency of Injuries at Work



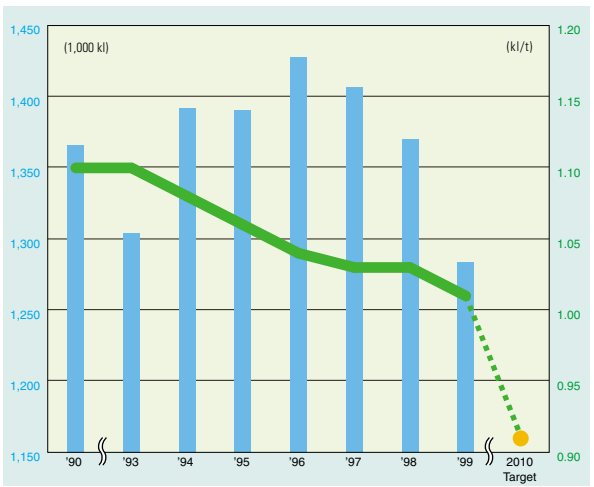

Note: Frequency rate = number of injured persons x 1,000,000/total working hours
(number of injured persons = number of persons absent from work for one day or more as a result of an accident)

# Energy Saving

**Sumitomo Chemical has long been committed to reducing its energy consumption. Since 1976, long before global warming became a major environmental issue, the Company has drafted an energy saving plan every three years and has worked hard to meet the challenging targets set forth within them. Currently, the Company aims to decrease unit energy consumption more than 1% on average every year to comply with energy conservation laws.**

**That said, it should be noted that Sumitomo Chemical emitted 3.5 million tons of $CO_2$ during fiscal 1999, 90% of which came from fossil fuel consumption (including purchased electricity and steam).**

## Energy Usage and Unit Energy Consumption




Energy usage (as crude oil)
Unit energy consumption (crude oil kl/ethelyne t)

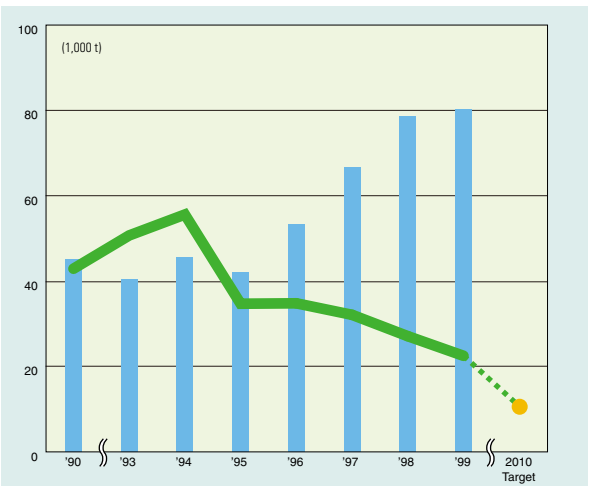
# Waste Disposal Management

**Sumitomo Chemical is also endeavoring to improve its performance in the areas of waste reduction and waste disposal. It has devoted its efforts to develop new products and processes that improve energy and resource consumption, reduce the output of waste materials and increase the recycling rate of resources.**

**The Company is particularly active in plastic recycling—developing recycling technologies, using the life cycle assessment process to improve product quality, and developing environment-friendly plastic process technologies.**

**The Company's goal for fiscal 2010 is a 75% reduction in the amount of landfill produced compared with the level in fiscal 1990. It is reported that the recycling rates in fiscal 1999 rose to a level 180% above those of fiscal 1990.**

## Recycling Rate and Amount of Landfill




Recycling rate = total amount of material recycled/total waste produced x 100
Amount of landfill (amount of internal factory and external factory buried waste)

# *Prevention of Air Pollution and Water Contamination*

**Sumitomo Chemical has been engaged in reducing emissions of $NO_x$ (nitrogen oxides) and $SO_x$ (sulphur oxides) and the level of COD (chemical oxygen demand) to prevent air pollution and water contamination.**

Wastewater treatment plant

Proprietary technology used for denitrification

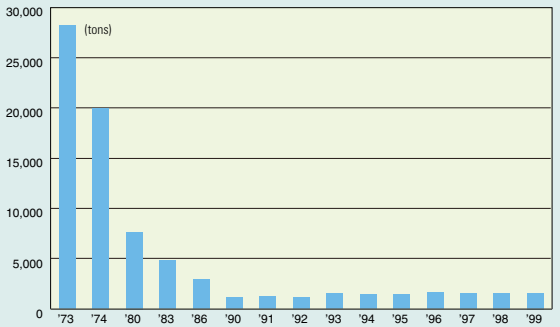
In the 1970s, Sumitomo Chemical developed highly effective technologies for reducing $NO_x$ and $SO_x$ emissions, processes which were adopted in its own plants and also licensed to other Japanese and foreign companies.

Sumitomo Chemical has also contributed to reducing vehicle emissions by developing lightweight materials for vehicles, such as high-performance plastics.

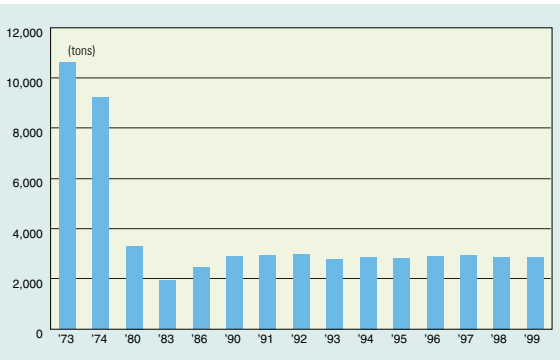
In addition, the Company is working to achieve further environmental protection through biotechnology. Through its participation in a government-sponsored project promoted by the New Energy and Industrial Technology Development Organization (NEDO), the Company has had notable success in exploiting the photosynthesis capabilities of aquatic plants as a method of $CO_2$ fixation.

Research into $CO_2$ fixation using aquatic plants

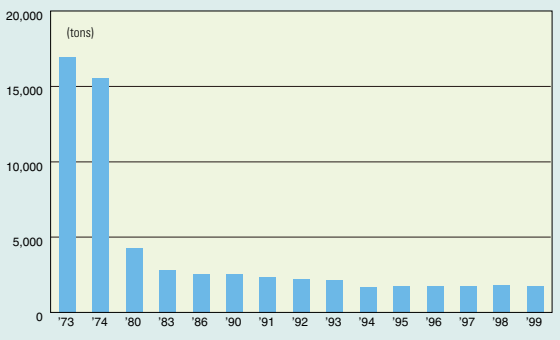
## $SO_x$ emissions




## $NO_x$ emissions




## COD



# *Voluntary Control under the PRTR System*

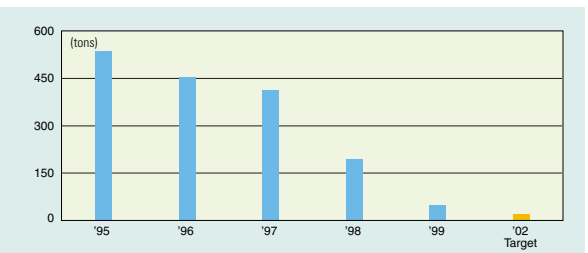
**In fiscal 1999, the Japan Chemical Industry Association (JCIA) conducted a survey of the emissions of 284 substances designated under the PRTR system. As a result of this survey, it was found that Sumitomo Chemical used 96 of these substances and produced a total annual emission volume of 1,738 tons, with airborne emissions accounting for 75.5% and waterborne emissions for 24.5% of the total. The amount of PRTR substances transported from the Company's production facilities was 1,015 tons.**

**The Japanese government has emphasized the need to reduce environmental pollutants and, in particular, has attached special importance to 22 substances. JCIA has targeted 12 of these for industrywide self-regulatory measures to reduce airborne emissions. Only nine of these are applicable to Sumitomo Chemical. The graphs show the emission of each substance in fiscal 1999. The Company's efforts in fiscal 1999 reduced the total emission of these substances to 305 tons. For fiscal 1999, the Company had set its sights on a 30% reduction of emissions compared with fiscal 1990, however as there are still several substances whose targets have not been reached, Sumitomo Chemical is redoubling its efforts to realize this goal.**

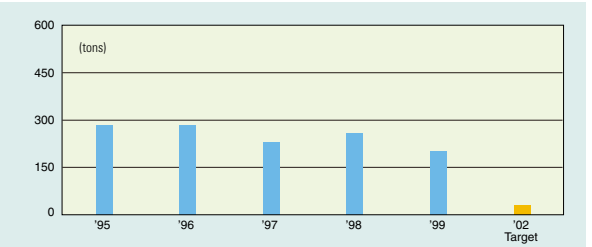
Notes: 1. Annual emission figures are based on PRTR records prepared in accordance with JCIA guidelines.

2. The method used in calculating the amount of emissions has been revised; therefore, this year's numerical values do not correspond exactly with those of previous years.

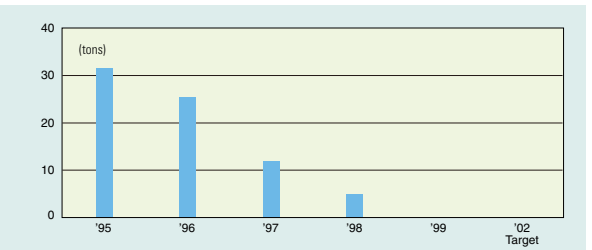
## 1,2-dichloroethane



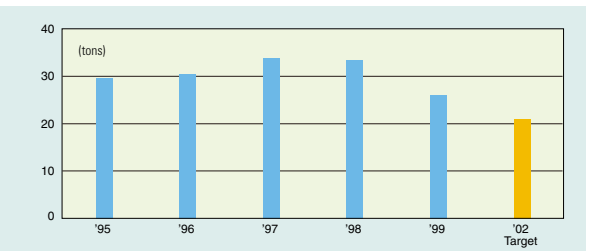

## Benzene



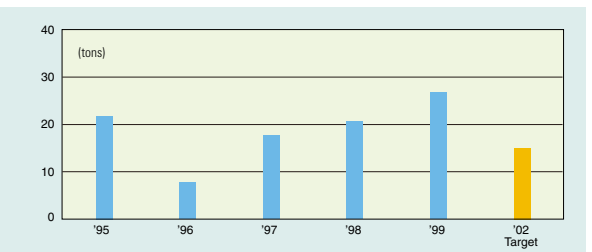

## Vinyl chloride monomer



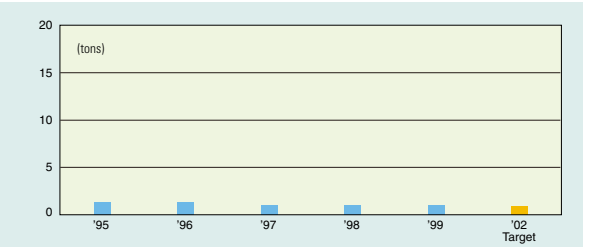

## Acrylonitrile



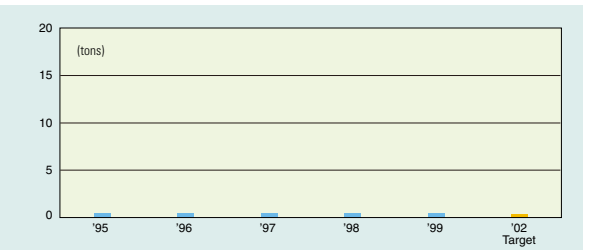

## Dichloromethane



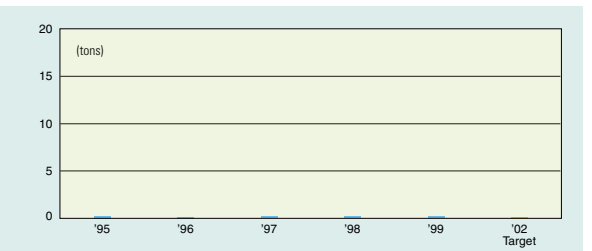

## Ethylene oxide



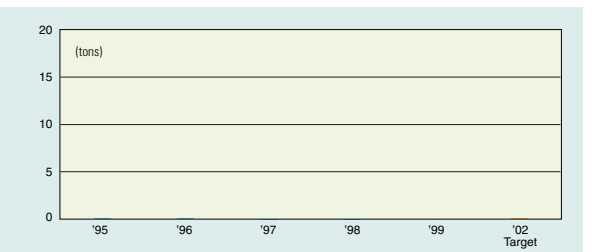

## 1,3-butadiene




## Formaldehyde




## Chloroform

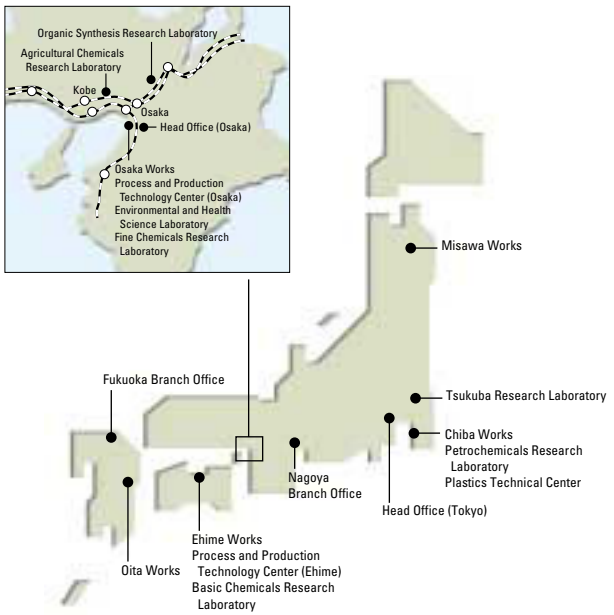


**Sumitomo Chemical makes every effort to preserve the safety of the environment in the neighboring communities around its works.**

**The Company has introduced numerous environmental protection measures. It also maintains efficient environmental monitoring systems and keeps chemical firefighting engines and other equipment in the event of an accident. Environmental protection measures are reviewed regularly to ensure that they fully comply with the latest local government regulations.**

**The Company's corporate objectives are to develop Sumitomo Chemical in tandem with the communities in which the Company operates. As corporate citizens, the Company will continue to promote and cooperate in local community activities.**


## ● Domestic Operations



**Sumitomo Chemical has expanded its business operations worldwide. While complying with the respective environmental standards applied in each country where it operates, the Company is determined to promote Responsible Care activities through its international operations.**

● **International Network**



Polypropylene manufacturing plant in the United States

Acrylic acid and MMA plant in Singapore

Sumitomo Chemical has contributed extensively to environmental protection through the application of its energy- and resource-saving technologies, such as its petrochemical complex operations in Singapore and polypropylene production in the United States.



Sumitomo Chemical's origins date back to 1913, to a copper mine in Besshi, Ehime Prefecture. Sulphuric acid gas generated while smelting the copper produced there was a major environmental problem at the time. To overcome the problem, a process was developed to manufacture calcium superphosphate by using the gas. Thus, Sumitomo Chemical started its business as a fertilizer producer. Since its beginning, Sumitomo Chemical has been conscious of quality, environmental and safety issues.

Business founded: September 22, 1913
Commenced business operations: October 4, 1915
Company incorporated: June 1, 1925
Capital: ¥84,748 million at March 31, 2000
Number of employees: 5,721 at March 31, 2000
Divisions: Basic Chemicals Sector
Petrochemicals & Plastics Sector
Fine Chemicals Sector
Agricultural Chemicals Sector

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レスポンシブル・ケア

**Responsible Care**

As a Responsible Care company, Sumitomo Chemical undertakes voluntary activities in the areas of safety, health and the environment from the development through the disposal of chemical substances. In Japan, the Responsible Care mark is used by companies that are members of the Japan Responsible Care Council.

This report has been printed using environment-friendly soybean oil ink.
Also, it has received the Ecomark for being printed on 100% recycled paper.

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