



**THE UBE GROUP**

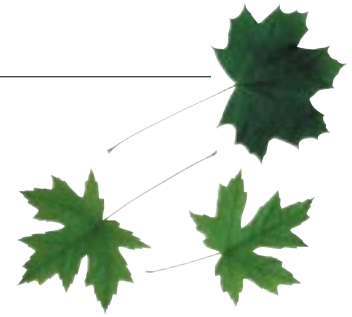
# **Working for the Environment, Safety and Health**

**(Responsible Care Report 2002)**

**UBE**  
UBE INDUSTRIES, LTD.

# Contents

Working for the  
Environment,  
Safety and Health  
(Responsible Care Report 2002)



Foreword	1
Company Profile	2
Responsible Care	3
Management System	4
Responsible Care Activities	
History	5
ISO Certifications and Other Approvals	6
Activity Report	7
Environmental Accounting	8
Environmental Preservation	
Environment Performance	10
Global Warming Countermeasures	11
Controlling Air Pollution	12
Controlling Water Pollution	13
Controlling Air Pollution	14
PRTR System	15
Industrial Waste Measures	16
Process Safety and Disaster Prevention	19
Occupational Safety and Health	20
Product Stewardship	21
Environment-Related Technologies and Products	22
Communication with the Community	25

## ● Scope of Report

- \* This report focuses primarily on activities in fiscal 2001 (April 1, 2001 to March 31, 2002). Some data include activities in fiscal 2002.
- \* The collected data cover Ube Industries and its 12 main subsidiaries:  
Ube Film, Ltd., Meiwa Kasei Industries, Ltd., Ube Ammonia Industry, Ltd.,  
Ube Agri-Materials, Ltd., Ems-Ube Ltd., Kemira-Ube, Ltd., Ube Cycon, Ltd. (now UMG ABS, Ltd.),  
Ube Material Industries, Ltd., Ube Board Co., Ltd., Ube Machinery Co., Ltd., Ube Steel Co., Ltd.,  
U-Mold Co., Ltd.
- \* This report covers only factories and subsidiaries located in Japan.

# Foreword

---

This report outlines the UBE Group's approaches to the environment, safety and health in fiscal 2001. The 21st century is often called the "Century of the Environment," and the Global Summit was held in Johannesburg in September this year in order to realize a sustainable society.

Under the philosophy that acting positively to improve the ecology and living conditions of our communities and to preserve the global environment is a social responsibility of companies, the UBE Group has evolved an extensive series of Responsible Care activities that covers the acquisition of raw materials up to the development of products, and includes the handling of chemical substances, the physical distribution and safety of products when used by customers and consideration for the matter of waste disposal, as well as direct environmental, safety and health issues that arise at our plants and factories in the course of production activities.

What is required today is the creation of new mindsets and new systems such as approaches to global environmental preservation, participation in creating a recycling-conscious society, the proper management of chemical substances, and how to establish communication with local communities, in addition to individual activities in daily business operations to reduce the burden on the environment.

From this perspective, the UBE Group last year selected "environment-focused management" as one of the management tasks under our mid-term "New 21: UBE Plan" business operations strategies, and is carrying out Responsible Care activities for all of the group's business fields. These include the manufacturing operations for such segments as chemicals and plastics, construction materials such as cement, machinery and metal products, as well as the energy and environmental business.

In particular, a special focus has placed on measures that promote the safe management of chemical substances (including responses to the Chemical Substance Management Promotion Law (the so called Pollutant Release and Transfer Register, or PRTR law) that requires filing reports (registration) with the government starting from this fiscal year), the effective utilization of resources centered on cement factories, and measures to deal with the issue of global warming through such efforts as energy savings.

We hope that this report will contribute to a better understanding of the activities of the UBE Group in addressing issues related to the environment, safety and health, and would welcome your comments and views in order to further enhance our efforts in these areas.



Ube Industries, Ltd.  
President (Group CEO)

**Kazumasa Tsunemi**

# Company Profile (as of March 31, 2002)

- \* **Founded: June 1897**
- \* **Consolidated: March 1942**
- \* **Capital: ¥43.5 billion**
- \* **Number of Employees: 3,706 (Non-consolidated); 11,983 (Consolidated)**

## \* Business Areas

### < Chemicals and Plastics Segment >

The manufacture and sale of fine chemicals, pharmaceuticals, caprolactam, nylon, industrial chemicals, specialty products, polyolefins, synthetic rubber, fertilizers.

### < Construction Materials Segment >

The manufacture and sale of cement, solidification agents, civil engineering and foundation materials, buildings materials, and magnesium.

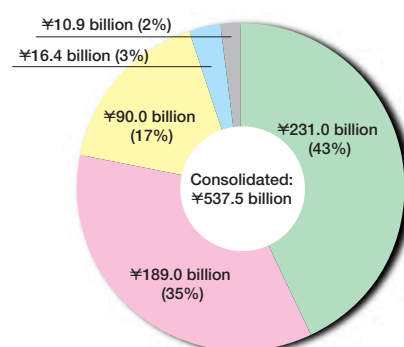
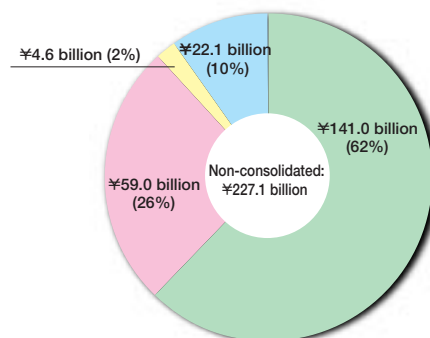
### < Machinery and Metal Products Segment >

The manufacture and sale of die-casting machines, injection molding machines, extrusion presses, crushing machines, pulverizing machines, cranes, conveyors, bridges, steel structures, and aluminum wheels.

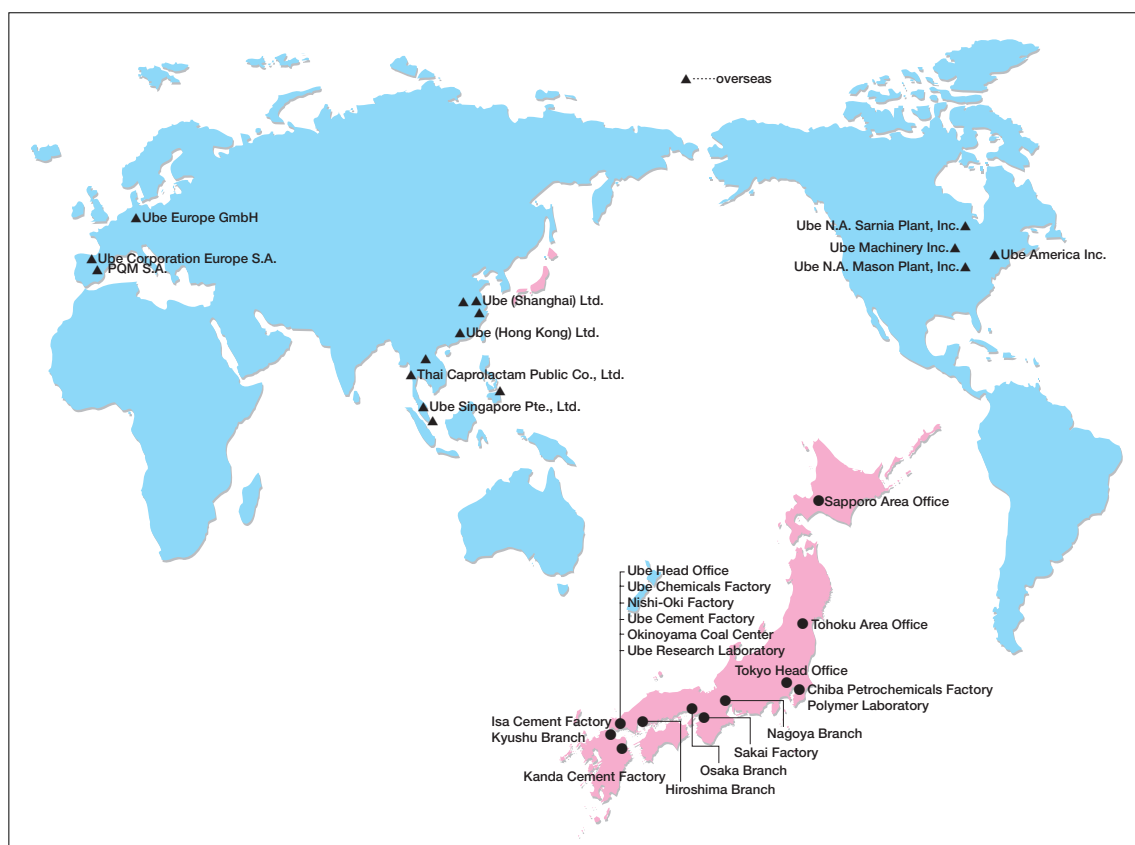
### < Energy and the Environment Segment >

The purchase, sale, storage, transportation and distribution of imported steaming coal, electrical power generation (for internal use and wholesale distribution), environmental recycling operations and the sale of related equipment

## \* Sales by Segment (Non-consolidated/Consolidated)



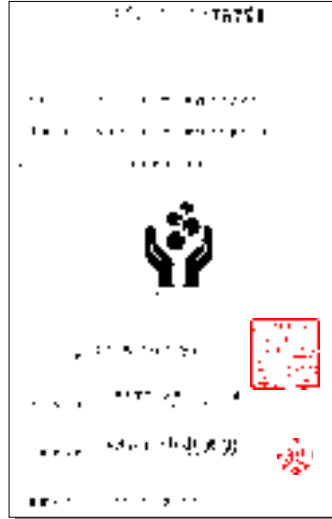
- Chemicals and Plastics
- Construction Materials
- Machinery and Metal Products
- Energy and the Environment
- Other



# Responsible Care

## ■ UBE's Responsible Care

In pursuing its vision of Responsible Care (RC), Ube Industries has been developing and promoting RC activities in all its business segments. These efforts are part and parcel of UBE's strategies in its Construction Materials, Machinery and Metal Products, Energy and the Environment and Chemicals and Plastics segments.



Responsible Care

## What is Responsible Care?

Responsible Care is a set of voluntary initiative based on the principles of autonomous decision-making and self-responsibility. Under RC, corporations that manufacture and/or handle chemical substances are working voluntarily to preserve health, safety and the environment in every process, from the development of chemicals through their manufacture, distribution, use, and final consumption and disposal. This includes maintaining ongoing dialogues and discussions with the public by openly disclosing the results of these efforts.

## ■ UBE's Environmental and Safety Principles

In 1992 UBE instituted its Environmental and Safety Principles that defines the fundamental approach to the environment, safety and health. Under this vision, UBE is promoting various RC measures.

As members of society, corporations must be fully conscious of their own responsibilities regarding their contributions to society, environmental preservation and the maintenance of health and safety in performing their corporate activities.

As the core company in managing a number of non-consolidated business segments, UBE shall pursue the following vision in order to perform its leadership role, and shall work to improve the quality of the environment and safety among all of its group companies.

### ● Safety Management

Ensuring safety shall be the priority in all areas and activities under UBE's commitment to respect human life.

### ● Environmental Preservation

As a responsible corporate citizen, UBE shall act positively to protect and improve both community and regional conditions and to work for the preservation of the global environment.

### ● Product Safety

The UBE Group shall pursue its corporate responsibility in providing its customers and the public with safe and reliable products.

### ● Health Management

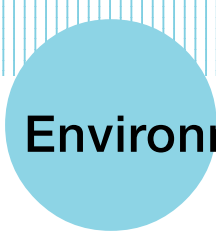
UBE recognizes that maintaining and promoting the health of its employees is the basis of corporate and social vitality.

Instituted: April 1992

Revised: April 1996

Revised: July 1999

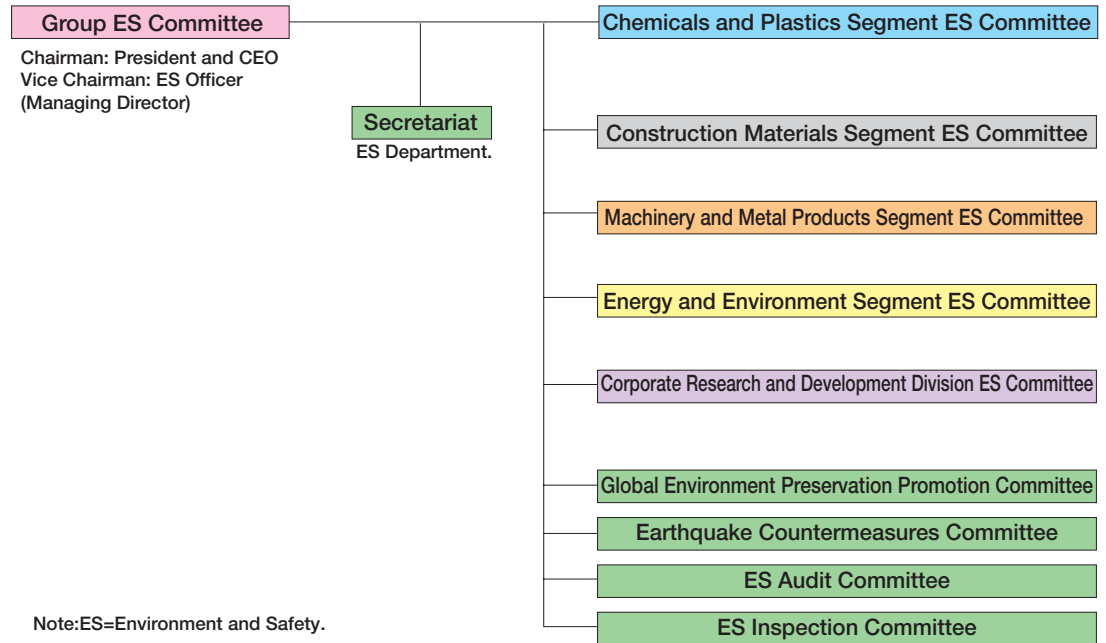
President



# Environment and Safety Management System

## Environment and Safety Management System

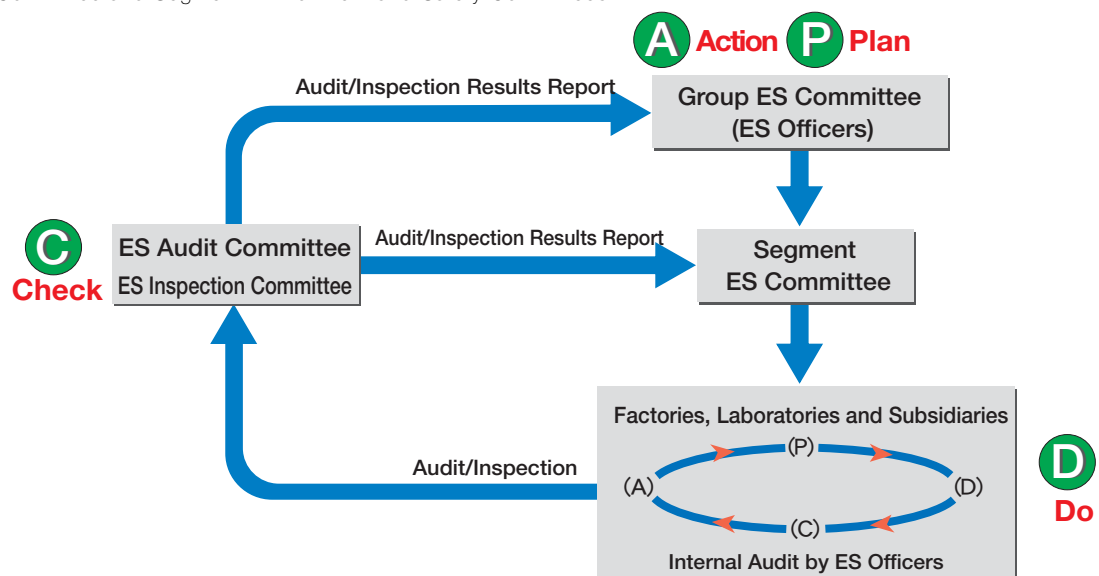
The UBE Group established its Group Environment and Safety Committee, which consists of senior management and is chaired by the president (also the CEO of the group), as the highest decision-making entity with respect to the four areas of Safety Management, Environmental Preservation, Product Safety and Health Management that are mentioned in the Environmental and Safety Principles. This committee examines and determines the policies and implementation plans for the group as a whole. Under the Group Environment and Safety Committee, individual Environment and Safety Committees were established for the five business segments including the Corporate Research and Development Division as shown in the following organizational chart. Each committee deals with environment and safety measures that relate to the business operations of each segment in accordance with the policies and plans determined by the Group Environment and Safety Committee. Furthermore, four separate committees (promoting global environment preservation, earthquake countermeasures, audits and inspections) are engaged in examining specific activity plans, carrying out deliberations, reporting and reviewing all audits and inspection results.



Note:ES=Environment and Safety.

## Responsible Care Management System

The UBE Group is promoting a management system based on the PDCA (Plan, Do, Check and Action) cycle in order to continue improvements with respect to three vital areas: the environment, safety and health. Specifically, Segment Environment and Safety Committees formulate specific plans in conformity with the policies determined by the Group Environment and Safety Committee, and each office implements measures based on these plans. Moreover, environment and safety audits and environment and safety inspections are carried out once a year for all offices and group companies. On the basis of these audits and inspections, corrective measures are required for applicable offices, and the results of these audits and inspections are reported to the Group Environment and Safety Committee and Segment Environment and Safety Committees.



# Responsible Care Activities

## History

	Organization & Environmental Activities	Environment-Related Products and Technology	Domestic and World Trends
1949	○ Starting Ube System		
1951	○ Established Dust Countermeasures Committee in Ube city		
1971	● Established environment management section in each factory		● Established Environment Agency
1973	● Established Environment Management Department in head office (now the ES Department) ● Established Energy Savings Committee		● Special Environment Preservation Law for Seto Inland Sea
1992	● Instituted the UBE ES Principles		● UN Conference on the Environment and Development
1993			● Established Basic Environment Law
1994	● Start of environment-related business ● 1st ES Audit		● United Nations Framework Convention on Climate Change took effect
1995	● Joined the Japan Responsible Care Council (JRCC). Determined UBE's Voluntary ES Plan	● Completion of demonstration plant for in-situ vitrification ● Completion of demonstration plant for the manufacture of RDF from waste plastics	● Established JRCC ● Established Container and Packaging Recycling Law
1996	● Revised the UBE ES Principles ● Formed Environment and Engineering Division	● Completion of sludge puffing demonstration plant that is now treating sludge in Ube city	
1997	○ Ube city was awarded the UNEP Global 500 Prize ● 1st RC Report issued ● 1st RC regional meetings held in Chiba, Sakai-Senboku and Yamaguchi	● Completion of demonstration plant for SWM production	● Convention on Climate Change (COP3) held
1998	● Established Resource Energy Measures Study Committee		● Established Law Concerning Promotion Measures to cope with Global Warming
1999	● Isa Cement Factory receives ISO-14001 certificate; subsequently, all plants receive ISO-14001 certification ● 2nd RC regional meeting held in Chiba	● Hand-over of RDF manufacturing plant to Mine city ● Completion of EUP demonstration plant ● Finished test operations of press and roll packing plant	● Established PRTR Law ● Established Law Concerning Special Measures Against Dioxins ● Guidelines of Environment Accounting was opened
2000	● Introduced environment accounting system ● Started 2010 Environment Preservation Project ● 2nd RC regional meetings held in Sakai-Senboku and Yamaguchi	● Start of commercial EUP operations	● Enactment of the Basic Law to Promote the Formation of a Recycling-Conscious Society
2001	● Formed Global Warming Prevention Promotion Committee ● 3rd RC regional meeting held in Chiba	● Facilities completed at Yamaguchi Eco-Tech to produce raw materials from ash generated from refuse incineration	
2002	● 3rd RC regional meetings held in Sakai-Senboku and Yamaguchi		● Ratification of Kyoto Protocol ● Established Soil Pollution Prevention Law

### UBE System:

This is the common name for a system that was independently established by Ube city as a measure to prevent environmental pollution, whereby the public, academic specialists, administrative agencies and companies have cooperated in carrying out voluntary activities on the basis of information disclosure. While the Ube System already has a history of more than 50 years, new viewpoints are still being incorporated in addressing environmental and safety issues.

## ■ ISO Certifications and Other Approvals

The UBE Group has worked to acquire ISO14001 and ISO9000s certifications, which represent the international standards for environmental management and quality assurance management systems. In addition, UBE has also voluntarily acquired self-inspection certifications for high-pressure gas and boiler installations.

### ● ISO14001 (Environmental Management System) Certification

	UBE	Group Companies
1998		<ul style="list-style-type: none"> <li>● Fukushima Ltd. (February)</li> <li>● Seibu Petroleum Co., Ltd. (December)</li> </ul>
1999	<ul style="list-style-type: none"> <li>● Isa Cement Factory (January)</li> <li>● Ube Cement Factory (August)</li> <li>● Kanda Cement Factory (August)</li> <li>● Chiba Petrochemicals Factory (July)</li> <li>● Machinery and Engineering Works (November)</li> <li>● Polymer Laboratories (Chiba, Ube) (December)</li> <li>● Ube Research Laboratory (December)</li> </ul>	<ul style="list-style-type: none"> <li>● Ube-Mitsubishi Cement Research Institute Corporation, Ube Center (September)</li> <li>● UBE Scientific Analysis Center (December)</li> </ul>
2000	<ul style="list-style-type: none"> <li>● Sakai Factory (February)</li> <li>● Ube Chemicals Factory (March)</li> <li>● Coal Center (March)</li> <li>● Power Division (March)</li> </ul>	<ul style="list-style-type: none"> <li>● Ube Cycon Ltd. (now UMG ABS Ltd.) (June)</li> <li>● Supermix Concrete(Singapore)(September)</li> <li>● U-Mold (December)</li> <li>● Ryukyu Cement Co.,Ltd Yabe (December)</li> <li>● Thai Synthetic Rubber (Thailand) (December)</li> </ul>
2001	<ul style="list-style-type: none"> <li>● Environment Business Division (March)</li> <li>● Nishi-Oki Factory (August)</li> </ul>	<ul style="list-style-type: none"> <li>● Ube Ammonia Industry Ltd. (March)</li> <li>● Thai Caprolactam Public Co. Ltd. (October)</li> </ul>
2002		<ul style="list-style-type: none"> <li>● Meiwa Kasei Industries, Ltd. (April)</li> </ul>

### ● ISO9000s (Quality Management System) Certification

	UBE	Group Companies
1992		<ul style="list-style-type: none"> <li>● Ube Cycon Ltd. (now UMG ABS Ltd.) (May)</li> </ul>
1994	<ul style="list-style-type: none"> <li>● Ube Chemicals Factory (February)</li> <li>● Chiba Petrochemicals Factory (February)</li> </ul>	<ul style="list-style-type: none"> <li>● Supermix Concrete (Singapore) (September)</li> </ul>
1995	<ul style="list-style-type: none"> <li>● Isa Cement Factory (August)</li> </ul>	
1996	<ul style="list-style-type: none"> <li>● Machinery and Engineering Works (July)</li> <li>● Kanda Cement Factory (August)</li> <li>● Sakai Factory (October)</li> </ul>	
1997	<ul style="list-style-type: none"> <li>● Ube Cement Factory (July)</li> </ul>	<ul style="list-style-type: none"> <li>● Ube-Nitto Kasei Co., Ltd. Gifu (March)</li> <li>● Fukushima, Ltd. (March)</li> </ul>
1998		<ul style="list-style-type: none"> <li>● U-Mold Co. Ltd. (July)</li> <li>● Nanging Ube Magnesium Co. Ltd. (PROC) (December)</li> </ul>
1999		<ul style="list-style-type: none"> <li>● Ube Information Systems Inc. (January)</li> <li>● Ube-Nitto Kasei Co., Ltd. Fukushima (March)</li> <li>● Meiwa Kasei Industries, Ltd. (June)</li> <li>● Ryukyu Cement Co.,Ltd Yabe (December)</li> <li>● Ube Steel Co., Ltd. (December)</li> </ul>
2000	<ul style="list-style-type: none"> <li>● Nishi-Oki Factory (February)</li> </ul>	<ul style="list-style-type: none"> <li>● Ube Electronics, Ltd. (June)</li> </ul>
2001		<ul style="list-style-type: none"> <li>● Ube Industries Consulting, Ltd. (March)</li> </ul>
2002		<ul style="list-style-type: none"> <li>● Hagimori Industries, Ltd. (March)</li> <li>● Shin Kasado Dockyard Co., Ltd. (March)</li> <li>● Ube Shipping and Logistics Ltd. (March)</li> </ul>

※ Though some factories have received several certificates, only the date of the first certification is specified

### ● Acquisition of Certification for Workers Engaged in High-Pressure Gas Safety and Completion Inspection

Contents	Certified Plants	Certified Date
Certification of workers engaged in high-pressure gas safety and completion inspection (High-Pressure Gas Safety Law)	<ul style="list-style-type: none"> <li>● Sakai Factory</li> <li>● Nishi-Oki Factory</li> </ul>	<ul style="list-style-type: none"> <li>February 1999</li> <li>June 2001</li> </ul>
Certification for inspections when boilers and Class-1 pressure vessels are operated(Industrial Safety and Health Law)	<ul style="list-style-type: none"> <li>● Nishi-Oki Factory</li> <li>● Chiba Petrochemicals Factory</li> <li>● Sakai Factory</li> </ul>	<ul style="list-style-type: none"> <li>July 1997</li> <li>November 1997</li> <li>June 1998</li> </ul>



# Activity Report

In order to put into practice its philosophy of Responsible Care and Environmental and Safety Principles, the UBE Group undertakes environmental and safety measures on a group-wide basis by comprehensively reviewing all pertinent activities for each fiscal year and determining the basic mid-term policies for the next and subsequent fiscal years, as well as priority themes to be commonly addressed by all companies in the group for the following fiscal year at the Group Environment and Safety Committee that is held at the beginning of the year. In addition, each office implements the common themes and environmental and safety measures that are appropriate for the respective business operations and the area in which the office is located.

## ◆ Mid-term policies

### **Environmental Protection: Actually Implementing Environment-Focused Management**

By selecting environmental measures as one of the key management issues, the UBE Group undertakes specific activities that address global environmental issues, themes related to a recycling-conscious society, and measures for chemical substances. The group also fosters communication with the general public.

### **Safety and Health: Working to Improve the Safety Culture**

The UBE Group makes every effort to ensure safety and health by establishing a culture focused on safety that befits a new era.

## ◆ Common priority items for implementation by all companies in the group in fiscal 2001

### **Environmental Protection**

- Fully implementing PRTR and enhancing safety measures for chemical substances
- Responding to global environmental issues
- Reducing waste and re-evaluating recycling

### **Safety and Health**

- Reinforcing the safety management structure for production lines and thoroughly implementing activities aimed at eliminating industrial accidents
- Establishing an occupational health management system

### **Safety and Disaster Prevention**

- Promoting safety management in plants and facilities
- Enhancing training programs for emergencies

### **Product Safety**

- Promoting safety evaluations of chemical substances
- Reinforcing safety controls regarding the physical distribution of dangerous substances

## ◆ Examples of our specific activities

### 1) Global Environmental Issues, Energy Savings (Page 11)

- The UBE Group is committed to reducing CO<sub>2</sub> emissions and established a Global Environment Preservation Promotion Committee in April 2001 in order to implement and provide follow-up measures for the Mid- and Long-Term CO<sub>2</sub> Reduction Strategy, which was determined in fiscal 2000 by a project team under the president's direct supervision.

### 2) Industrial Waste Measures (Pages 16, 17 and 18)

- The zero-emissions campaign has taken firm root in three cement factories, and the rate of recycling has reached 100 percent.
- The UBE Group continues to promote the effective utilization of waste through linkages among all segments such as Chemicals and Plastics, Construction Materials (cement), Machinery and Metal Products, and Energy and the Environment, and by taking in various types of industrial and household waste from outside the group.
- The UBE Group developed the technology of the 2-stage pressurized gasification process for organic residues, discarded plastics and shredder waste, which is also called the Ebara-Ube Process (EUP), and expanded its capabilities after conducting tests to verify its effectiveness.

### 3) Reduction of Hazardous Substance Emissions, Promotion of PRTR (Pages 14 and 15)

- The UBE Group continues to reduce the emissions of benzene, butadiene, and chloride compounds such as chloroform. We reduced 28% of emissions of the applicable 6 substances.
- We are also diligently carrying out PRTR procedures and will require all group companies to thoroughly implement the PRTR protocol.

### 4) ISO14001 and ISO9000s Certifications (Page 6)

- While all offices have already acquired ISO certifications, we will encourage group companies to acquire appropriate ISO certifications in the future.

### 5) Risk Assessments (Safety Evaluation)

- We improved the standard of process safety assessment and implemented the assessment of the new installation and improvement of facilities.
- We have introduced risk assessment for the unit work and equipment proper and utilized to occupational safety prevention, and is also promoting it to the group companies.
- We are preparing to introduce the Occupational Health and Safety Management System (OHSMS), and will start operation of the OHSMS in fiscal 2002 and 2003.

### 6) Safety Management of Chemical Substance and Participation in International Projects

- UBE participates in the HPV-Initiative, a program that focuses on safety assessments of high production volume (HPV) chemical substances, which was launched by the International Council of Chemical Associations (ICCA). The assessment of 8 chemical substances related to UBE is now in progress. The company also participates in a project called the Long-Range Research Initiative (LRI), which is a plan for long-term basic research on the safety of chemical substances.

### 7) Implementation of Inspections and Audits

- The progress of various measures is monitored through the inspection of 17 business locales (9 business offices, 1 department, and 7 group companies) by senior management, and an audit of 14 business sites (7 business offices, 2 departments, and 5 group companies) by head-office staff members.

# Environmental Accounting

The UBE Group introduced environmental accounting in fiscal 1999 as a tool to quantitatively grasp and evaluate environmental protection costs and the effects of such costs on business activities in order to continuously promote more efficient environmental protection measures. Environmental accounting is effective only after it is incorporated into a company's environmental management, is allowed to function as a decision-making tool, and is given the capacity to disclose accurate information on the results of environmental protection activities. The UBE Group will continue to carry out various measures aimed at establishing more effective environmental accounting.

## ◆ Calculation Methods

### 1) Subject, Scope and Period

Calculations are based on the costs and the effects of activities mainly aimed at environmental protection. The analysis covers Ube Industries (including some of the group companies that are managed jointly with the company's business offices) and 12 major consolidated companies. The period is the 2001 fiscal year (from April 1, 2001 to March 31, 2002). All intra-group transactions are offset internally.

### 2) Environmental Protection Costs

The categories used in the calculation are in conformity with the 2000 report entitled "Establishing Environmental Accounting Systems" issued by the Environment Agency (currently the Ministry of the Environment). The amount of capital investment reflects investments made in fiscal 2001, and costs cover maintenance and management expenses (including depreciation) related to facilities used for environmental measures as well as personnel cost and other costs related to these measures. In case any portions of the data are uncertain, calculations are carried out according to designated standards (proportional allocation, etc.)

### 3) Environmental Preservation Effect

The effect of environmental protection measures generated through the maintenance and management of existing facilities and through newly taken measures in fiscal 2001 is expressed in the form of total emission volumes or emission levels (t and kl) and the year-on-year changes in total emission volumes (improvement or deterioration).

### 4) Economic Effect

The economic effect reflects what was achieved from environmental protection activities in fiscal 2001. As only the effects that can be reasonably calculated are covered, costs based on assumptions such as the avoidance of environmental damage are not covered. The net income effect comes from actual cash income gained by the sale of valuable resources and waste trading. The savings effect is the amount of money saved in terms of fuel and waste disposal costs.

## ◆ Results

### 1) Environmental Preservation Costs (Table 1)

Capital investment was ¥1.99 billion, a decline of ¥100 million from the previous year. The main causes for the decline are a reduction in the costs for air pollution control measures (dust, hazardous substances, etc.) and research and development costs (related to waste recycling), and an increase in resource circulation costs (related to waste recycling).

The costs totaled ¥8.79 billion, a decline of ¥550 million from the previous year. The main causes for the decrease are a reduction in repair costs and personnel costs related to research and development, and an increase in resource circulation costs.

### 2) Environmental Preservation Effect (Table 2)

The amount of SO<sub>x</sub> emissions was reduced by 8% through adjustments in operating methods and timing, but the amount of NO<sub>x</sub> emissions increased by 2%. Other indices such as emissions of COD and hazardous substances are either flattening out or declining as the plans. Energy consumption and the volume of CO<sub>2</sub> emissions have been cut in accordance with specific reduction measures toward the goal set by the fiscal 2010 plan.

### 3) Economic Effect (Table 3)

With respect to the economic effects, the net income gained from the sale of valuable resources to companies outside the group and other activities totaled ¥2.69 billion. The effect of savings generated by promoting energy conservation and other measures was ¥3.76 billion.

**Table 1: Environmental Protection Costs**(Unit: a hundred million ¥) (%)

Category	Investment	Cost
Cost by business area	17.1 (86)	67.3 (77)
Pollution prevention	6.8 (34)	48.3 (55)
Air quality	3.3	31.2
Water quality	2.0	14.6
Odor control	1.1	0.4
Other	0.4	2.1
Global environment preservation	1.5 (8)	1.6 (2)
Resource recycling	8.8 (44)	17.4 (20)
Waste processing	0.6	3.0
Waste recycling	7.9	8.0
Waste disposal	0.3	4.1
Effective use of resources	—	1.8
Other	0.0	0.5
Costs for upstream and downstream production processes	— (0)	5.2 (6)
Product and packaging recycling	—	4.5
Other	—	0.7
Costs of management activities	— (0)	5.0 (6)
Load monitoring and measuring	—	2.7
Other	—	2.3
Research and development costs	2.7 (13)	5.1 (6)
Costs of social activities	0.1 (1)	2.1 (2)
Costs of cleaning up environmental damage	— (0)	3.2 (3)
Total	19.9 (100)	87.9 (100)

● **Reference**

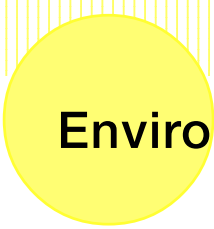
Investment during the period = ¥26.7 billion  
Ratio of environmental investment = 7.4%  
R&D investment during the period = ¥12 billion  
R&D-related ratio = 4.2%

**Table 2: Environmental Preservation Effect**

Indicators	Unit	Emission Volume			Reference
		2001(A)	2000(B)	Change(A-B)	
Energy Consumption	1,000kl	1,962	2,035	- 73	See page 11
CO <sub>2</sub> Emissions	1,000t-c	1,711	1,777	- 66	See Page 11
SO <sub>x</sub> Emissions	Tons	2,879	3,125	- 246	See Page 12
NO <sub>x</sub> Emission		21,013	20,521	+492	See Page 12
Dust Emission		484	491	- 7	See Page 12
Water Usage		107,567,000	—	—	See Page 10
COD Emission		1,162	1,268	- 106	See Page 13
Total nitrogen		1,569	—	—	See Page 13
Total phosphorus		42	—	—	See Page 13
Benzene		136	148	- 12	See Page 14
1,3-Butadiene		73.0	90.5	- 17.5	See Page 14
1,2-Dichloroethane		6	62	- 56	See Page 14
Chloroform		1.1	2.0	- 0.9	See Page 14
Dichloromethane		0.4	0	+ 0.4	See Page 14
Acrylonitrile		0.18	0.16	+ 0.02	See Page 14
Final Disposal Volume		23,524	33,195	- 9,671	See Page 18
Recycled Waste Volume		281,359	273,827	+7,532	See Page 18

**Table 3: Economic Effects** (Unit: a hundred million ¥)

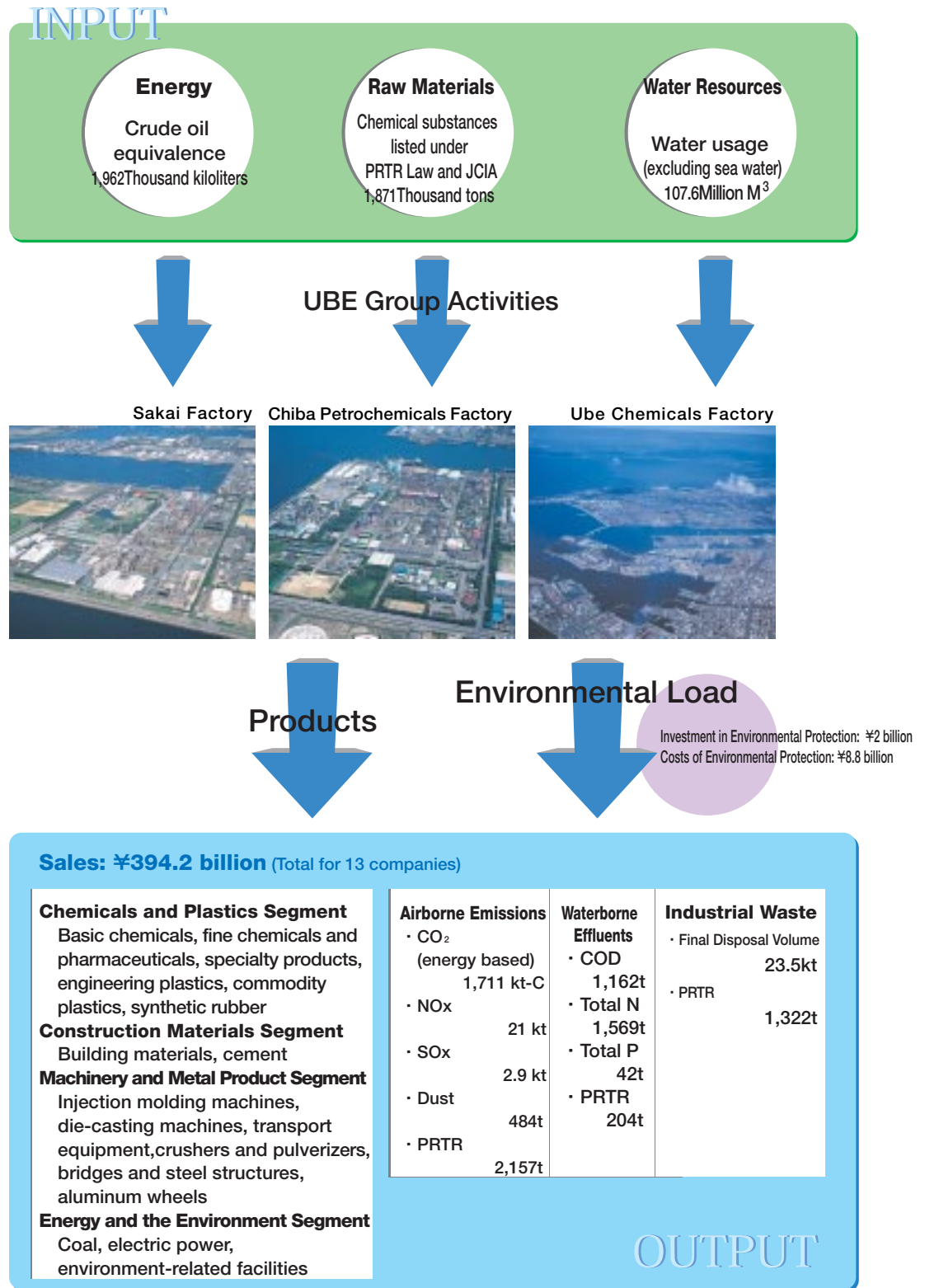
Income Effect	Savings Effect	Total
26.9	37.6	64.5



# Environmental Preservation

The UBE Group is extensively evolving business operations that include the manufacturing of chemicals and plastics, construction materials, machinery and metal products as well as operations in the energy and environmental fields. We position the resource and environment issues that constitute the global tasks of the 21st century as one of our leading goals by recognizing and accepting the fact that our manufacturing activities exert a major impact on the environment, and are promoting measures to reduce the environmental load at our manufacturing sites and to support the creation of a recycling-conscious society. Our efforts also aim at making contributions to society through manufacturing environment-friendly products and developing technologies to reduce the environmental load.

## Environment Performance



(PRTR: UBE data only)

## Global Warming Countermeasures

In June 2002, Japan ratified the Kyoto Protocol. Accordingly, if this protocol comes into effect, Japan will have an obligation to reduce gases that have a warming effect by 6% as compared to fiscal 1990 in the average emission volumes between 2008 and 2012.

The UBE Group formulated a mid- and long-term "Global Warming Prevention Strategy (Environmental Preservation 2010)" in fiscal 2000 that pursues a more than 6% reduction in CO<sub>2</sub> emissions by fiscal 2010 under a project directly managed by the president, and established its Group Global Environment Preservation Promotion Committee in April 2001 to implement and provide follow-up for this goal. The reduction measures based on this framework are part of the UBE Group's ongoing operations.

In fiscal 2001, measures to reduce the volume of CO<sub>2</sub> emissions by more than 20,000 t-C were implemented through improving the thermal efficiency of processes, shifting to highly efficient equipment and diversifying fuel sources. In pursuit of improving the energy efficiency by more than 1% every fiscal year, we will continue to undertake various measures to reduce energy consumption in order to clear the targets (see the following table) set for each industry under the voluntary action plan of the Nippon Keidanren (Japan Business Federation).

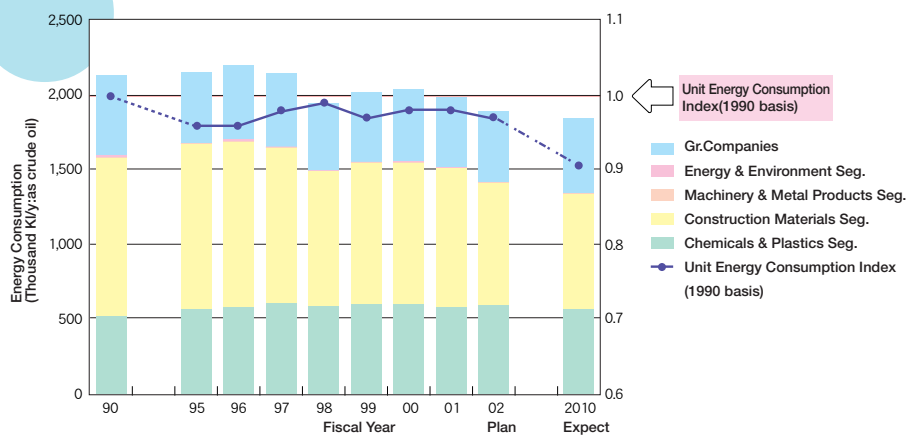
### Segment Objectives

**Chemicals and Plastics Segment: 10% reduction in Unit Energy Consumption by 2010 (1990 basis)**

**Construction Materials Segment: 3% reduction in Unit Energy Consumption by 2010 (1990 basis)**

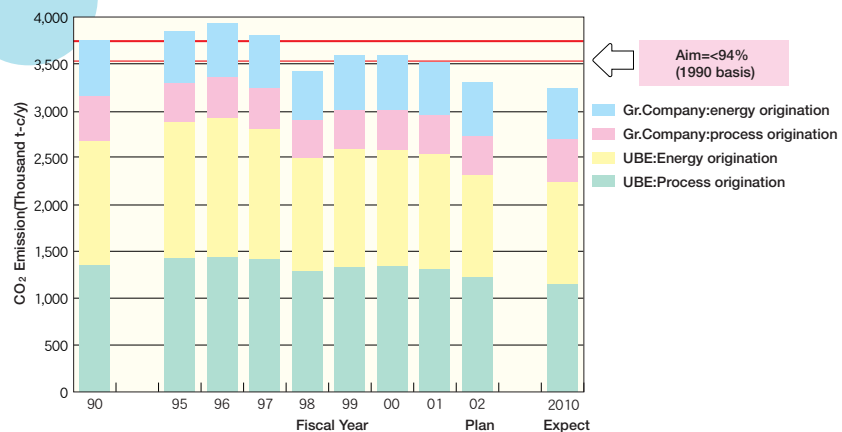
**Machinery and Metal Products Segment: 1% per year reduction in Unit Energy Consumption by 2010 (1997 basis)**

### Energy Consumption and Unit Energy Consumption Index



- Absolute and indexed energy consumption have respectively been reduced and improved since 1996 by adopting the NSP system in cement kilns.
- Further energy savings activities and reduced production volume are expected to lower energy consumption and improve the energy consumption index in fiscal 2002.

### CO<sub>2</sub> Emissions



- As a result of reducing energy consumption as described above, CO<sub>2</sub> emissions also decreased, falling to 94% of the 1990 basis. Further reductions in CO<sub>2</sub> emissions will be continued by energy saving activities in consideration of future business developments.

## ■ Controlling Air Pollution

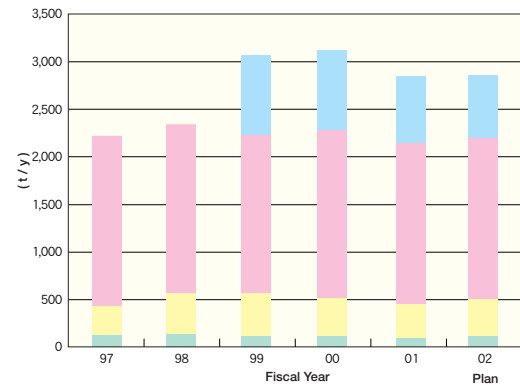
The UBE Group started to undertake activities aimed at preventing air pollution in 1949 in cooperation with the public, academic specialists and the administration—long before the environmental issue started to attract growing public attention around 1965. Such hazardous substances as sulfur oxides (SOx), nitrogen oxides (NOx) and dust are eliminated or reduced through the desulfurization, denitrification and dust removal processes developed by UBE.

The volume of emission loads is monitored at the source of the emissions, and controlled by plant operation depending on the circumstance. And an environment monitoring system installed by the Environment Preservation Council at various sites in Ube city monitors air conditions on a constant basis. These data are reflected in factory operations by establishing independent management standards.



### SOx Emissions

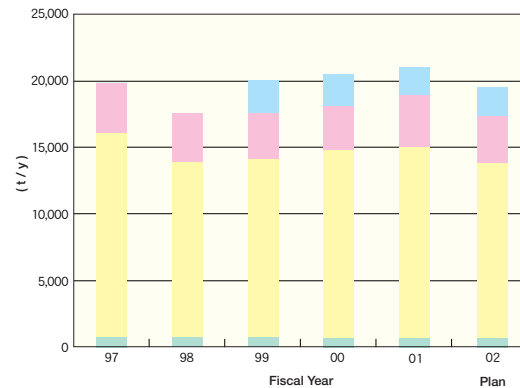
**SOx :**  
As sulfur oxides (SOx) originate from sulfur contained in various fuels, boilers are one of the main generating sources.



Although a 9% reduction in SOx emissions stemming from adjustments in operating methods and timing was planned for 2001, the actual result was 8% lower than the figure for 2000. Total emissions in 2002 will be the same level as those in 2001.

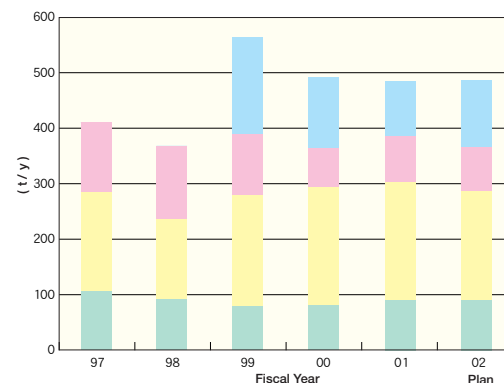
### NOx Emissions

**NOx :**  
As nitrogen oxides (NOx) originate from nitrogen compounds contained in various fuels and the air, they are generated by the combustion process that takes place in boilers, cement kilns, etc.



Total NOx emissions in 2001 increased slightly over the figure for 2000 in spite of adjustments in operating methods and timing. Total emissions in 2002 are projected to be 7% lower than in 2001.

### Dust Emissions



Continuous efforts are being carried out to cut dust emissions, and these efforts are showing positive results. No fluctuations are expected in the volume of dust emissions in 2002.

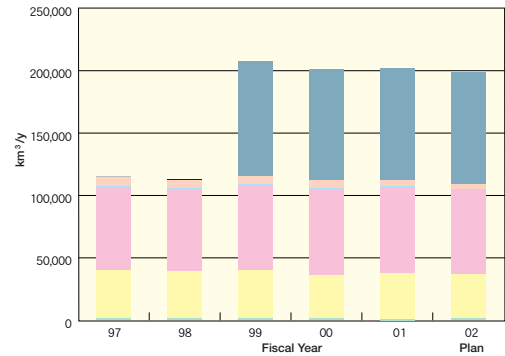


## ■ Controlling Water Pollution

With respect to the prevention of water pollution, laws and regulations (including regulations on total effluent volume) in enclosed sea areas, such as the Seto Inland Sea, have become increasingly more severe. The UBE Group (in particular our chemical plants) discharges waste water only after purification by means of activated-sludge or wet-oxide processes as well as other methods, and carries out strict monitoring on a constant basis in our continued efforts to reduce COD (chemical oxygen demand), nitrogen, and phosphorus effluents that are the typical indicators of water pollution. In addition, especially stringent monitoring is provided for emissions involving hazardous substances.

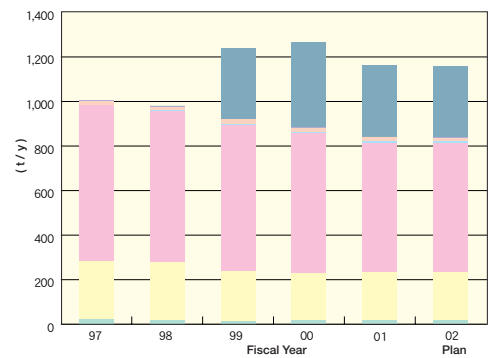


### Waste Water Discharges



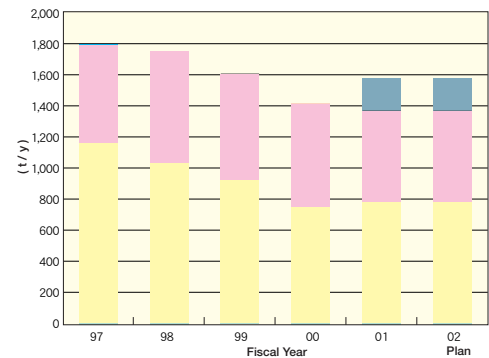
### COD Effluents

COD :  
COD (chemical oxygen demand) is an indicator of water pollution, and shows the oxygen demand when organic substances are oxidized.

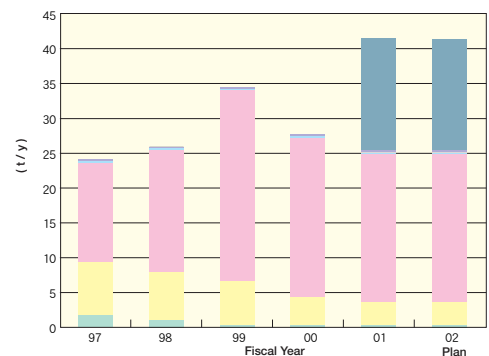


### Total Nitrogen Effluents

Total N and P concentration levels are indicators of water pollution in rivers, lakes and the sea, and must be controlled to maintain the biologic conditions for a healthy ecology.



### Total Phosphorus Effluents



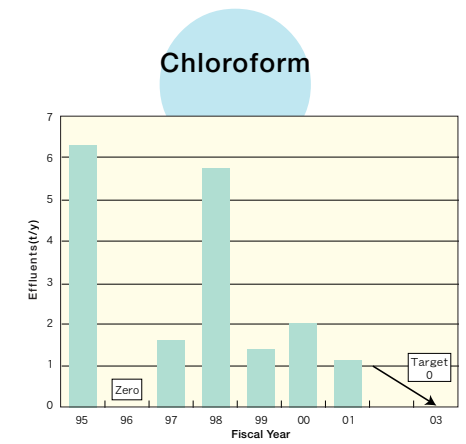
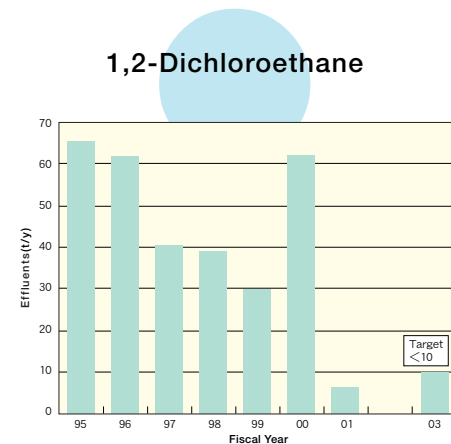
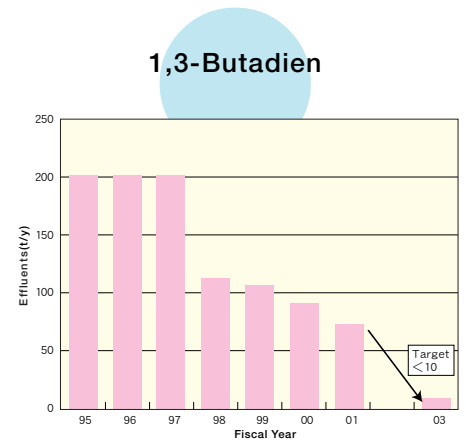
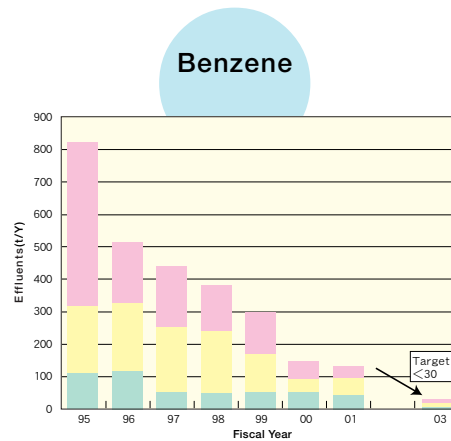
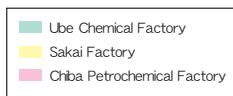
## ■ Controlling Air Pollution

In consideration of usage volumes, potential harm and other attributes, the chemical industry has determined 12 substances that are subject to voluntary control from among a range of harmful air pollutants, and has been promoting voluntary measures to reduce the emissions of these substances since 1997 under 3-year management plans. This has led to a reduction of 46% by 1999 on the basis of 1995 volumes as the standard for the entire industry. During this same period, the UBE Group achieved a reduction of 59%.

The industry is now implementing the 2nd voluntary management plan to further reduce emissions in the 3 years starting from fiscal 2001. UBE is pursuing a reduction of more than 80% under the 1999 figures during this period.

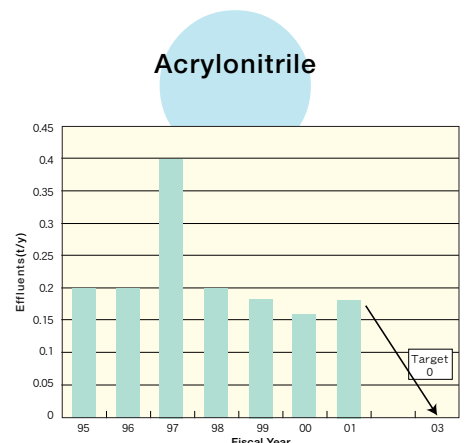
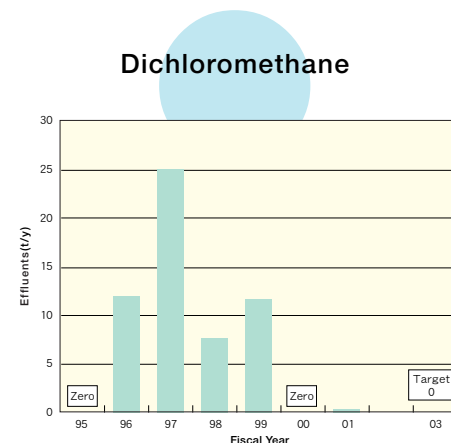
UBE uses 6 of these 12 substances. These include: benzene, 1,3-butadien and acrylonitrile as raw materials in chemical synthesis, and benzene, 1,2-dichloroethane, chloroform and dichloromethane as solvents. UBE will further reduce emissions of these substances over the next 2 years, especially those with harmful properties such as benzene and 1,3-butadien. (The other 6 substances are acetaldehyde, ethylene oxide, vinyl chloride monomer, tetrachloroethylene, trichloroethylene and formaldehyde.)

### ● Emissions of Airborne Chemical Pollutants



#### 1,2-Dichloroethane:

Depending on the wide fluctuation of production schedule using this substance, emissions of this is fluctuated every year. We continue effort to reduce.





## ■ PRTR (Pollutant Release and Transfer Register) System

Under the PRTR system, the volume of chemical substances emitted from plants and other facilities into the atmosphere, rivers or the sea through their business activities and transferred outside of these facilities in the form of waste is monitored and surveyed, and the results are reported (registered) to an external organization.

The chemical industry selected chemical substances subject to such investigation in 1996, and has been conducting these surveys as part of its Responsible Care activities. The Japan Chemical Industry Association (JCIA) has been playing a coordinating role for these activities. Other industrial associations are also carrying out similar activities with the aim of reducing harmful emissions and improving the safety management of chemical substances.

With the enactment of the Chemical Substance Management Promotion Law (the so-called PRTR law) in 1999, the legal framework was established for this system. It is now required that a report (registration) of the survey results for fiscal 2001 be submitted to the government.

### <PRTR Results for UBE>

Surveys are conducted and emission controls are provided for a total of 480 substances and substance groups. This total has been obtained from adding the 284 substances subject to surveys as determined by the chemical industry to the 354 substances covered by the PRTR Law and by subtracting any overlapping entries. Of this total, UBE is handling 66 substances.

### ● UBE Data in 2001

Applicable number of substances	66
Volume handled in production and use	1,870,813 tons
Volume released in production and use	2,370 tons
Transfer volume after production and use	1,322 tons

(Transfer volume = Volume treated as waste)

### ● UBE Emission Volumes

No. shown by Law	Substance	CAS No.	Handling Volume (tons)	Emission Volume (tons)			Total
				Air	Water	Soil	
227	Cyclohexane	110-82-7	277,140	804	31	0	835
	Ammonia	7664-41-7	368,286	433	0	0	433
	Toluene	108-88-3	837	264	21	0	285
	Methyl alcohol	67-56-1	6,722	149	11	0	161
299	Benzene	71-43-2	97,132	136	1	0	137
	Butyl alcohol	*	756	115	8	0	123
	Methyl-butyl-ketone	*	88	77	1	0	79
61	ε -Caprolactam	105-60-2	205,290	0	78	0	78
268	1,3-Butadiene	106-99-0	79,212	73	0	0	73
	Dimethyl Fitalic Acid	131-11-3	1,134	25	0	0	25

CAS No: Chemical substance registry number (issued by Chemical Abstract Service).

\*: Isomer mixture

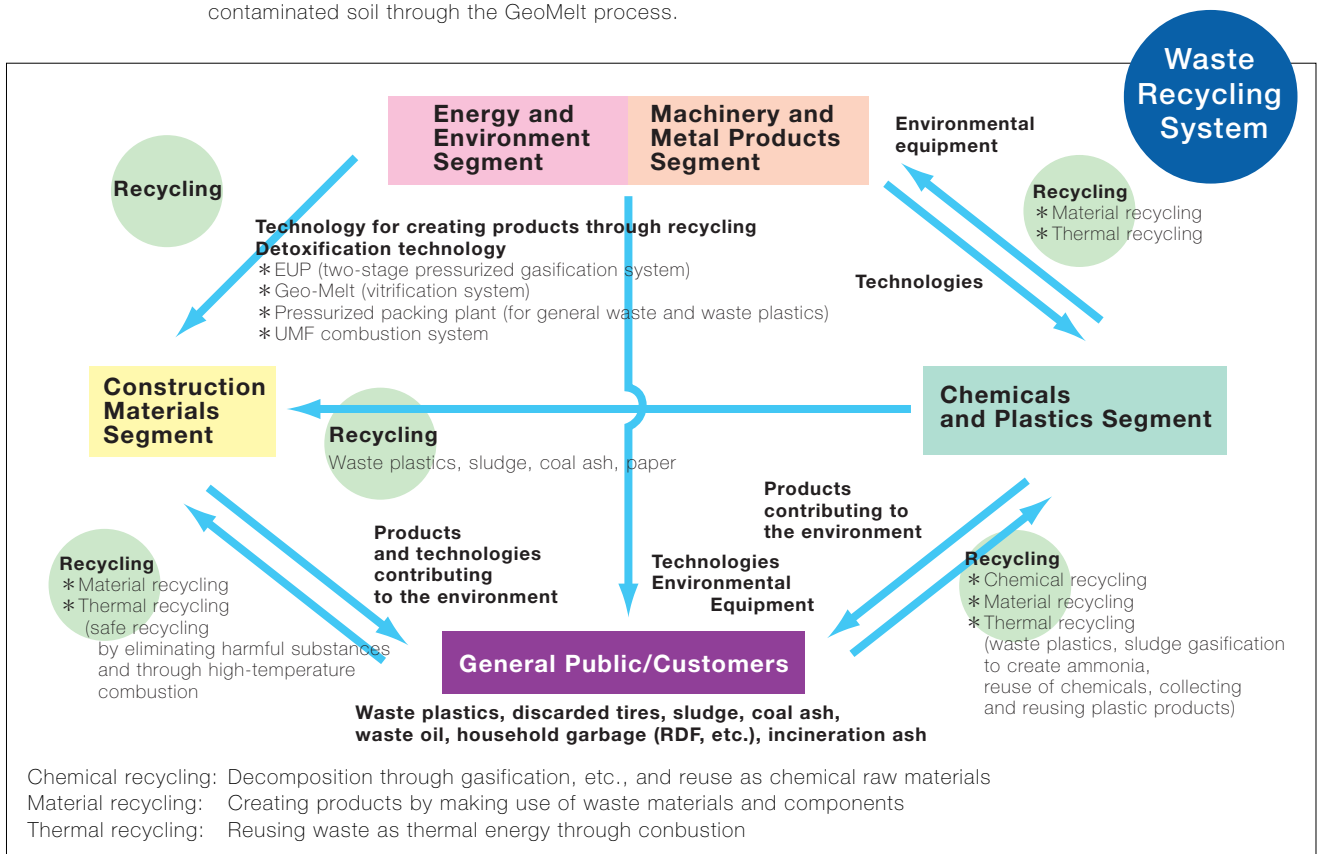
## Industrial Wastes Measures

### Towards Establishing a Recycling-Conscious Society

The UBE Group is making a substantial contribution to the realization of a recycling-conscious society by taking in wastes at its cement factories and by using its original recycling technology. The group is not only reducing the amount of waste within the group, but also promoting activities for cutting down on waste generation by the public at large and in reducing the amount of generated wastes through recycling.

#### < Cooperation of the UBE Group in establishing a recycling-conscious society >

- ◆ Each factory of the UBE Group is making every effort to reduce waste generation and to increase the effective use of resources within its premises, as well as taking in waste from companies outside the group and the general public.
- ◆ Mutual linkages are established among the features of business operations and technologies used in the Chemical and Plastics, Construction Materials, Machinery and Metal Products, and Energy and the Environment segments in our efforts to realize the 3Rs (Reduce, Reuse, and Recycle, which calls for reducing waste generation, reusing discarded materials, and recycling waste as resources).
- ◆ Chemical, material and thermal recycling are promoted within the Chemicals and Plastics segment.
- ◆ The Construction Materials (cement) segment makes every effort to save natural resources by accepting large amounts of waste and utilizing it effectively as raw materials and fuel. UBE 3 cement factories also undertake work to burn animal feed made of bone and offal that may possibly be infected with BSE.
- ◆ The Machinery and Metal Products segment offers products and technologies that generate a lower environmental load.
- ◆ The Energy and the Environment segment makes extensive contributions to society in the field of environment-friendly technologies such as recycling products through gasification of waste plastics and the detoxification of contaminated soil through the GeoMelt process.



### Yamaguchi Eco-Town Plan

Yamaguchi prefecture is promoting the Yamaguchi Eco-Town Plan as part of its campaign to realize zero-emissions. High expectations are placed on the following 2 projects that are jointly promoted by UBE and other companies as the core environmental business under this plan.

- (1) Yamaguchi Eco-Tech Corporation, a joint venture between Tokuyama Corporation and Ube Industries, started a business to detoxify and recycle refuse incineration ash in Yamaguchi prefecture as a raw material for cement. The venture's processing capacity is 50,000 tons per year.
- (2) EUP Co., Ltd., a joint venture between Ebara Corporation and Ube Industries, engages in the gasification of organic residues, discarded plastics and shredder waste and recycles them as chemical raw materials such as ammonia. Although its initial processing capacity was 30 tons per day, a new facility with the capacity of 65 tons per day is now being constructed.

## ● Waste Utilization

### 《Cement factories are the ultimate resource recycling plant》

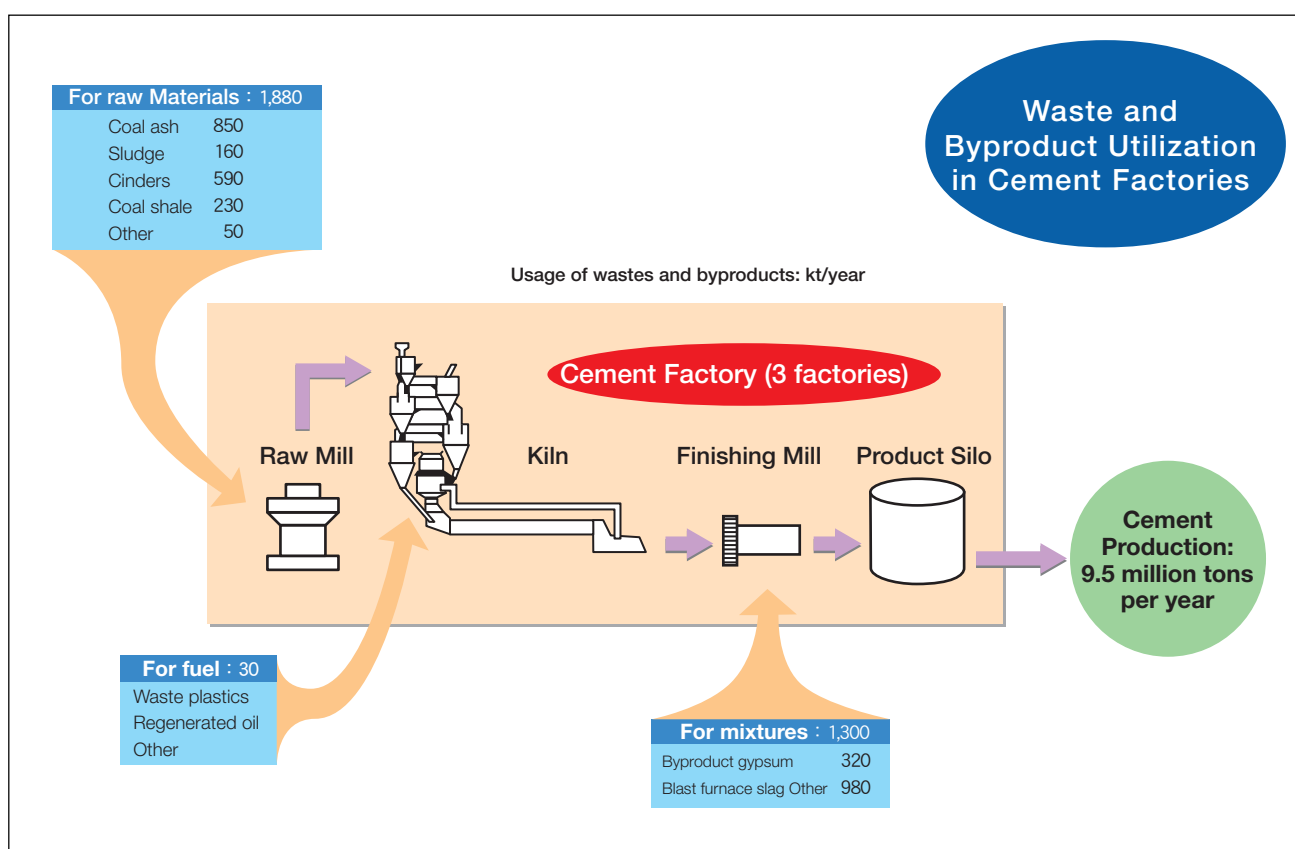
As waste can be used as one of the ingredients in cement (as an alternative to raw materials) or fuel, it is possible to process a wide range of wastes.

In addition, since ash generated by incineration can also be used as an alternative to clay, final dumping sites will no longer be needed. Moreover, the high incineration temperature (1,450°C) of a cement kiln can burn and destroy substances that cannot be eliminated by ordinary incinerators. These factories also have a large processing capacity.

The 3 cement factories are actively taking in and utilizing various wastes such as slag, coal ash, refuse incineration ash, sludge, waste fluids, and waste plastics from inside the company and group companies, as well as companies outside the group.

The amount of wastes and byproducts utilized effectively in fiscal 2001 totaled about 3.2 million tons, which included about 200,000 tons received from inside the company and from group companies.

We will continue to take an active approach towards utilizing wastes in our pursuit of establishing advanced factories that utilize wastes effectively while at the same time giving full consideration to the quality of the cement output and the environment of plants and local communities.



## ● Kinds of Waste Products Utilized

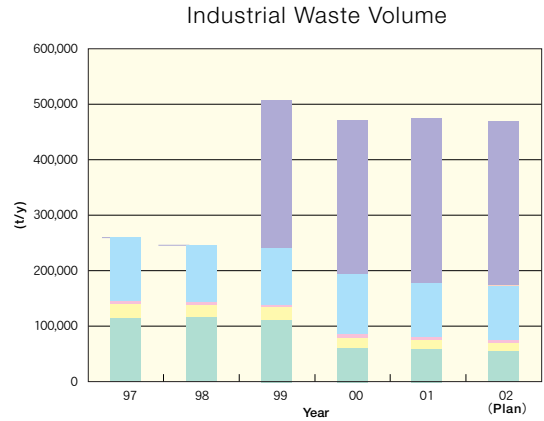
Three cement factories reuse considerable amounts of the following waste products.

Industry	Kinds of Waste
Local Government	Sewage and city water-treatment sludge, garbage
Steel, Non-ferrous Metal	Slugs, slugs from electric furnaces, gypsum
Electrical Power	Coal ash, gypsum
Chemicals, Paper	Waste plastics, hydraulic cakes, gypsum, activated sludge, paper sludge
Petroleum, Petrochemicals	Waste liquids, waste oil
Construction, Building Materials	Waste residues, waste board
Food, Beverage	Organic sludge and residues
Automobiles	Waste silica sand, paint residue, waste grinding sand, discarded tires
Other	Waste pachinko boards, bone meal

## Industrial Waste

### Industrial Waste Volume

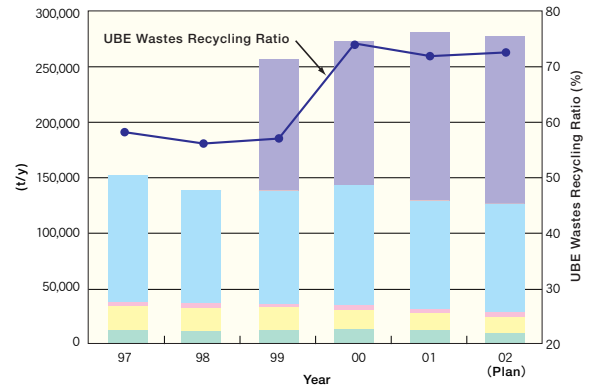
The UBE Group generates wastes such as sludge, waste oil and waste plastics from its chemical plants, coal ash from its electric power and ammonia plants, and inorganic wastes from its magnesium factory. We are continuously working to reduce waste generation and to reutilize resources by recycling.



### Recycled Volume of Industrial Waste

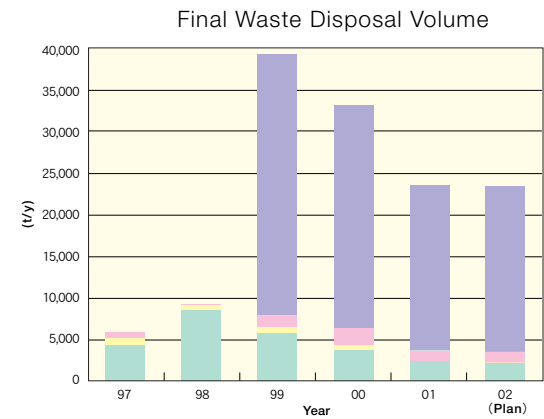
Industrial wastes generated within the UBE Group are recycled whenever possible to promote effective resource use within the group. In addition, approaches have been adopted to effectively utilize part of the waste through cooperation with other companies.

A line graph shows UBE wastes recycling ratio. Recycling ratio exceeds 70% since fiscal 2000.



### Final Waste Disposal Volume

UBE's cement factories take in various kind of waste and utilized them as raw materials and fuel, thereby contributing to the society by resource recycling. In fiscal 2001, the final disposal volume within the group was reduced by 30% compared with the figure for 2000. This was accomplished by increasing the effectiveness of resource utilization and further cutting the volume of generated waste.



### Industrial Waste Control

Industrial wastes are stringently monitored and controlled to provide for careful treatment and suitable disposal. When contracting waste treatment to outside companies, we use a manifest system to monitor the flow of wastes from treatment to final disposal.



# Process Safety and Disaster Prevention

Safety operations at offices represent a matter of great interest not only among employees but also among people in the community. The UBE Group is working towards the creation of a safety culture through various activities based on the policy leadership of senior executives and the basic principles of safety, disaster prevention, and the prevention of industrial accidents.

## ■ Safety Education

Training programs are provided to newly hired employees concerning the importance of the environment, safety and health, as well as the appropriate mental attitude required in addressing these matters, and education in practical skills is regularly provided at each workplace.

## ■ Training for Emergencies

Each office implements emergency training programs, mutual workplace diagnoses by safety supervisors, and mutual safety patrols with cooperating companies every month. The results of these activities are outlined in the form of monthly quick reports and announced via the intranet. As a quick report also includes matters requiring review and improvements, these data can also be useful for those who were unable to participate in training or safety patrols.

Explosion Experiment



Emergency Training



Mutual Workplace Diagnosis



Mutual Safety Patrol



## ■ Plant Safety Assessments

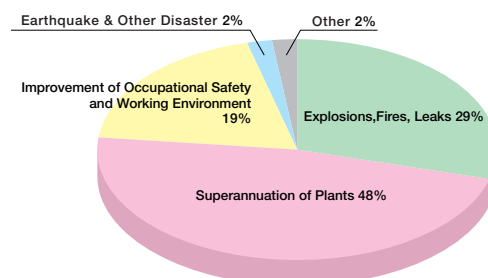
The methods specified in the in-house plant safety assessment standards are used to implement safety assessments in newly installed and additional equipment and in establishing or amending related regulations. In fiscal 2001, the UBE Group implemented these assessments in 38 cases.

## ■ Disaster Prevention Measures

The UBE Group spent about ¥3.5 billion for safety, health and security measures in fiscal 2001.

## ■ Personnel with Environmental and Safety-Related Qualifications

The acquisition of legal qualifications is recommended and encouraged in order to safely operate and manage workplaces.



Investment in Process Safety and Disaster Prevention Measures

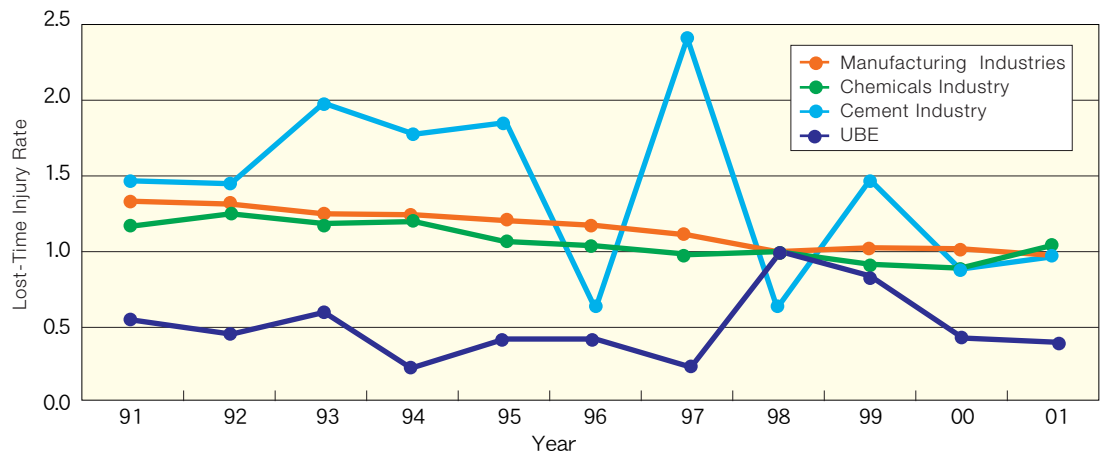
Qualifications	Number of Qualified Personnel
Pollution control manager and chief	363
Environment measurement expert	5
Working environment measurement expert	47
Health supervisor	117
Energy supervisor	129
Hazardous materials supervisor	3,247
Operations chief for work handling specified chemical substances	605
High-pressure gas production safety chief	774

(As of April, 2002)

# Occupational Safety and Health

Under the basic principle of environment and safety ("Respecting People Means Putting Safety First"), each office of the UBE Group is making every effort to implement safety and health and plant safety measures.

## Frequency Rate



Notes:

- (1) Data of Lost-Time Injury Rate for Manufacturing Industries, Chemicals Industries and Cement Industries are based on Ministry of Health, Labor and Welfare data;
- (2) frequency rate = (number of lost-time injuries) / (million working hours).

\*Various safety and disaster-prevention activities (such as KYT, TPM, and hiyari-hatto) are carried out, as well as ensuring a safety management system to oversee the production line.

\*Chemical substance safety assessments are carried out according to the standard methods prescribed for newly developed and/or introduced substances.

\*In recognition of achieving a 10-year non-disaster record (covering 6.2 million hours), the Ube Research Laboratory received a Safety Effort Award in 2002 from the Japan Chemicals Industry Association and the Japan Responsible Care Council.

\*The UBE Group meeting on safety and hygiene is held every year to increase safety awareness among employees, group companies and contractors, and to award safety commendations to deserving individuals and entities.

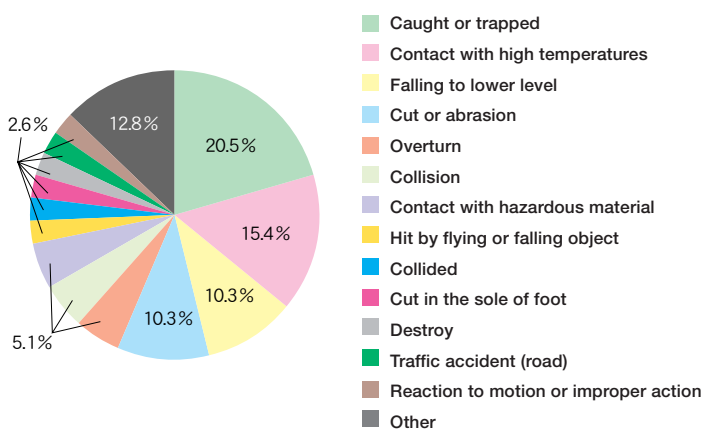


Received the Safety Effort Award by JCIA and JRCC



Safety Symposium by JCIA and JRCC

## Contents of Injuries (by accident type)



UBE Group Safety and Hygien Meeting

## Health Care

The Health Management Office opened an in-house Homepage called the "Total Health Promotion Plan" to extensively provide advice to employees. This guidance is effectively utilized to promote health such as anti-smoking measures, mental health, follow-up health guidance after medical examinations, nutrition counseling, etc. With respect to mental health, advice for those experiencing anxiety and fatigue as well as explanations on how to overcome stress are also provided.

# Product Stewardship

The UBE Group works to ensure the safety of chemicals and products throughout their entire lifecycle, from development through manufacture, distribution, use, and final consumption and disposal.

## ■ MSDS (Material Safety Data Sheets)

We prepare MSDS for all products in order to ensure the safe usage of chemical products and distribute such sheets to all customers. In addition, we share safety information on our products by announcing MSDS data on all products via the in-house intranet.

We have also established rules to update the MSDS data according to our in-house standards in order to facilitate appropriate updating every time new information on hazards is released or applicable laws or regulations are amended. The information entry format conforms to the guidance for preparing MSDS issued by the Japan Chemical Industry Association on the basis of JIS.



## ■ Labeling

Warning labels are also affixed to all containers of hazardousness products. These labels include handling information in addition to the legally required warnings.

## ■ Collection of Hazardous Information

UBE participates in the ICCA HPV Initiative, the international chemical substance safety management program, and is engaged in the collection of data as well as carrying out hazard evaluations for 8 substances.

We also participate in the ICCA LRI, which is a long-term voluntary research project concerning the impact of chemical substances on human health and the environment, through the Japan Chemical Industry Association.

※ICCA : International Council of Chemicals Associations  
 HPV : High production volume  
 LRI : Long-range research initiative

## ■ Emergency Response Cards

In preparation for an accident during the transportation of chemical substances, those dealing with the transportation of chemical products are provided with an emergency response card that contain information on product characteristics, handling methods, emergency measures, and contact information such as police and fire stations. Within the plant, moreover, all drivers of tank trucks are checked to make certain they are carrying the proper card.



## ■ Measures in Response to Product Liability Law

The PL (product liability) committee was established in 1996 under the chairmanship of the president. We are making every effort to ensure the safety of all products through such measures as carrying out examinations based on the PL advance-evaluation system for all new products.

# Environment-Related Technologies and Products

The UBE Group is contributing to environmental preservation through the development of products and technologies with a low environmental load.

## < Chemicals and Plastics Segment >

### ■ DMC (Dimethyl carbonate)

This product is used in the methylation, carbonylation, and carbomethoxylation of various compounds. In comparison with dimethyl sulfate, phosgene, and methyl chloride that have been used in the past, this product has lower toxicity and excels in terms of application maneuverability. Accordingly, it is used as an alternative to more toxic substances. There are high expectations that it will perform well as a fuel additive to reduce soot particles in diesel engines in the future.



### ■ Hydrogen peroxide (Kemira-Ube, Ltd.)

This product is used as an intermediate agent for bleaching, sterilization, and industrial chemicals. As it easily breaks down into oxygen and water, it can be widely used as a wastewater disposal agent.



### ■ Oxamide fertilizer (Ube Agri-Materials, Ltd.)

Because it dissolves very slowly, this product offers long-lasting effects as a fertilizer ingredient (oxamide). It acts as a neutral fertilizer in both physiological and chemical terms as no harmful substances are generated following its dissolution in soil.



### ■ De-nitrification catalyst, de-sulfurizing agent

Used as a catalyst to remove NOx contained in emitted smoke, this product is highly reactive and is subject to few changes over time. Moreover, it offers excellent SOx tolerance, and is not highly subject to dust abrasions. This catalyst can detoxify emitted gas by reacting with harmful organic halogen compounds such as dioxin.

Ube Material Industries, Ltd. is also selling a high-purity hydroxide magnesium that was developed as a de-sulfurizing agent.



### ■ UBETAC APAO (Amorphous polyalpha-olefin)

Offering intermediate features that resemble the characteristics of plastic, rubber, and wax, this product is mainly used in compounds or mixed with other materials. It is widely featured in films and carpeting as a material that is easy to secure and discard because it does not contain any specific harmful ingredients.



### ■ ECO-SOFT, POLY-WRAP (Ube Film, Ltd.)

Eco-Soft and Poly-Wrap are multi-layer and single layer polyolefin films, respectively. As they do not contain chlorine, they do not emit harmful substances during combustion.



### ■ New ceramics

Developments have been made for new ceramics that excel in high-temperature thermal resistance and that can lead to energy savings through improving thermal efficiency, such as superhigh-purity silicon nitride (1,400°C), "Tyranno Fiber®" and its compounds (1,500°C), and "CAST CERA®" (1,600°C) that can be used at even higher temperatures.





## < Construction Materials Segment >

### ■ Siding Wall

This new construction material used for interior panels was created from diatomaceous earths that suppress the generation of VOCs (volatile organic compounds) that are the cause of dew condensation, mold and the "sick-house syndrome."



### ■ SOLBALIT

(Ube Material Industries, Ltd.)

This product absorbs and removes harmful substances such as dioxin contained in emitted gas from a garbage incinerators, power generation boilers, etc.



### ■ Cement Chain Soil Solidifier (U-STABILIZER) (Ube-Mitsubishi Cement Corporation)

### ■ Limestone Chain Soil Solidifier (Green Lime) (Ube Material Industries, Ltd.)

These cement- and limestone-chain soil solidifiers were developed especially to treat and stabilize soft soil, sludge, and sewage mud.



### ■ CLEAR WATER · CALSAN MARINE · CALSAN O2

(Ube Material Industries, Ltd.)

These products use magnesium hydroxide and unslaked lime as the basic ingredients to improve the water quality at the bottom of sea and lakes.



## < Machinery and Metal Products Segment >

### ■ All-electric injection molding machine (Ube Machinery Co., Ltd.)

This large, all-electric injection molding machine, which employs multi-motor drives in place of waste-producing hydraulic fluids and coolants, was jointly developed by Ube Machinery Co., Ltd. and Niigata Engineering Co., Ltd. Compared to a conventional hydraulic power system, this machine produces significant energy savings effects by requiring only about one-third the power consumption and about two-thirds of cycle time needed by hydraulic units. This all-electric machine received the Director-General's Award from the Agency of Natural Resources and Energy in fiscal 2001 under the 22nd energy savings machinery commendations sponsored by the Japan Machinery Federation.



### ■ Aluminum wheels (Ube Automotive, Ltd.)

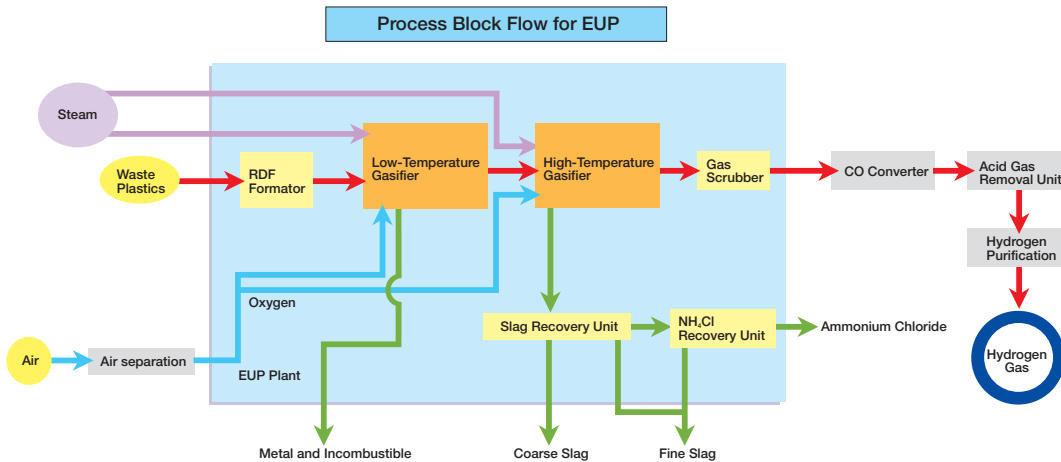
Aluminum "Squeeze Wheels" produced by our original manufacturing methods can reduce wheel weight by some 15% to 20% as compared to those made by conventional methods. This new wheel manufacturing technology substantially contributes to reducing the weight of automobiles as well as to improving combustion efficiency and reducing gas emissions.



# Environment-Related Technologies and Products

The UBE Group is focusing its efforts on the development and practical use of technologies designed to create usable products from waste and detoxified harmful substances in pursuing its goals of helping to establish a society based on resource recycling.

## Two-Stage Pressurized Gasification System EUP Plant (EUP: Ebara Ube Process)



- This is a chemical recycling process designed to produce gases that can be used as chemical raw materials (such as ammonia) from organic residues, discarded plastics and shredder waste. The system was jointly developed by Ebara Corporation and Ube Industries.
- This technology received the Nikkei Global Environment Technology Award from the Nihon Keizai Shimbun Inc., the Japan Industrial Technology Award from the Nikkan Kogyo Shimbun, Inc. and the Technology Award from the Society of Chemical Engineers, Japan.
- The EUP plant is commercially operated with a waste-treatment capacity of 30 tons/day. A new plant with a capacity of 65 tons/day is now under construction.

## Geo-Melt (Vitrification System)

Contaminated soil and hazardous waste are remediated and made harmless by melting and vitrification.



## Pressurized Packing Plant

This plant handles urban garbage disposal and waste plastics by sorting, pressurizing and compacting them into an easily handled package.



## Demonstration Plant to Produce Artificial Sand from Fly Ash

An experiment was started on a demonstration plant for the mass production of artificial sand (commercial name: Z-SAND) whose main ingredient is fly ash generated from thermoelectric power stations by coal combustion. Z-SAND is used as a replacement material for natural sand and soil.



# Communication with the Community

The UBE Group is carrying out various public relations activities to facilitate increased understanding of the group's business operations among the community, and is also an active participant in various local activities.

## ■ Touring Facilities

The UBE Group's factories and laboratories welcome many people including students from nearby schools, and plant tour for employee family is also provided.



Plant tour for employee family

## ■ Responsible Care Community Dialogue

The Japan Responsible Care Council holds regional RC dialog meetings mainly in petrochemical complex districts, and UBE participated in the 3rd dialogs held in the Sakai-Senboku and Yamaguchi districts, both of which featured panel discussions. In the Yamaguchi district, the meeting was held first in Ube city, and attracted a wide variety of participants including people from community organizations, citizen NGOs, and students.



Panel Discussion



RC community dialog



Guided Experimentation

## ■ Guided Experimentation

As part of the Junior Science Education programs held every summer, elementary and junior high school students are invited to Ube Research Laboratory for hands-on experience in carrying out interesting chemical experiments under the guidance of UBE researchers.



Training for ignition briquette production

## ■ Ube International Environmental Cooperative Association

UBE participates in this association as a local company, and accepts overseas trainees in manufacturing technology. We have also provided training programs concerning the basic technologies for ignition briquette production.

## ■ Participating in Other Local Activities



Gardening activity



Voluntary activity of street cleaning



Wings of  
technology  
Spirit of  
innovation  
**UBE**

## **UBE INDUSTRIES, LTD.**

**Environment and Safety Department**

Seavans North Building  
1-2-1 Shibaura, Minato-ku,  
Tokyo 105-8449 JAPAN  
TEL: +81-3-5419-6148  
FAX: +81-3-5419-6242  
URL: <http://www.ube.co.jp>