

Responsible Care 2000

Report on Responsible Care

Putting chemistry to work
for our future.



Basic Policy and Action Objectives

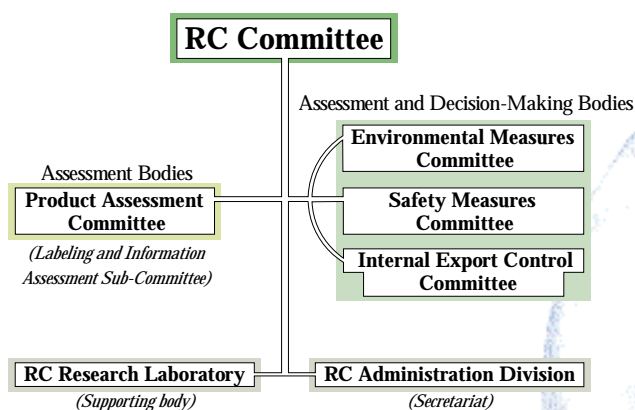
Basic Policy

As a member of the Japan Responsible Care Council, Tokuyama Corporation carries out Responsible Care activities that protect the environment and preserve safety and health throughout the entire chemical cycle—from development to manufacturing, distribution, use, final consumption and disposal. Our social mission is to aggressively tackle and solve environmental issues in particular, which will in turn drive sustainable corporate development. Based on this recognition, we are promoting environmental management, which is a management method that emphasizes the environment, in all of our business activities, including development, manufacturing and sales.

Action Objectives

1. **To promote environmental protection.**
To employ environmental management systems in accordance with ISO14001 and reduce environmental impact.
2. **To faithfully observe laws and regulations.**
To faithfully observe international rules, domestic laws and regulations, and industry standards.
To thoroughly practice internal export control rules.
3. **To promote energy conservation and curb global warming.**
To achieve the lowest unit energy consumption in the industry for all of our products.
To improve 1990 unit energy consumption by 15% by 2005.
4. **To promote resource recycling and work toward reduction of and proper management of waste materials.**
To promote material recycling and thermal recycling of resources.
To promote office paper reduction.
To increase effective waste utilization ratio to 91% by 2005.
5. **To promote safety, disaster prevention, and workers' health and safety.**
To aim for zero accidents and disasters based on the principle of personal safety and personal responsibility.
To ensure a comfortable work environment and preserve safety and health.
6. **To ensure strict product safety standards.**
To provide products that have little impact on the environment and can be used safely.
To provide appropriate information on how to use products properly, precautions, etc.
7. **To deepen our trusting relationship with society.**
To disclose information regarding Tokuyama's activities in the areas of safety measurements.
To actively carry out dialogue with local communities.

Responsible Care Promotion Organization



RC : Responsible Care

*Promoting environmental management
to establish a corporate presence
in the recycle-oriented society to come*



Companies in the chemical industry have long been providing essential materials for sustaining and enriching our lives. On the other hand, consideration to prevent the occurrence of environmental and human health problems over the entire chemical substance life cycle, from distribution to use, recovery and disposal, is imperative to our business activities.

From this viewpoint, Tokuyama has participated in the Japan Responsible Care Council since its inauguration in 1995. We pledged to adopt Responsible Care, and have initiated aggressive Responsible Care activities that extend beyond conventional environmental and health issues.

The concept of "Environmental Management" is at the core of the managerial strategies in our new mid-term plan that began in FY1999. We regard environmental issues as a central theme in Tokuyama's business approach that encompasses all of our business activities, from research and development, the manufacturing process and production to sales and highlights our social mission to aggressively tackle and solve environmental issues, which will in turn enhance our company's value and drive corporate development.

Tokuyama has already accepted large amounts of waste from external sources that we use for cement production. In addition, another pioneering example of our environmental develop-

ment activities is the development of polyvinyl chloride recycling technologies.

It is said that the year 2000 is the first year of the "Recycle-oriented society." In addition to the Home Appliance Recycling Law and the Containers and Packaging Recycling Law already in place, the Government of Japan enacted six new laws, including the Basic Law for Promotion of the Creation of a Recycle-Oriented Society and the Green Purchasing Law.

Japan is in the process of making a swift transition to a recycle-oriented society. At Tokuyama, our goal is to play a vital role in the circle of recycling and establish a strong presence as part of this society.

We publish this Responsible Care report on an annual basis in order to foster public awareness of our environmental policies. With each year, the report becomes fuller and more detailed, reflecting both our deepening commitment to environmental issues and our growing expertise. We hope that your interest in and understanding of our programs will increase and we welcome your opinions and comments.

*Yuichi Miura
President
September, 2000*

A handwritten signature in black ink that reads "Y. Miura". The signature is written in a cursive, flowing style.

Recent

Environmental Activities

Responsible
Care 2000



We are extending aggressive measures to address environmental issues to apply to more activities and products at all of our places of business.

Tokuyama views environmental issues as one of our most important management policies. It is a core element of our business strategy and our top managers are working hard to find resolutions.

In FY1999, the Tokuyama factory worked to receive the ISO9000s certification, and promoted the development of recycling technologies for used polyvinyl chloride at prototype plants and the recycling of waste plastic into fuel at its cement plant.

ISO14001 Certification at all Plants

In FY1998, we obtained the ISO14001 international certificate for environmental management systems at our Tokuyama factory and Kashima factory. Since then, we have steadily employed environmental management systems and are tackling environmental protection.

More ISO9000s Certifications at all Plants

Tokuyama is pursuing acquisition of ISO9000s international standards for quality management systems at all of its places of business to reach new levels of product quality. In 1999, we received certifications for polypropylene, OPP film, chemical products and polycrystalline silicon products for the Tokuyama factory.

The Kashima factory obtained ISO9001 for dental materials.



ISO14001 Certification



Mizutori Zosan 550

Green Products

Mizutori Zosan 550 (Eco-mark approved)

The 550ml model of our Mizutori Zosan line of dehumidifiers (Mizutori Zosan 550) received the Eco-mark certification as a product made with due consideration given to the environment.

This model uses recycled resin for the main unit's plastic case, thereby contributing to resource recycling. It also differs from conventional types in its refill design, in which the desiccant and the case can be separated, thereby contributing to reduction of household trash.

Plants for Recycling Waste Plastic into Fuel

Tokuyama has long exploited the advantage of having cement kilns in our chemical factories by reusing waste materials and byproducts as raw materials and fuel for manufacturing cement. At the recycled waste plastic fuel plant completed in August 1999, we have been recycling waste plastic that had previously been disposed as waste in landfills, as raw material and fuel for cement kilns. Our capacity for receiving and disposal reached 15,000 tons in FY1999 and we plan to further increase this volume in the future.



Waste Plastic-to-Fuel Recycling Plant

Waste Polyvinyl Chloride Recycling Plants

From April 1998, in concert with three other organizations*, Tokuyama initiated the development of new recycling technologies for polyvinyl chlorides, and completed our prototype plant inside the Tokuyama factory in July 1999. At this plant, we are promoting the development of a system in which waste polyvinyl chloride is degraded down for the purpose of reusing recovered hydrochloride in the vinyl chloride monomer manufacturing process and utilizing the residue as raw fuel for the cement kiln. Prototype tests were conducted in FY1999 and continued through FY2000 in expectation of practical application at a new facility in the beginning of the 21st century.

*Vinyl Environmental Council, Plastic Waste Management Institute Japan, and Japan PVC Environmental Affair Council.

Participation in Green Volunteers

Forests protect the natural environment and fulfill the vital role of "green dams" that provide a stable supply of clean water. Protecting forest helps us to ensure safe and comfortable lives. With this in mind, we support the goals of the Green Volunteers*, which is sponsored by the Yamaguchi Prefecture Agriculture and Forestry Office, and participate in their volunteer activities each year.

*Green Volunteers: An event carried out each year by the Yamaguchi Prefecture Agriculture and Forestry Office that brings together persons involved in forestry in the upper reaches of the Nishikigawa river and persons using water in the lower reaches with the goal of cultivating understanding and promotion of proper development of forests through forestry work experience, including pruning and thinning.

Kashima Factory Earns Award for Distinguished Service in Fire Prevention

Tokuyama's Kashima factory received an award for distinguished service in fire prevention from the Kashima Southern Fire Fighting Association Headquarters during Dangerous Goods Safety Week 2000. From its commencement of operations on 1 April 1985, we have implemented prevention of disasters caused by dangerous goods, by means of employee education and safety measures for equipment and facilities. These achievements were recognized by the conferment of the award, which described its efforts as "a model of devotion to disaster prevention."



Waste polyvinyl chloride recycling plant



Green Volunteers

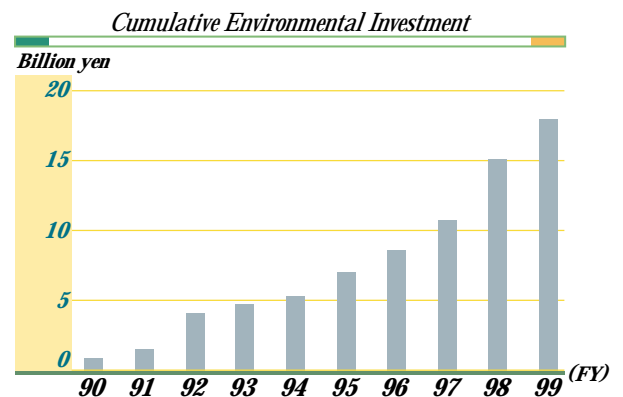


Members of the Kashima factory display their award

Investments for Reducing Environmental Impact

Tokuyama invested approximately JPY2.6 billion in our environmental programs in FY1999. These included waste water treatment facilities and disposal facilities for specific chemical substances.

Tokuyama prepares mid-term investment plans for reducing environmental impact and carries out investments systematically. We also evaluate and manage the effectiveness of these investments.



Toward the Reduction of Environmental Impact

Responsible Care 2000

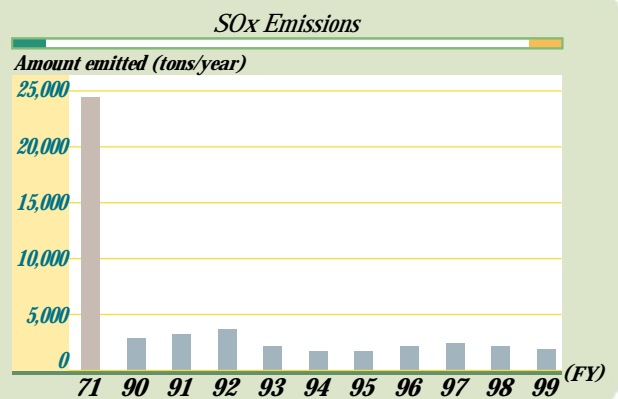


Tokuyama is working to reduce environmental impact by promoting the development and installation of facilities that reduce SOx, NOx and other emissions.

Reducing environmental impact is one of the most important aspects of environmental management. Tokuyama currently has a number of air, water and soil pollution prevention measures underway.

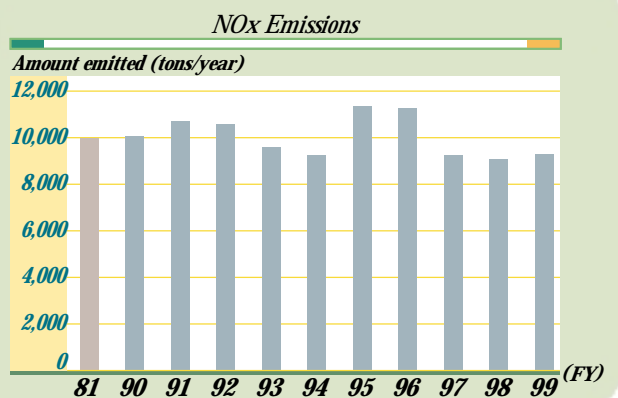
Reduction of SOx (sulfur oxides)

SOx is emitted from boilers, kilns and dryers when heavy oil and coal are burned. Tokuyama is working to reduce these emissions by installing exhaust gas desulfurizers on power plant boilers, which are the primary producers of SOx emissions.



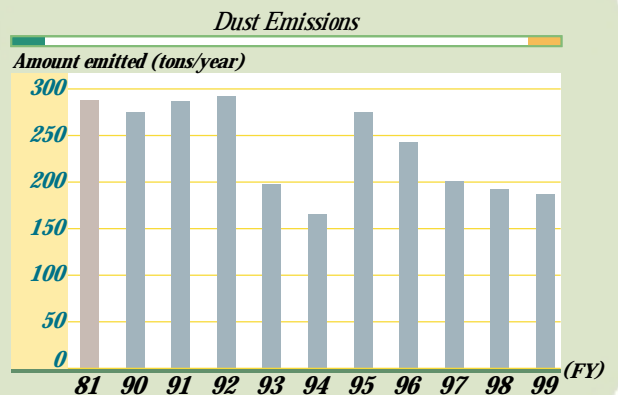
Reduction of NOx (nitrogen oxides)

NOx is also emitted from boilers, kilns and dryers when heavy oil and coal are burned. The primary producers of NOx emissions are power plant boilers and cement kilns. Tokuyama has constructed new power plant boilers equipped with exhaust gas denitrizers.



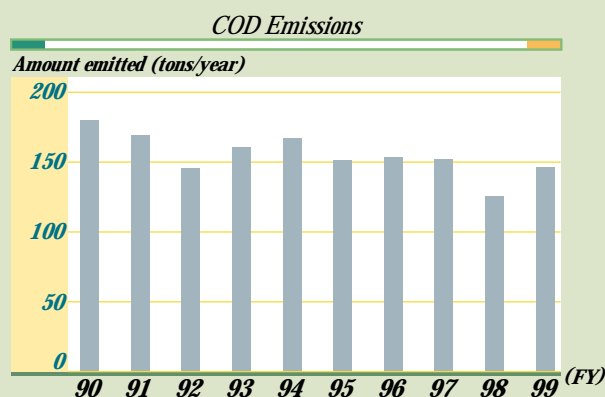
Reduction of Dust Emissions

Dust emissions result from fuel combustion at power plants and cement kilns. Tokuyama works to reduce emissions by equipping these facilities with electrostatic precipitators.



Reduction of COD (chemical oxygen demand)

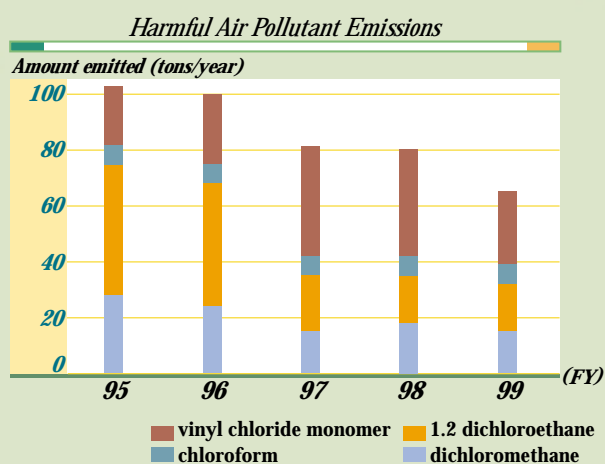
Tokuyama works to prevent the pollution of factory drainage water. Tokuyama is reducing COD emissions through various measures, including activated sludge processing equipment for industrial drainage water containing organic substances.



Programs for Reducing Harmful Air Pollutants

The Japan Chemical Association has independently decided to and is working to reduce emissions of 12 types of harmful air pollutants. Tokuyama is also taking part in these activities. These activities aim to reduce chemical emissions into the air in all parts of the handling process (manufacture, use, transportation, storage, consumption and disposal) by about 30% of 1995 levels by FY1999.

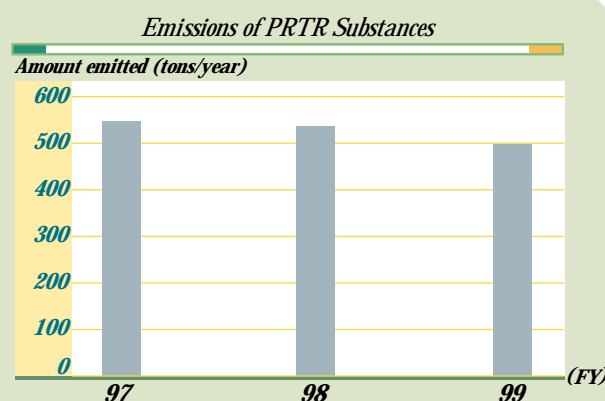
Four of these substances are produced by Tokuyama; vinyl chloride monomer, chloroform, 1,2 dichloroethane and dichloromethane. We are reducing emission levels by carrying out investigations of the emission amounts and measures to deal with them.



* Due to Tokuyama's merger with Sun Arrow Chemical in April 1999, emissions figures also include the latter's from this fiscal year.

PRTR (Pollutant Release and Transfer Registers)

Tokuyama participates in PRTR survey implemented by the Japan Chemical Association, which are carried out annually. We work to expand the substances subject to PRTR survey, increase study accuracy and reduce emission levels. In FY1999, Tokuyama either manufactured or used 41 of the 284 substances subject to study.



Dioxin Countermeasures

Waste incinerators and other equipment are subject to dioxin emission regulations, and Tokuyama carries out studies of actual emission conditions, all of which have resulted in levels

below the regulated values. We will continue to measure and monitor dioxin emissions, and take the most appropriate measures to deal with them.

Recycling

Responsible
Care 2000



Wastes in an Open Way

Contributing to the Recycle-Oriented Society Through Our Cement Business.

At our cement factory, we are recycling resources from many waste materials and byproducts gathered both internally and externally. Cement is a substance composed of minerals such as limestone, clay and silica. Since many of these minerals are contained in waste materials, various wastes can be used in cement manufacture. In addition, cement kilns capable of sustaining intensely high temperatures between 1,000 and 1,800°C are used to completely incinerate the non-mineral, combustible waste portions. Thus, all components of waste materials can be effectively recycled into either thermal energy or raw materials for cement manufacture. As a result, the cement factory is making an enormous contribution to recycling.

Accepting Waste from Outside Sources

- A Huge 1.54 Million Tons in 1999

Since our cement business began some 60 years ago, Tokuyama's cement plant has recycled large amounts of industrial wastes and byproducts generated both internally and externally. We receive slag from the steel industry, as well as coal ash, sludge and incinerator ash, which are used for material recycling, while used tires and waste plastics are used for thermal recycling. The total amount of recycled wastes and byproducts in FY1999 was 1.77 million tons, which includes 1.54 million tons received from outside the company. We plan to continue to increase the quantity of waste we recycle.

Accepting Various Types of Waste

Completing Our Fuel Recycling Plant

Tokuyama's fuel recycling plant, which finely pulverizes waste plastics, was completed and started operating in August 1999. At the plant, which has a processing capacity of 15,000 tons of plastics per year, plastics of various shapes and sizes are cut and crushed into 20-30mm blocks for incineration in cement kilns. From now on, we plan to further expand our acceptance of waste plastics.

Recycling 10,000 Tons of Used Tires Annually

Tokuyama possesses facilities for receiving and loading cut tires into cement kilns, and is currently recycling at a rate of approximately 10,000 tons of used tires per year.

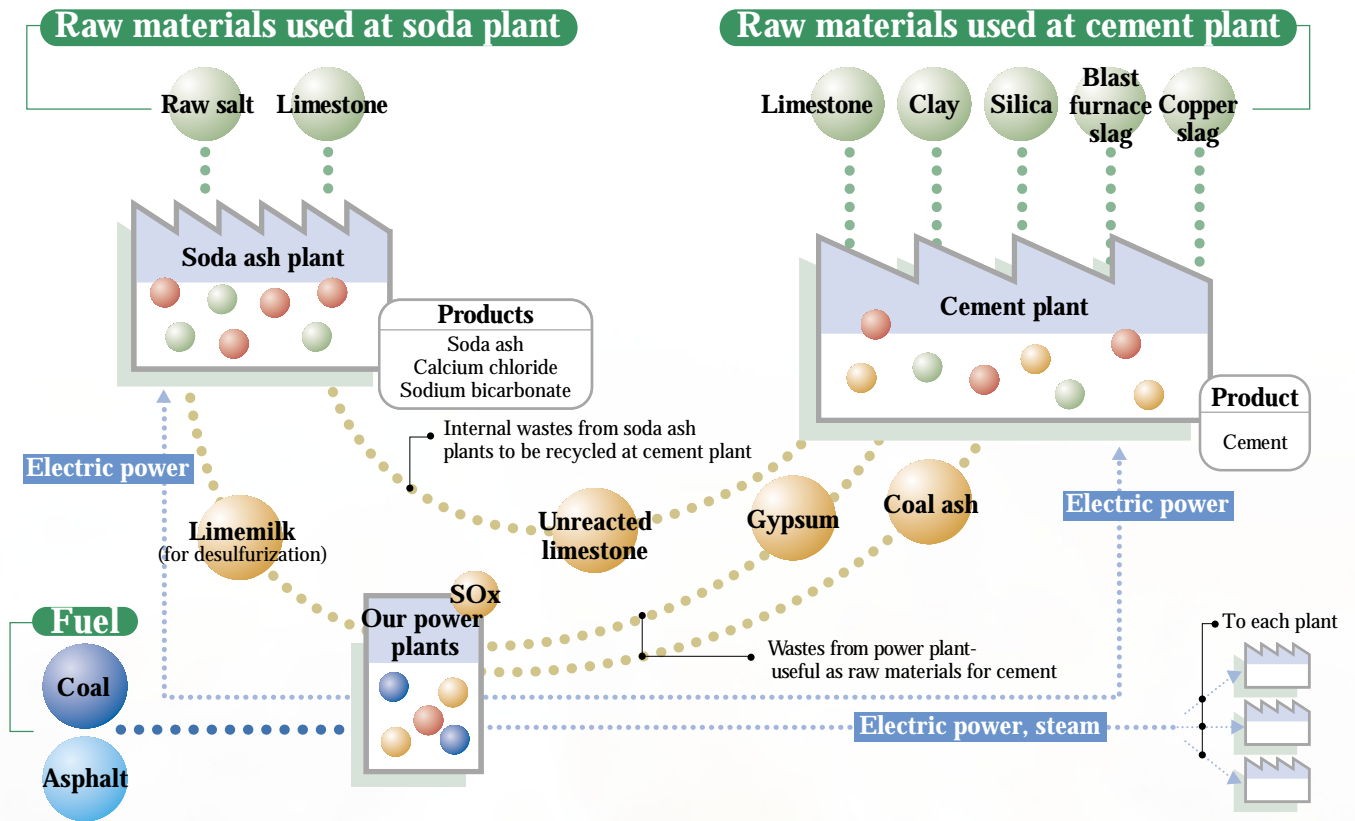
Recycling Waste into Resources and Fuel

Tokuyama's recycling programs go far beyond the traditional bounds of internal waste recycling. By fully utilizing the capabilities of our cement plant, we can recycle all kinds of internally generated and externally sourced industrial wastes as raw materials for cement manufacture and as fuel for cement kilns. By effectively reusing our limited resources and preventing environmental pollution through our cement business, we have contributed to the creation of a recycle-oriented society.

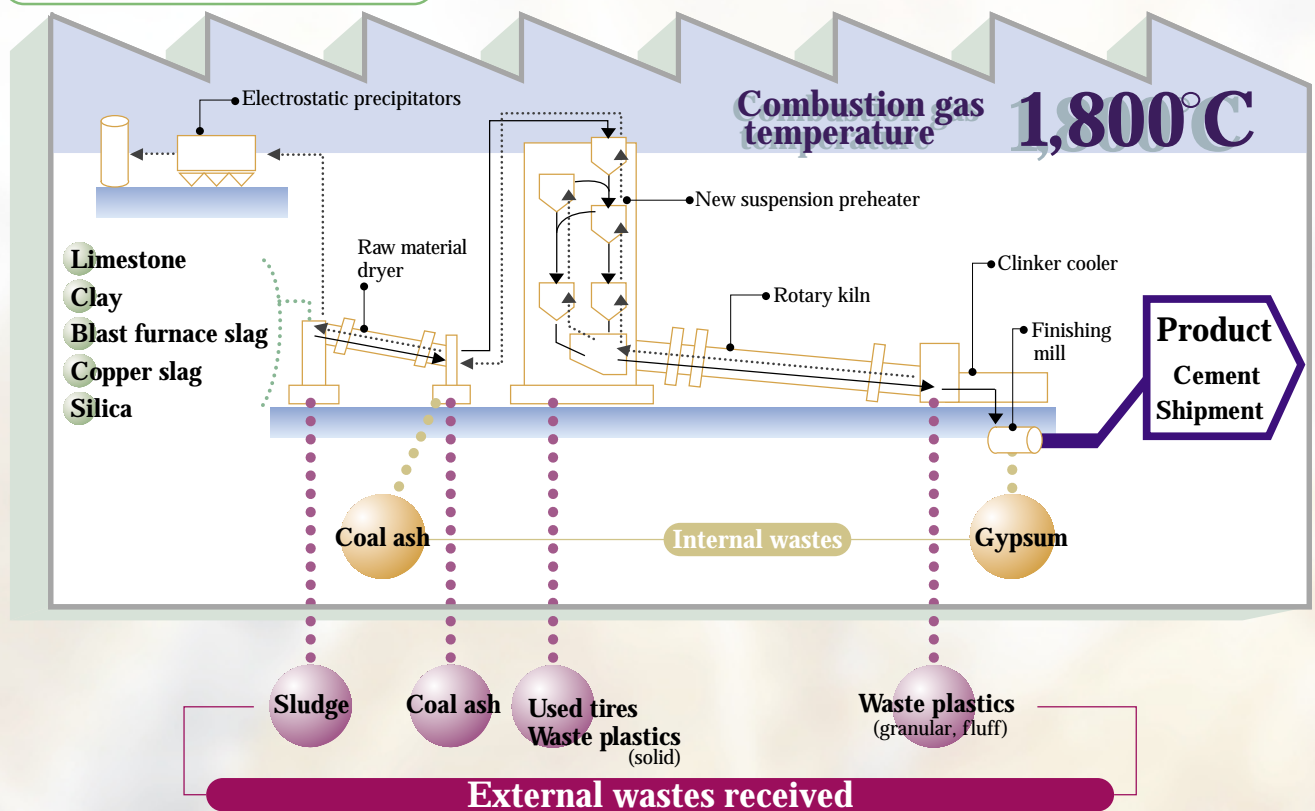
Expanding the Coal Ash and Sludge Accepted for Recycling to 340,000 Tons

Tokuyama is increasing the amounts of coal ash and sludge it accepts. In FY1999, the volume of coal ash and sludge we received reached 340,000 tons.

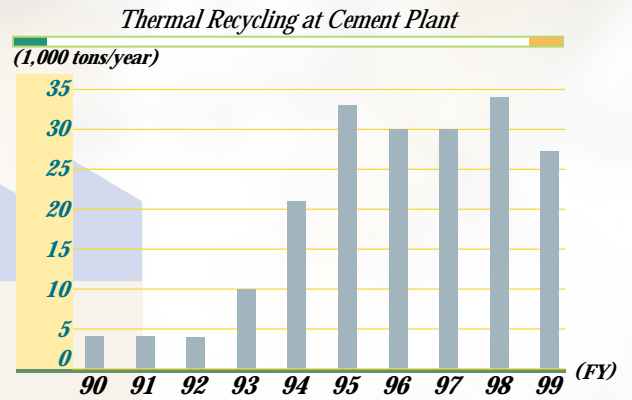
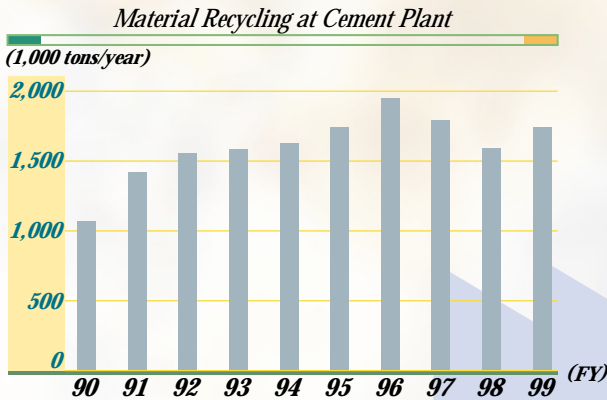
Recycling of Internally Generated Wastes



Effective Use at Cement Plant



Effective Use at Cement Plant



Material Recycling

Material recycling is the reuse of wastes and byproducts as raw materials. Tokuyama recycles slag, coal ash, sludge and incinerator ash generated internally and externally.

Thermal Recycling

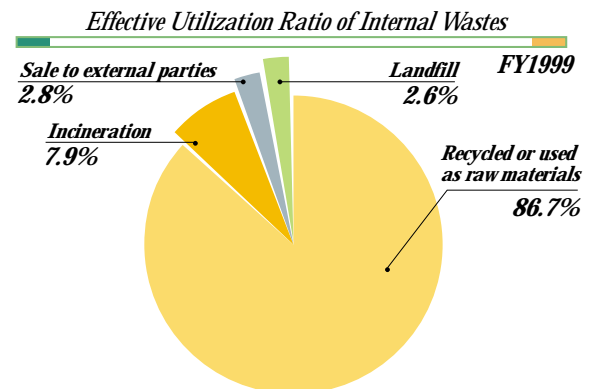
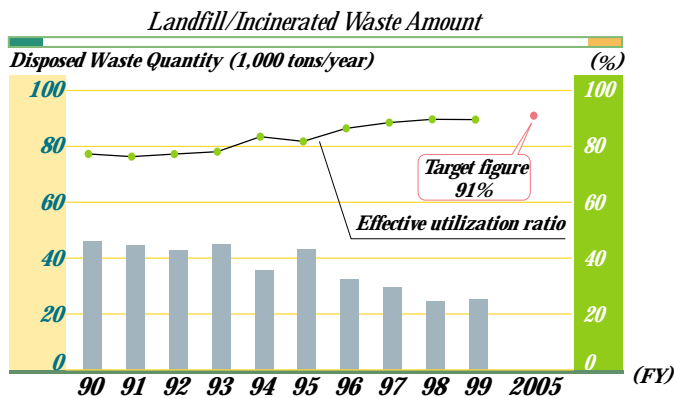
Thermal Recycling is the reuse of waste as a heat source. Tokuyama receives large amounts of waste plastics, used tires, etc., which we reuse as fuel.

We Recycle 90% of Our Internal Wastes

Tokuyama generates about 250,000 tons of internal wastes, about 90% of which we recycle. The remaining approximately 25,000 tons is disposed by landfill or incineration.

About 87% of our waste generated from our plants is used as raw material or fuel for cement production, while 3% is sold to external parties as valuable materials. The remainder becomes landfill or is incinerated.

We will continue to work to reduce waste materials to achieve the goal of increasing our effective waste utilization ratio to 91% by 2005.



Preventing Global Warming

Responsible
Care 2000



We are promoting energy and resource conservation and tackling the construction of a production system that uses energy more effectively.

It is said that the destruction of the earth's environment is progressing rapidly due to human economic activities. One example of this development is global warming. This phenomenon is generally considered to be caused by the emission of greenhouse gases into the environment. One such gas is carbon dioxide (CO₂).

As a measure to prevent global warming, we are making efforts to use energy efficiently and improve energy consumption.

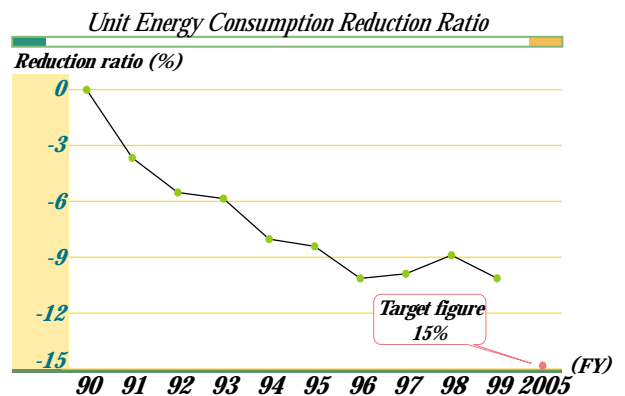
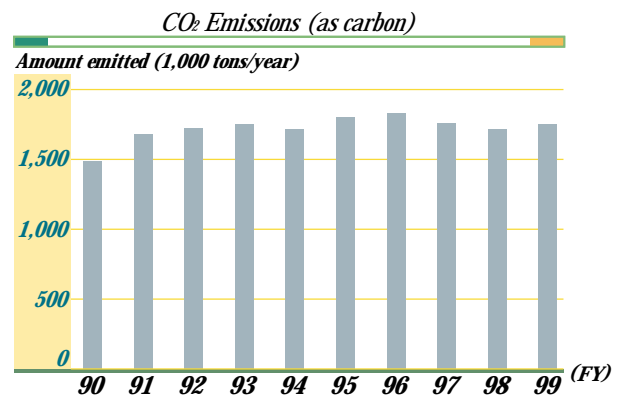
Trends in Reduction of CO₂ Emissions

It is imperative to reduce emissions of CO₂, which is considered one of the causes of global warming. CO₂ is one of the main emissions of power plants and the cement kilns. However, despite our rising production output, Tokuyama has been keeping CO₂ emission levels steady for the past several years due to our efforts to reduce unit energy consumption.

Reducing Unit Energy Consumption

The Tokuyama factory, our main production facility, has been promoting energy conservation programs with the goal of reducing unit energy consumption to 85% of 1990 levels by 2005. A reduction ratio of 10% was achieved in FY1999.

Note: The unit energy consumption ratio is calculated taking into consideration waste plastics and other fuel alternatives are contributed to energy saving.



Total Safety Management of Chemical Products

Responsible
Care 2000



We Keep a Keen Eye to Ensure Environmental and Human Safety Based on Accurate Information Gathered Throughout the Entire Product Life Cycle.

Tokuyama gathers product safety information that it uses as bases for conducting safety and environmental assessments of facilities, product safety assessments and product labeling assessments. In addition, we investigate the impact of chemicals on the surrounding environment by running simulations on the dispersion of emitted chemical substances. Moreover, we provide our customers and dealers with instructions and training regarding the proper handling of hazardous chemical products.

Chemical Substance Dispersion Simulations

We run simulations to investigate how emitted chemicals are dispersed, with the goal of evaluating their impact on human health and the environment. Through simulations, we can estimate how the emitted chemicals are spread and where there is possibility of impact.

The results of these simulations are of use in formulating measures aimed at reducing environmental impact through improving facilities, setting our target value to be attained and other ways.



Dispersion simulation

Product Safety and Labeling Assessments

From research and development of new products to their market release, Tokuyama carries out product safety and labeling assessments that evaluate product safety and suitability.

Product Stewardship Activities - MSDS

Tokuyama offers Material Safety Data Sheet (MSDS) to its users and clients, offering guidance on the proper handling of products for use and disposal. So far, we have published 365 MSDS.

Education

Courses on Product Handling

We carry out guidance and education on product handling and laws and regulations by holding lectures for traders who handle our products.

Assessment Flowchart

Assessment Procedure	Product Safety Assessment	Safety & Environment Assessment	Labeling Assessment
Research Start	Research Laboratory General Manager (First Assessment)		
Development Start	Executive Managing Director (Second Assessment)		
Feasibility Study	Product Assessment Committee (Third Assessment)	Safety & Environment (Basic Calculations)	
Facility Design		Safety & Environment (Design)	
Before Market Launch (Before Operation)		Safety & Environment (Before Operation)	Labeling Assessment Sub-committee
After Operation		Status Report (Environment)	



Educating Our Employees

In the course of employee training, Tokuyama implements education regarding Responsible Care and environmental management. We also educate and enlighten our employees by setting thorough policies, goals and measures regarding Responsible Care programs through in-house newsletters and other means.

Promoting Safety Management at the Distribution Stage

Based on MSDS, Tokuyama educates transporters with instructions on our products' chemical properties and handling methods. We also require their drivers to carry an Yellow Card that describes emergency procedures to ensure that they can respond quickly with the appropriate measures in the event of an accident during transportation.

Supporting Responsible Care: The RC Research Laboratory

The RC Research Laboratory supports the research side of Tokuyama's Responsible Care system. It is comprised of

1. Analysis and Evaluation Team
2. Environmental Analysis Team
3. RC Assessment Team

The Analysis and Evaluation Team offers analytical and evaluation support regarding product safety to research and development departments through microanalysis and structural analysis with full use of state-of-the-art analysis equipment.



Yellow Card



Inductively coupled plasma (ICP) mass analysis equipment

Safety

Measures

Responsible
Care 2000



Ensuring Safety is the First Step in Becoming a Good Corporate Citizen

Based on our corporate philosophy, "Safety is the foundation of our activities, and ensuring safety is the first step in becoming a good corporate citizen," Tokuyama creates a safety management plan every year and is vigorously carrying out activities aimed at eliminating accidents and disasters.

Extensive Accident and Disaster Prevention Activities

The Tokuyama factory is fully equipped for disaster prevention. It is home to an altitude water cannon carriage, chemical fire engines, an ambulance and oil fences. We have formed a special organization for defense against accidents and disasters, and we conduct comprehensive disaster drills every year.

Safety Programs for Zero Accidents

Safety management activity plans are prepared for each work place based on the concepts of creating high awareness of unsafe actions and conditions, and creating safety measures based on thorough assessments.

Safety and Environmental Assessments of Facilities

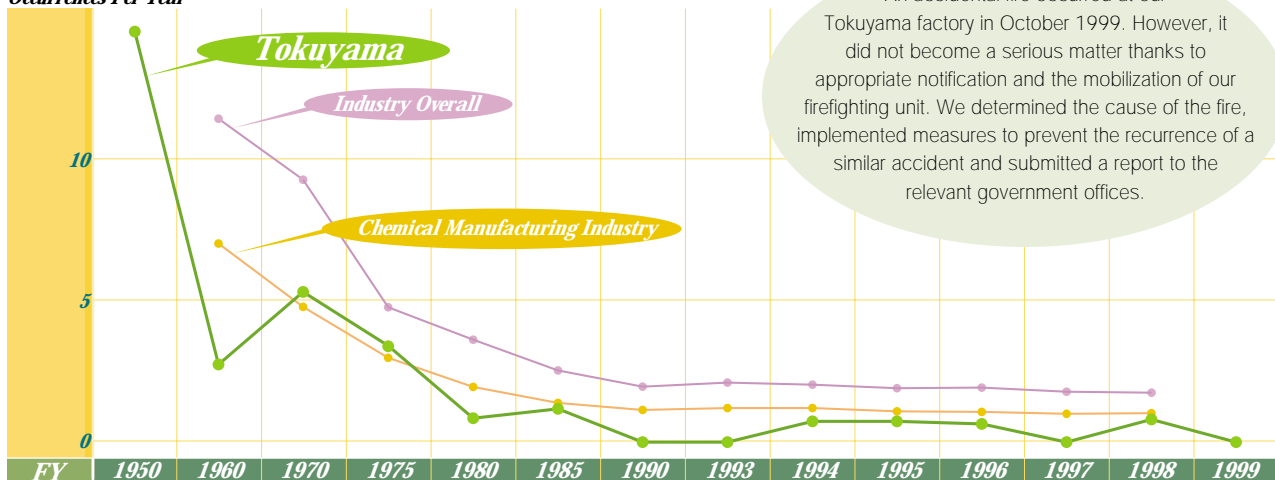
Before a facility is newly built, expanded or remodeled, safety and environmental assessments are implemented. These assessments evaluate facility design, substances handled, readiness for abnormal situations, laws and regulations, safety, environmental impact and other factors with the goal of building facilities that are easy to maintain and free of accidents.

Plant Safety Surveillance

Every year, we carry out plant safety surveillance of all of our places of business to determine whether our activities are being implemented according to plan.

Safety Record

Occurrences Per Year



An accidental fire occurred at our Tokuyama factory in October 1999. However, it did not become a serious matter thanks to appropriate notification and the mobilization of our firefighting unit. We determined the cause of the fire, implemented measures to prevent the recurrence of a similar accident and submitted a report to the relevant government offices.

RC Audits

Tokuyama prepares a Responsible Care action plan every year and carries out internal audits and surveillance in the following three areas in order to determine whether RC activities are being implemented according to plan.

1. Environmental Audit
2. Plant Safety Surveillance
3. Quality and Product Liability Audit

We also undergo external audits based on ISO14001 and ISO9000s for environmental and quality management. These audits are reported to the Japan Responsible Care Council.

Tokuyama's History of Responsible Care Activities

1991/ 9	Global Environmental Issues Committee established
1993/ 4	RC Committee established
4	Voluntary plan for overall management of environment, safety and quality enacted
1994/ 4	ISO9002 certification obtained for high-purity isopropyl alcohol
6	Arrangement for quality assurance system including product safety and labeling assessments
12	Internal Export Control Committee established
1995/ 4	Participation in Japan Responsible Care Council
1997/ 2	First edition of Responsible Care report issued
5	ISO9001 certification obtained for cement
1998/ 4	ISO9001 certification obtained for dental materials
12	ISO9001 and ISO9002 certifications obtained for aluminum nitride and precipitated silica.
12	Tokuyama factory obtained ISO14001 certification
1999/ 1	Kashima factory obtained ISO14001 certification
5	ISO9002 certifications obtained for chemical products, polypropylene, film, etc.
10	Ecological Management Initiative Dept. inaugurated
12	ISO9002 certifications obtained for polycrystalline silicon, organic solvent, etc.

Established

February 16, 1918

Headquarters

Shibuya Konno Bldg.,
3-1 Shibuya 3-chome,
Shibuya-ku, Tokyo 150-8383 Japan

Business Locations

Tokuyama factory
Kashima factory
Tsukuba Research Laboratory

Capital (As of March 2000)

JPY19.273 billion

Sales (FY1999)

JPY180.7 billion

Employees (As of March 2000)

2,540

Main Areas of Business

1. Soda ash, inorganic and organic chemicals and other chemical products.
 2. Cement, materials for civil engineering and construction.
 3. Synthetic resins, ion exchange membrane and other highly polymerized compounds.
 4. Fine ceramics, pharmaceutical and agrochemical intermediates, and dental materials.
 5. Electronic instruments, parts, and materials for them.
 6. General household goods and hygiene products.
- Manufacturing, processing and sale of items mentioned in 1-6 above.
7. Design, construction and contracting of civil engineering and construction work.
 8. Power generation and electricity supply.
 9. Collection, transportation, disposal and recycling of industrial and general waste. Sale of recycled products.
 10. Designing, manufacturing and sale of, as well as technical guidance concerning machinery, equipment and systems related to 1.-9.above, and consulting.

Tokuyama Corporation

RC Administration Division Shibuya Konno Bldg. 3-1 Shibuya 3-chome, Shibuya-ku, Tokyo 150-8383 Japan
Telephone : 03-3499-8478 FAX : 03-3499-8967 URL : <http://www.tokuyama.co.jp>
e-mail : rc-toukatsu@tokuyama.co.jp

Recycled paper

I•Promotion. 00101000
Printed in JAPAN